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1.0 PROJECT OBJECTIVES

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

Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
TADSS Facility	Classroom

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

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

1.1. SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

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

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

2.2. SITE:

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

Approximate area available 0.70 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: Roof-supported Bridge Gimbal frame (Contractor Installed)

2.4. FURNITURE REQUIREMENTS

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

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

The Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package. Reference applicable appendix for Preliminary FF&E Information including furniture dimensions sizes as shown in the Standard Design.

2.5. NOT USED

3.0 TADDS Facility

3.1 Architectural:

(See Appendix D for Facility Concept Perspectives and Appendix J for Concept Floor Plans.)

3.1.1. The project consists of an open bay two story area of approximately 12,000 SF on a single floor and a classroom space of 10,000 SF which is split between the first floor and a second floor mezzanine.

3.1.2. Accessibility: This facility is to be handicapped accessible. An accessible route is to be maintained from the POV parking in JLENS II throughout the building. A handicapped accessible elevator is to be provided.

3.1.3 Interior Finishes

Space Name	Floor	Base	Walls	Ceiling	Min. Ceiling Height
Classrooms	Vinyl Tile	Resilient	Paint	Susp. Acous.	10 feet
Instr. Offices	Carpet	Resilient	Paint	Susp. Acous.	9 feet
Storage	Concrete	Resilient	Paint	Open Struc.	10 feet
Restrooms	Ceramic	Ceramic	Paint	Susp. Acous.	8 feet
Jan. Closet	Ceramic	Ceramic	Paint	Painted Gyp.	8 feet
Mech. Room	Concrete	N/A	Paint	Open Struc.	N/A
Elec. Room	Concrete	N/A	Paint	Open Struc.	N/A
TR	Vinyl Tile	Resilient	Paint	Open Struc.	N/A
Corridors	Large Porcelain / Ceramic Tile	Tile	Paint	Susp. Acous.	9 feet
Stairs	Vinyl Tile	Resilient	Paint	Susp. Acous.	8 feet
Elevator	Carpet	Laminate Panels	Laminate Panels	Metal	7 ft 4 in
Instruc. Bays	Concrete	Resilient	See Note 1	Open Struc.	40 ft clear - See Note 2

Note 1: Instructional Bay walls are to be corrugated metal wainscot to 8 feet above finish floor and exposed structure above 8 feet at exterior walls and painted gyp board with resilient base at walls common with the Classrooms, Elevator, Storage Rooms.

Note 2: Erect Government-furnished bridge/truss/gimbal assemblies. Provide continuous support along the top chords of the rail sections to the building structure above. Provide intermediate structural members between the primary roof structure and top chords of the rail sections as required to achieve continuous support. Provide 40 foot clear height from the top chord of the rail sections to the floor below. See Appendix J for configuration of bridge/truss/gimbal assemblies to be mounted in the instructional bays. Weight of each bridge/truss/gimbal assembly is approximately 28,000 pounds. Confirm exact configuration and weight of each bridge/truss/gimbal assembly with USACE and end user prior to completion of structural design.

3.2.1 Building Components: TADSS (Refer to Appendix J for Floor Plans)

3.2.1.1. The TADSS is comprised to two components consisting of an open bay training area on one side and classrooms / instructor offices on the other side. The open bay area will be approximately 38' to 40' clear to the underside of the roof deck. The classroom / office area is located on the first floor and second floor mezzanine. The building will be of steel frame

construction with exposed steel truss structure and concrete floors. The exterior will have with a masonry wainscot base (split-face CMU or brick). Metal wall panels will be the primary facade. The classroom module contains classrooms, open offices, storage, copier area, break room, restrooms, shower, elevator, mechanical room, janitor closet, electrical room, and communication room. The open bay area consists of three bays, of which two bays will have 22' wide x 25' high overhead coiling doors on each side to facilitate drive thru convenience. Structural support between open bays will be required as a part of the construction for radar equipment installation training. Coordinate with the equipment installer for structural loading and clear areas for training equipment.

3.2.1.2. The TADSS should have an appearance that reflects the importance of company operations, readiness and training. The adjacent JLENS I TEMF project will serve as establishment of the architectural design theme for this project.

3.2.1.3. Massing: Entry designs need to address pedestrians by being sensitive to human scale in its massing. The facility should have appropriate architectural components and proportion, incorporating design detail in materials, reveals, banding, patterns and wall textures.

3.2.1.4. Form: Building form should relate to the street network, other community facilities and work centers in a way that unifies the district architecturally, while providing appropriate and convenient access. A higher central building area marks the entry, articulated with glazing for transparency and light in the interior.

3.2.1.5. Roof Style: Use a sloped, hipped, low pitch, metal roof over the primary building volume (entrance), with eave overhangs projecting at least five feet for enhanced shade and shadow. Recessed banding at the roof line provides additional scale and detail. Beyond the primary building volume, use a visually flat, low-slope roof behind a parapet wall and avoid conflicting roof forms and a cluttered appearance. Scale the height of the roof appropriately to the size of the building providing "human scale" design elements.

3.2.1.6. Wall Treatment: Use a formal, symmetrical massing, and punched fenestration on the instructional façade. Introduce shadow lines and building massing by recessing or bring forward building planes, spandrels, and window openings. Walls should have an appearance of depth rather than appearing to be flush, thin "skin". Use more than one principle wall color to accentuate and articulate the building's form. Provide and differentiate cornices, columns, spandrels, and banding.

3.2.1.7. Wall Base: The base should be masonry, split-face CMU or brick matching JLENS I Phase I TEMF. Size the base/wainscot with sensitivity to the building volume to form a significant element.

3.2.1.8. Trellises: Trellises provide shade and sun protection at the entry, while also adding architectural interest with articulation and shadow added to the building's exterior.

3.2.1.9. Color and Materials Palette: Use warm, neutral colors as the principle wall colors. Select an accent color, or colors, on building elements such as parapets, parapet caps, column caps, etc. as visual "punctuation." The roof colors may also be used as an accent color. Vary materials, colors, or textures to distinguish building masses and forms.

3.3. Structural:

3.3.1. Structural Requirements General: Structural components for this facility consist of structural steel framing, reinforced concrete foundations, and concrete slab flooring.

3.4. Electrical:

3.4.1. Electrical Infrastructure Design: Electrical service and site installation is by the contractor. Connection to the existing service to be made by Rio Grande Electrical Cooperative (RGEC).

3.4.1.1. Existing Electrical Capacity -

3.4.1.2. Existing Electrical Service: An overhead 13.2 KV power line is located along Pershing Street bordering the north side of the JLENS Site. An underground 13.2 KV line will be installed as part of the JLENS I, Phase I project as well as the THAAD I and II projects before this project begins.

3.4.1.3. Electrical Service: Connect to the secondary side of the building service transformer and extend service to building. Perform final connection to building. Extend ductbank containing three 4" diameter conduits and one 1" diameter conduit from the demarcation point shown on Exhibit E, Appendix J to the building. Coordinate with JLENS Site Contractor and USACE to confirm exact location of demarcation point and timing of installation, including access to building service transformer.

3.4.1.4 4160V Electrical Service: Provide 4160V, NEMA 4X, pad-mounted, Load-Interrupting Switchgear rated at 600A with appropriately-sized current-limiting fuse. Locate as shown in Appendix J. Connect to the secondary side of the 1000 kVA 4160V transformer. 4160V transformer is to be provided by others.

3.4.1.5. Site Lighting Power: Site lighting power will be provided by the JLENS II site lighting transformer.

3.4.1.6. Power: Other facility power requirements for TADSS are based on nonstandard TADSS design.

3.4.1.7. Cathodic Protection: Cathodic protection is required for underground metallic raceway systems.

3.4.2. Interior Electrical Systems: See Space Design Criteria below.

3.4.2.1. Building Power:

3.4.2.2. Building Lighting: Provide lighting in accordance with UFC 3-530-01 Design: Interior, Exterior Lighting and Controls. Provide maintained illumination levels as listed below. Maintained illumination levels in areas not included below shall comply with the recommendations of the IESNA Lighting Handbook.

Administration and Shop Control - 50fc

Storage and Miscellaneous Rooms - 20fc

Restrooms - 20fc

Break Rooms and Conference Rooms - 30fc

Instructional Bays - 50fc

Electrical/Mechanical Rooms - 30fc

3.4.2.3. Fire Alarms: Building construction, fire protection design for sprinkler system, fire sensor and mass notification system, exterior hose system(s), backflow preventer, fire pump, and fire department connection will be in accordance with UFC 3-600-01, NFPA 72, NFPA 13 and NFPA 20.

3.4.2.4. Flexible Wiring System for Prewired Work Stations:

3.4.2.5. Intrusion Detection Systems: Intrusion Detection, consisting of balanced magnetic switches interlocked with the key card access system, is to be installed at all exterior doors and windows. Motion detectors and CCTV are not required.

3.4.2.6. Public Address System/Mass Notification System: Provide Mass Notification in accordance with UFC 4-021-01.

3.4.2.7. Grounding: Grounding shall conform to the NFPA 70 National Electrical Code, NFPA 780 Lightning Protection Code and the Installation Information Infrastructure Architecture (I3A) Guide.

3.4.2.8. Telecommunications: The Telecommunications design shall be installed to meet the Installation Information Infrastructure Architecture (I3A) Guide and ANSI/TIA/EIA requirements.

3.5. Mechanical:

3.5.1. Mechanical Systems: Mechanical system shall be designed to accommodate partial to full occupancy with temperature control separate from other portions of the building. Equipment and airflow shall be quiet to meet noise level requirement. Each classroom must have individual temperature control.

3.6. Plumbing:

Final location of utilities for JLENS II must take into consideration the TADSS since TADSS will be located within the planned JLENS II site.

3.6.1. Domestic Water Service: Domestic water is controlled by a private utility. Domestic water lines were placed east of the site with JLENS I. JLENS II will extend these utilities west through the JLENS II site. 65 LF of 4" water service pipe will be required to extend the existing domestic water to the proposed TADSS building. A water meter will be installed on the 4" water service pipe in a vehicle protected location outside of the pavement, west of the building. The water meter is the point of service or line of demarcation between the Utility Provider (UP) and TADSS. Existing JLENS II fire hydrants are adequate to provide coverage for TADSS. No additional fire hydrants will be required off the domestic lines. It is anticipated that there is adequate capacity in the system to support this development. Cost has been estimated based on length and size of actual run(s)

3.6.2. Fire Protection Water Service: Site water is controlled by a private utility. Extensions to facilities will be required. A fire pump system was installed during the THAAD I project and lines extended through JLENS I. This site will connect into that system. 50 LF of 8" fire line will be required to extend the fire line to the proposed TADSS building. A Post Indicator Valve (PIV) will be installed on the 8" fire line in a vehicle protected location outside of the pavement, west of the building. The PIV is the point of service or line of demarcation between the UP and TADSS. It is anticipated that there is adequate capacity in this system to support this development. Cost has been estimated based on length and size of actual run(s).

3.6.3. Sanitary Sewer: Site sanitary sewer is controlled by a private utility. Extensions to facilities will be required. This site will connect into the sanitary sewer system that will be installed in JLENS II. A new sanitary sewer line will be installed in a west to east direction between the JLENS II COF and TEMF. A 6" sanitary sewer will be extended south to serve the JLENS II TEMF. A 6" service line will be extended south from that point to serve TADSS. A cleanout and an upstream oil/water separator will be required at the TADSS building. The cleanout is the point of service or line of demarcation between the utility provider and TADSS. It is anticipated that

there is adequate capacity in the existing system to support this development. Cost has been estimated based on length and size of actual run(s).

3.6.4. Natural Gas Service: Site natural gas is controlled by a private utility. New medium pressure gas lines were installed during the JLENS I project. A gas line will be installed in a west to east direction between the JLENS II COF and TEMF. A 2" gas line will need to be extended 220 LF south from that line to the TADSS building. A gas meter will be installed at the building and this meter is the point of service or line of demarcation between the UP and TADSS. It is anticipated that the existing system has adequate capacity to support this development. Cost has been estimated based on length and pipe size of actual run(s).

3.7. Sustainable Design:

See Sections 01 10 00.5.11 and 01 10 00.6.14.

3.8 Additional Project Requirements:

3.8.1. Furnishings & Equipment:

3.8.2. Information Systems Requirements:

3.8.3. Life Safety:

3.8.3.1. Provide eyewash stations, HAZMAT showers, and lightning protection.

3.9. Antiterrorism Measures:

3.9.1. Provide a minimum stand-off distance in accordance with UFC 4-101-01. The TADSS Facility will be located within the JLENS containment area. Security fencing (installed under separate contract) will surround the entire JLENS site (Battery I, II and III) upon completion of all phases.

3.4.2. Existing parking areas within the JLENS containment area will be utilized for the TADSS parking. No additional parking is required under this contract.

3.4.3. Entry and exit doors to the TADSS shall have proximity card locks.

3.10 Space Design Criteria

3.10.1 Classrooms

3.10.1.1 Provide heating, ventilation, and air conditioning.

3.10.1.2 Provide recessed floor or wall mounted raceway to provide data and power access for each student station. Provide power and data receptacles at Instructor station.

3.10.1.3 Lighting: provide switching to allow for variable lighting levels. Provide occupancy sensors in each classroom to switch lighting off automatically when not in use.

3.10.2 Instructors' Offices

3.10.2.1 Provide heating, ventilation, and air conditioning.

3.10.2.2 Provide power and data receptacles for 2 Instructors per office.

3.10.3 Copy Room

3.10.3.1 Provide heating, ventilation, and air conditioning.

3.10.3.2 Provide power for printing / copying equipment.

3.10.3.3 Provide telephone / data outlet.

3.10.3.4 Provide a built-in 34 inch high counter approximately 10 feet long with wall cabinet above and drawer base cabinet below.

3.10.4 Restrooms

3.10.4.1 Provide heating, ventilation, and air conditioning.

3.10.4.2 Provide a quantity of fixtures in accordance with the International Plumbing Code.

3.10.4.3 Provide a minimum of one floor drain with trap seal primer connection per restroom; locate floor drain outside of traffic areas.

3.10.4.4 Provide GFI-protected convenience receptacles. Provide occupancy sensors for automatic control of lighting.

3.10.4.5 Provide speaker for PA system in each restroom.

3.10.4.6 Provide countertop-mounted lavatories, floor mounted toilets, and wall-hung urinals. Provide overhead braced, solid polymer plastic toilet partitions. Provide the following toilet accessories:

- One continuous mirror full width of countertop at countertop mounted lavatories
Full length mirror
- One paper towel dispenser / waste receptacle per three toilet fixtures (minimum one per restroom)
- One soap dispenser per lavatory
- One toilet tissue dispenser per toilet
- One robe hook on the inside of each toilet partition door.
- One Sanitary Napkin / tampon vending machine at each Women's Restroom

3.10.5 Janitor Closet

3.10.5.1 Provide heating, ventilation, and air conditioning.

3.10.5.2 Provide Janitors' Sink and mop rack for three mops. Janitors Sink faucet is to be designed to support a full bucket and to have threaded end to receive hose. Provide vacuum breaker for faucet.

3.10.6 Mechanical Room

3.10.6.1 Provide plumbing as required for the functions of the space.

3.10.6.2 Provide heating for mechanical room separate from the rest of the building. Space shall be ventilated.

3.10.6.3 Provide convenience receptacles on each wall in addition to power for equipment.

3.10.6.4 Provide telephone service for energy management system and for maintenance use.

3.10.7 Electrical Room

3.10.7.1 Do not run plumbing over electrical panels.

3.10.7.2 Electrical Room shall be ventilated and cooled as required to keep equipment functioning properly.

3.10.7.3 Provide convenience receptacles on each wall.

3.10.7.4 Provide telephone service for Fire Alarm, security systems, and maintenance use.

3.10.8 Telecommunications Room (TR)

3.10.8.1 Provide a dedicated HVAC system, separate from the main building system, for year round air conditioning. The unit shall control and maintain room temperature and humidity to I3A requirements and specifications of the installed equipment. Provide positive pressure with respect to other spaces.

3.10.8.2 Provide convenience receptacles, power connections, and lighting in accordance with I3A criteria.

3.10.8.3 Provide telephone and LAN receptacles in accordance with I3A criteria.

3.10.9 Corridors

3.10.9.1 Provide heating, ventilation, and air conditioning.

3.10.9.2 Provide convenience receptacles at 50 feet on center maximum.

3.10.9.3 Provide public address speakers in corridors.

3.10.9.4 Provide room identification signage at doors to each room.

3.10.9.5 Provide overhangs or recesses at exterior doors for weather protection.

3.10.10 Stairs

3.10.10.1 Provide heating, ventilation, and air conditioning.

3.10.10.2 Minimum stair width shall be as required by applicable codes, but not less than 44 inches. The main student use stair should be no less than 48 inches wide.

3.10.10.3 Interior stairs shall be cast-in-place concrete or steel construction with concrete-filled treads. Open risers and metal grating treads are prohibited.

3.10.11 Elevator

3.10.11.1 Provide heating, ventilation, and air conditioning.

3.10.11.2 Provide STC 48 for both elevator shaft and Elevator Equipment Room.

3.10.11.3 Elevator pit shall be provided as required by code.

3.10.11.4 Elevator Equipment Room shall be ventilated.

3.10.11.5 Lightng in elevator shall be recessed down lights.

3.10.11.6 Finishes: Car door and front: satin stainless steel. Hoist way entrance doors and frames: satin finish stainless steel.

3.10.12 Instructional Bays

3.10.12.1 Provide ventilation in accordance with the criteria for "Enclosed Parking Garages" in the International Mechanical Code. Provide manual on-off operation, in addition to CO₂ and CO sensor overrides to allow for automatic operation of the ventilation system.

3.10.12.2 Provide convenience receptacles at 50 feet on center maximum.

3.10.12.3 Provide public address speakers.

4.0 APPLICABLE CRITERIA

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

4.1. INDUSTRY CRITERIA

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

Table 1: Industry Criteria

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

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

American Iron and Steel Institute	
AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members
American National Standards Institute 11 (ANSI)	
ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2	National Electrical Safety Code
ANSI/AF&PA NDS	National Design Specification for Wood Construction
American Society of Civil Engineers (ASCE)	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process

ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality
ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy (Design portion is applicable, except where precluded by other project requirements.)
ASHRAE Standard 189.1	Standard for the Design of High-Performance Green Buildings (ANSI Approved; USGBC and IES Co-sponsored) , - (APPLICABLE TO THE EXTENT SPECIFICALLY CALLED OUT IN THE CONTRACT)
American Society of Mechanical Engineers International (ASME)	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
American Water Works Association (AWWA)	
	Standards [standards for water line materials and construction]
American Welding Society	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
Architectural Woodwork Institute (AWI)	
Latest Version	AWI Quality Standards
Associated Air Balance Council (AABC)	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems

	AABC Associated Air Balance Council Testing and Balance Procedures
ASTM International	
ASTM C1060-90(Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
Builders Hardware Manufacturers Association (BHMA)	
ANSI/BHMA	The Various BHMA American National Standards
Building Industry Consulting Service International	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
Code of Federal Regulations (CFR)	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
Consumer Electronics Association	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
Electronic Industries Association (EIA)	
ANSI/EIA/TIA 568	Structured Cabling Series

ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
Federal Highway Administration (FHWA)	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL
Illuminating Engineering Society of North America (IESNA)	
IESNA RP-1	Office Lighting
IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE)	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
International Code Council (ICC)	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire</p>

	Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.
IMC	International Mechanical Code – Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1 Note: For all references to “VENTILATION”, follow ASHRAE 62.1
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.
International Organization for Standardization (ISO)	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes – infrared method
LonMark International (LonMark)	
LonMark Interoperability Guidelines	(available at www.lonmark.org), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at www.lonmark.org), including Standard Network Variable Type (SNVT) definitions
Metal Building Manufacturers Association (MBMA)	
	Metal Building Systems Manual
Midwest Insulation Contractors Association (MICA)	
	National Commercial and Industrial Insulation Standards Manual
National Association of Corrosion Engineers International (NACE)	

NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
National Electrical Manufacturers Association (NEMA)	
National Environmental Balancing Bureau (NEBB)	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
National Fire Protection Association (NFPA)	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems
NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design] Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code

NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 70E	Standard for Electrical Safety in the Workplace
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
National Roofing Contractor's Association (NRCA)	
	Roofing and Waterproofing Manual
National Sanitation Foundation, International	
NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59, 169	Food Equipment Standards
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
Occupational Safety and Health Administration (OSHA)	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction

Plumbing and Drainage Institute (PDI)	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
Precast Concrete Institute	
PCI Design Handbook	Precast and Prestressed Concrete
Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
State/Local Regulations	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements
Steel Door Institute (SDI)	
ANSI A250.8/SDI 100	Standard Steel Doors and Frames
Steel Deck Institute	
	SDI Diaphragm Design Manual
Steel Joist Institute	
	Catalog of Standard Specifications and Load Tables for Steel Joists and

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

4.2. MILITARY CRITERIA

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

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

4.2.2. Executive Order 12770: Metric Usage In Federal Government

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

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

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

4.2.5. Deleted.

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

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

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

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

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

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

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

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

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

5.0 GENERAL TECHNICAL REQUIREMENTS

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

5.1. SITE PLANNING AND DESIGN

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

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

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

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

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

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

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

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

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

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

5.2. SITE ENGINEERING

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

5.2.2. SOILS:

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

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

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

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

5.2.3.2. Parking Requirements.

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

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

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

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

5.2.5. UTILITIES: See paragraph 6.4.6 for specific information on ownership of utilities and utility requirements. Meter all utilities (gas, water, and electric, as applicable) to each facility. For Government owned utilities, install meters that are wireless data transmission capable as well as have a continuous manual reading option. All meters will be capable of at least hourly data logging and transmission and provide consumption data for gas, water, and electricity. Gas and electric meters will also provide demand readings based on consumption over a maximum of any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

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

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

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

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

5.3. ARCHITECTURE AND INTERIOR DESIGN:

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

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

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

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

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

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

5.3.5. BUILDING INTERIOR

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

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

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

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

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

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

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

5.3.6. COMPREHENSIVE INTERIOR DESIGN

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

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

5.4. STRUCTURAL DESIGN

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

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

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

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

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

5.5. THERMAL PERFORMANCE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- (a) Develop an Air Barrier Quality Control plan to assure that a competent air barrier inspector/specialist inspects the critical components prior to them being concealed. At a minimum, three onsite inspections are required during construction to assure the completeness of the construction and design.
- (b) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft² at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using both pressurization and depressurization.. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft² @ 0.3" w.g. (L/s.m² @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.
- (c) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.
- (d) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

5.6. PLUMBING

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

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

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

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

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

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

5.6.7. URINALS: Urinals shall be water-use type, conforming to ASHRAE Standard 189.1 (0.5 gpf/1.9 lpf).

5.6.8. BUILDING WATER USE REDUCTION. Reduce building potable water use in each building 30 percent from the Baseline, using the Manufacturing Performance Requirements for .Plumbing Fixtures

from the Energy Policy Act of 1992 (Public Law 102-486), except as modified by LEED. See Appendix S. Public lavatory faucets shall deliver a maximum flow rate of 0.5 gallons per minute, when tested in accordance with ASME A 112.18/CSA B125 and use that flowrate as the Baseline figure for calculating the 30 percent reduction requirement from the Baseline.

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

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

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

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

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

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

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

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

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

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

5.7.5.1. Interior Lighting:

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

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

- (c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.
- (d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.
- (e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. See Also Appendix T, Functional Area Lighting Control Strategy.
- (f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cut-off type exterior luminaries.

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

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

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

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

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

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

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

5.8.2. DESIGN CONDITIONS.

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

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

5.8.2.3. Cooling equipment may be oversized by up to 15 percent to account for recovery from night setback. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Provide ventilation air from a separate dedicated air handling unit (DOAU) for facilities using multiple single zone fan-coil type HVAC systems. Do not condition outside air through fan coil units. In Air handlers that handle outdoor air and have fans that run continuously during the occupied mode, direct expansion cooling coils may be used only if the controls and compressor technology is provided that allows the compressor to operate down to 10% of full load without utilizing hot gas bypass to minimize the potential of delivering unconditioned outdoor air to the space.

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

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

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

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System (BAS), consisting of a building control network , 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 all the heating, ventilating and air conditioning (HVAC) systems and for control of other building systems. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and use only LonMark Standard

Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

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.
- (i) Provide on board nonvolatile memory for devices accumulating energy consumption.

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

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

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

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

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

5.8.3.8. 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 Networkness and shall use the installation's basewide IP network to provide connectivity between building control systems. DIACAP, Networkness 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 (CxA), certified as a CxA by AABC, NEBB, or TABB, as described in Guideline 1.1 to perform the ASHRAE Commissioning activities. The CxA will be an independent subcontractor and not an employee of the Contractor nor an employee or subcontractor of any other subcontractor on this project, including the design professionals (i.e., the DOR or their firm(s)). The CxA will communicate and report directly to the Government in execution of commissioning activities. The Government will provide the Commissioning Authority for LEED Enhanced Commissioning. Cooperate and communicate with, fully coordinate with and provide the LEED CxA access to all necessary information and attendance in all necessary meetings and activities related to execution of enhanced commissioning. The Contracting Officer's Representative will act as the Owner's representative in performance of duties spelled out under OWNER in Annex F of ASHRAE Guideline 0. All buildings with Minimum LEED Silver (or better) requirement will earn LEED Credit EA3 Enhanced Commissioning.

5.9. ENERGY CONSERVATION

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

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

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

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

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

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

5.10. FIRE PROTECTION

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

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

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

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

5.10.5. Roof Access: Paragraph 2-9 of UFC 3-600-01 Fire Protection for Facilities will be modified in the next update to that UFC. Pending revision, comply with roof access and stairway requirements in

accordance with the International Building Code. Where roof access is required by the IBC or other criteria, comply with UFC 4-010-01, Anti-Terrorist Force Protection, Standard 14. "Roof Access".

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

5.11. SUSTAINABLE DESIGN

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.0 PROJECT SPECIFIC REQUIREMENTS FORT BLISS, TX

6.1. GENERAL

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

6.2. APPROVED DEVIATIONS

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

6.2.1. Irrigation Potable Water Use Reduction . The requirement for 100% reduction in potable water usage for irrigation in Paragraph 5.2.7.1 is waived. Instead, the requirement is to reduce irrigation potable water use 50 percent using LEED credit WE1.1 baseline, except where precluded by other project requirements.

6.3. SITE PLANNING AND DESIGN

6.3.1 General See Appendix J.

6.3.1. Site Structures and Amenities See Appendix J.

6.3.2. Site Functional Requirements:

6.3.2.1. Stormwater Management (SWM) Systems. See Appendix J.

6.3.2.2. Erosion and Sediment Control

The Texas Pollutant Discharge Elimination System (TPDES) oversees the Stormwater Sediment and Erosion Control Management Plan for the post. Comply with requirement general permit number TXR150000. See Appendix J.

6.3.2.3. Vehicular Circulation.

NOT USED

6.4. SITE ENGINEERING

6.4.1. See Appendix J.

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

6.4.3. Fire Flow Tests. See Appendix D for Results of Fire Flow Tests to use for Basis of Design for Fire Flow and Domestic Water Supply Registration. In areas under development or planned development, see Appendix D for fire flow data to be used for the basis of proposal preparation and for design in lieu of actual fire flow tests.

6.4.4. Pavement Engineering and Traffic Estimates:

NOT USED

6.4.5. Traffic Signage and Pavement Markings

NOT USED

6.4.6. Base Utility Information (See Appendix J.)

6.4.7. Cut and Fill

NOT USED

6.4.8. Borrow Material

NOT USED

6.4.9. Haul Routes and Staging Areas

6.4.9.1. A Map with available haul routes, construction water distribution point, construction entrance gate, common staging areas, landfill, and borrow areas (if applicable) is included in Appendix J.

6.4.10. Clearing and Grubbing:

Site grading will include clearing and grubbing for access drives, parking lots, and any site development

6.4.11. Landscaping:

6.4.11.1. See Appendix J.

6.4.12. Turf:

NOT USED

6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin 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 the Installation's 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 the installation's identified preferences. Implement these preferences considering the following:

- (a) Achievable within the Contract Cost Limitation
- (b) Meets Milestones within Maximum Performance Duration.
- (c) Achieves Full Scope identified in this Solicitation.
- (d) Best Life-Cycle Cost Design
- (e) Meets the Specified Sustainable Design and LEED requirements.

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

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

that the TADSS Facility should have an appearance that reflects the importance of company operations, readiness and training. See Section 01 10 00.3.2.1.2 through 01 10 00.3.2.1.9 and the rendering in Appendix F for additional guidance. Site and Architectural conceptual drawings that meet this objective are shown in Appendix J.

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. The manufacturers and materials referenced are intended to establish color only, and are not intended to limit manufacturers and material selections.

6.5.2.6. Additional architectural requirements:

(a) Install fall protection anchor points on all roofs with a slope greater than 2:12

(b) Architectural Design Objectives

a. 1. Exterior Walls: If a stucco look is desired in the Theme, use more durable materials such as EIFS or stucco-like finish on prefabricated metal panels or concrete panels. If EIFS is used, use a heavy duty reinforcing mesh around all doors and window openings, and extend a minimum 8'0" above finished floor elevation on all exterior walls. The heavy duty reinforcing mesh used on the EIFS shall have a minimum combined weight of 20 ounces per square yard and this standard can be met by using multiple layers. Use high impact mesh on all other surfaces.

2. Roof:

a. Fully adhered, single ply Hypalon 45 mil / TPO 60 mil with a white color finish is required for flat roof systems. Minimum slope for flat roof system shall be 1/4 inch in 12 inches

b. Roof Mounted Equipment: Unless specifically required in Section 3 of the Scope of Work or the standard design provided herein, do not provide roof-mounted equipment. If roof-mounted equipment is provided, use modified bitumen roofing system.

c. Roof access from building exterior is prohibited.

d. Submit a Sample Warranty Certificate and Maintenance Guidelines for government review and concurrence prior to submission of final warranty. Provide a manufacturer's standard 20 year warranty. Warrant for 100 mph wind speed.

3. Trim and Flashing

Gutters, downspouts, and fascias shall be factory pre-finished metal and shall comply with SMACNA Architectural Sheet Metal Manual. Provide for bird habitat mitigation.

4. Bird Habitat Mitigation

Provide details necessary to eliminate the congregating and/or nesting of birds at, on, or in the facility.

5. Connect boot wash drains to underground drainage.

6. Exterior Doors and Frames

- a. Main Entrance Doors: Main Entrance Doors: Aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile are preferred for entry into lobbies or corridors.
 - b. Exterior Non-Main Entrance Doors: Exterior doors and frames opening to spaces other than corridors or lobbies shall be insulated hollow metal.
 - c. Side Entrance / Exit Doors: Exterior doors and frames opening to corridors shall be insulated hollow metal and comply with ANSI A250.8/SDI 100. Fire-rated openings shall comply with NFPA 80, and the requirements of the labeling authority. Door and frame installation shall comply with applicable codes and UFC 4-010-01 requirements.
7. Exterior Doors Finish and Hardware
- a. Hardware General: All hardware in the facility shall be consistent and shall conform to ANSI/BMHA. Standards for Grade 1. Hardware finishes shall conform to ANSI/BHMA A156.18. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel). Disassembly of knob or lockset is not allowed in order to remove interchangeable core from lockset.
 - b. Key locksets for mechanical rooms, electrical closets, and Telecommunications Rooms to the existing Post Engineer Key System without key removable cores.
 - c. Auxiliary Hardware: ANSI/BHMA A156.16. Provide wall or floor stops for all exterior doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.
8. Exterior Windows:

Unless specifically required by the standard design, provide fixed windows. If the standard design requires operable windows, furnish windows with fiberglass or aluminum insect screens removable from the inside, secured with interior metal clips.

9. Exterior Louvers:

Design exterior louvers to exclude wind-driven rain, with bird screens and to withstand wind loads in accordance with the applicable codes. Wall louvers shall bear the AMCA 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 color.

10. Roof Hatches:

Roof access hatches shall be a minimum of 16 square feet in opening area, with no dimension smaller than 4'-0". Equip roof hatches with Post Engineer Master Lock on operating hardware.

11. Exterior Signage

See Appendix H for Exterior Signage requirements

12. Additional Requirements

See Appendix AA for additional architectural design requirements.

6.5.3. Programmable Electronic Key Card Access Systems: [Not Supplied - PS_Architecture : PROGRAMMABLE_KEY_CARD]

6.5.4. INTERIOR DESIGN

6.5.4.1. Interior building signage requirements: Furnish paper and software for creating text and symbols for computers for Owner production of paper inserts after project completion. Coordinate with user and installation facilities engineer (DPW). Provide Room Number and Room Function signage for all rooms, except apartment modules.

6.5.4.2. Interior Design Considerations:

- (a) Interior Partitions and Walls.
- (b) Interior Glass and Glazing: Coordinate the arrangement of fenestrations with the proposed furniture layout.
- (c) Floors:
- (d) Metal Support Systems

Non-load bearing metal studs and furring shall comply with ASTM C 645; stud gauge shall be as required by height and loading. Metal framing and furring system shall be capable of carrying a transverse load of 5psf without exceeding either allowable stress or a deflection of L/240, but shall not be less than 20 gauge. Provide galvanized finish.

- (e) Gypsum Board

Comply with ASTM C 36. Minimum panel thickness shall be 5/8 inch. Provide moisture resistant panels (glass-mat panels are preferred) at locations subject to moisture. Glass-mat gypsum panels or water-resistant "greenboard" gypsum drywall shall be used as substrate for ceramic tile wall applications except at showers where cementitious backer board shall be used. Gypsum Board systems are to be constructed using Joint treatment per ASTM C 475, screws per ASTM C 646, and drywall installation per the requirements of ASTM C 840.

- (f) Interior Doors and Frames

Provide hollow metal, flush solid core wood, or hollow core wood doors as specified below. All door frames shall be hollow metal.

1. 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; provide AWI Sound Grade hardwood face veneer for painted doors. (Transparent finished doors are preferred.)
2. Wood Doors – Provide hollow core, Type II flush doors conforming to WDMA I.S 1-A. Provide Architectural Woodwork Institute (AWI) Grade A hardwood face veneer for transparent finished doors; provide AWI Sound Grade hardwood face veneer for painted doors. (Transparent finished doors are preferred.)
3. Hollow Metal Doors: Comply with ANSI A250.8/SDI 100. Doors shall be minimum Level 2, physical performance Level B, Model 2; factory primed.
4. Hollow Metal Frames: Comply with ANSI A250.8/SDI 100. Frames shall be minimum Level 2, 16 gauge, with continuously welded corners and seamless face joints; factory primed.

- (g) Interior Door Finish Hardware:

1. Hardware General: All hardware in the facility 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. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel.)
2. Key locksets for mechanical rooms, electrical closets, telecommunications rooms (TR), and crawl spaces to the existing Post Engineer Key System, consisting of a lever with a dead bolt cylinder above passage lockset, AR-1 keyway, without key removable cores.
3. Auxiliary Hardware: ANSI/BHMA A156.16. Provide other hardware as necessary for a complete installation.
4. Locksets: Provide cylinders and cores with seven-pin tumblers for locks. Cylinders shall be products of one manufacturer, and cores shall be products of one manufacturer. Mortise cylinders, and knobs of bored locksets shall have interchangeable cores that are removable by special control keys.

Stamp each interchangeable core with a key control symbol in a concealed place on the core. Cylinders shall be fully compatible with products of the Best Lock Corporation, Arrow Lock Corporation, or Falcon Lock. Submit a core code sheet with the cores. Provide cores master keyed in one system for this project. Disassembly of knob or lockset is not allowed in order to remove interchangeable core from lockset. For interior locksets, use bored type vs. mortise lockset, to the maximum extent possible. The bored type lock will have a metal plate to prevent jimmying of lockset.

(h) Specialties And Furnishings:

1. Window Treatments: Provide aluminum horizontal mini-blinds or roller tube window shades (MechoEuroveil or equal) at all exterior glazing, except where noted otherwise. Provide roller tube window shades at clerestory windows or other difficult to access windows.

(i) Thermal Insulation: Do not install insulation directly on top of suspended acoustical panel ceiling systems.

(j) Elevators: Provide a State of Texas (or State of New Mexico, as applicable) licensed elevator inspector to inspect the elevator, test all new elevators, as applicable to the project, and to certify in writing that the installation meets all requirements.

6.6. STRUCTURAL DESIGN

6.6.1. Site Specific Loading Requirements:

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

6.6.1.2. Use ground snow load of 5psf.

6.6.1.3. Use frost penetration of zero inches.

6.6.1.4. Use the following seismic acceleration parameters for mapped Maximum Considered Earthquake spectral response at short periods and at 1-second period, respectively: Ss: 31 (%g) and S1: 10 (%g).

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

6.7. THERMAL PERFORMANCE

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

6.8. PLUMBING

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

6.8.2. Cross Connection Control: See the Fort Bliss Cross Connection Control Manual, located in Appendix E, for specific requirements for cross connection control and backflow prevention.

6.8.3. Provide gas plumbing for GF Clothes dryers (provided by others).

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

- 6.8.5. Natural Gas Supply: Furnish standard gas pressures from building regulator of 8-15 ounces, 2 psi or 5 psi.
- 6.8.6. Gas Regulator Venting: Vent all gas regulators in building to the outside
- 6.8.7. Exterior Water Piping Freeze Protection: Design seasonally (not used in winter) utilized water supply piping for complete drain down including interior or below grade isolation valve. Insulate exposed water piping that is utilized year round and heat trace and protect with pipe jacketing to ensure that the piping will not freeze.
- 6.8.8. Fixture Faucet Mixing Valves: Provide single handle type mixing faucet valves with seals and seats combined into one replaceable cartridge; the cartridge shall be designed to be interchangeable between lavatories, bathtubs, kitchen and bar sinks, etc. or provide replaceable seals and seats that are removable either as a seat insert or as a part of a replaceable valve unit. Approved manufacturers are Delta, Kohler, Price Pfister, Crane.
- 6.8.9. Use automatic infrared metered-flow faucets at lavatory sinks in public areas.
- 6.8.10. Not Used
- 6.8.11. Provide cast iron valve boxes and covers. Water meter vaults shall have covers weighing 20 lbs or less or shall have a closeable opening in the cover directly above the meter to allow reading of the meter. Distance from top of cover to top of water meter consumption reading (dial) shall be less than 18 inches.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

- 6.9.1. Exterior Lighting: Exterior site and area lighting, including lighting for parking areas, roadways, walkways, and ball courts shall be high pressure sodium, except compact fluorescent lighting shall be acceptable for walkway lighting. Photo control devices for exterior lighting shall conform to ANSI C136.10 and shall have an adjustable operation range of approximately 0.5 to 5.0 footcandles.
- 6.9.2. Utility Metering: Provide Watt Node Plus LON Electric Power meter or equal. Provide pulse meter for gas and water. Provide a legibly and indelibly printed multiplier on the face of the meter. Wiring for UMCS system shall be compatible with Fort Bliss system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Gas Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Electric Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Water Meter for use by the UMCS system
- 6.9.3. Exterior Communications: Install communications infrastructure as required by the drawings in Appendix J. Cable TV is to be included in the Site Communication duct bank. Coordinate with Fort Bliss DOIM / NEC Plans Office.
- 6.9.4. Corrosion Control: Obtain the services of a "corrosion expert" to design, supervise, inspect, and test the installation and performance of the cathodic protection system. "Corrosion expert" refers to a person, who by thorough knowledge of the physical sciences and the principles of engineering and mathematics, acquired by professional education and related practical experience, is qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. Such a person must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes 5 years experience in corrosion control on underground metallic surfaces of the type under this contract. The corrosion expert shall obtain soil resistivity data, acknowledging the type of pipeline

coatings to be used and reporting to the Contractor the type of cathodic protection required. Use sacrificial anode type cathodic protection.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1. Facility Telecommunications systems:

6.10.1.1. Telephone and Local Area Network (LAN):

- (a) All equipment racks shall have both vertical and horizontal cable management.
- (b) Line all walls in the telecommunications rooms with 4' X 8' X 3/4" plywood, painted flat white. All plywood shall be fire-rated and the fire-retardant stamp are shall remain unpainted and open to view. Provide a ladder type cable tray around the perimeter of the telecommunications room and from the perimeter ladder tray to the 19" communications rack. Mount the ladder cable tray 7-1/2 feet above finished floor. Install all horizontal cabling into the TR in this cable tray routing them around the room and into the 19" rack.
- (c) Terminate the incoming fiber optic cable on a 19" twelve port single mode fiber optic patch panel with SC type connectors.
- (d) No construction deviations in the communications system from the accepted design will be permitted without prior Government review and concurrence.
- (e) Submit a detailed test plan for all the cable plant installation for government review and concurrence. Include information on the test equipment and its calibration documentation.
- (f) Feed all electrical circuits within a TR from an electrical panel installed within that room.
- (g) Provide a 1" conduit from the electrical panel in the TR to outside of the building for future commercial cable television power. Provide a 2" conduit (adjacent to the 1" conduit) from the TR to outside of the building for future commercial cable television service entrance.
- (h) Terminate Single-Mode and Multi-Mode Fiber Optic cables on separate patch panels.
- (i) Terminate voice and data cables on separate patch panels located in the same equipment rack. Install voice patch panels in the copper equipment rack or cabinet.
- (j) All raised flooring shall have a cable tray management system in compliance with UFC 3-580-01 under the floor for communications cabling. Submit a cable management plan showing cable routing and cable management system installation for review and concurrence prior to commencement of work.
- (k) Install the horizontal cabling conduit from the outlet box, extending to the cable tray. The use of J-hooks is not permitted without prior written approval.
- (l) Terminate exterior communications drops for testing purposes and cover with a blank weatherproof faceplate.
- (m) Use green insulation on all bonding jumpers, regardless of size.
- (n) Floor mount communications and power drops to be used by modular furniture including those for modular furniture near a wall. Submit a communications and power plan showing locations of communications and power drops superimposed over modular furniture plan with the interim and final design packages.
- (o) Manholes shall be splayed type communications MH's with preinstalled terminators and internal grounding.
- (p) Provide lockable, waterproof CMH covers. Submit for approval prior to use in accordance with Fort Bliss Force Protection Standards.
- (q) Use the following color scheme for Telecommunications wiring and voice/data jacks:
NIPRNET – Green

SIPRNET – Red

TACNET – Yellow

Voice - Gray

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

6.10.3. Closed Circuit TV (CCTV): Provide and install a conduit system to support CCTV throughout the designated spaces. Conduit system shall include but not limit to conduits, pull boxes, and pull wires. Route all conduits for CCTV signals back to the designated monitoring room. As part of the Interim Design Review, present the proposed Floor Plan to representatives of Fort Bliss and 1AD Security personnel to identify specific locations of security cameras, location of monitoring room, conduit routing, and system details.

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

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

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

6.10.7. Not Used

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

6.10.9. Control exterior security lighting by a switch and photocell.

6.10.10. Not Used

6.10.11. Where SIPRNET is required, the USAISEC-FDED SIPRNET Team will determine and engineer the SIPRNET.

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1. General: The existing UMCS is LonWorks Open.

6.11.2. System Selection: Current local utility rates for gas, electric, water and sewer are contained in Appendix K. These are rates paid by Fort Bliss to the local utility providers and are for use in LEED energy cost calculations. Provide CO2 sensors in return air stream to minimize the amount of outside air required to satisfy ASHRAE 62.1 requirements for building Indoor Air Quality. Provide one CO2 sensor per HVAC zone. Installation infrastructure has insufficient capacity to support use of electric HVAC systems. Provide gas-fired and/or renewable energy sources for heating.

- 6.11.3. Communication Rooms: Air condition communications equipment rooms to space comfort conditions as per applicable criteria by separate year round direct expansion cooling systems.
- 6.11.4. Mechanical Room Ventilation: Automatically ventilate mechanical, fire protection, electrical, and storage spaces to limit space temperatures to 10 degrees F above design outdoor air temperature.
- 6.11.5. Equipment Coordination: For Variable Air Volume (VAV) systems, limit size of any individual VAV box to approximately 2500 cfm to promote better zoning and fit of equipment to space available. Coordinate all mechanical systems and equipment with space available to prevent conflict with other building systems.
- 6.11.6. UMCS Base-wide System and Building Control Interface: A base-wide UMCS/EMCS system has been installed as part of a separate contract. Provide a 3/4" conduit with CAT VI cable from the EMCS router to the nearest comm room for connection to the building LAN. Integration to the base-wide system shall be done under separate contract and is not part of this scope of work. The building shall be capable of running stand alone until such time it is integrated into the base-wide system. Energy saving controls are desired such as schedule start/stop, optimized start/stop, occupancy sensors, etc. Locate AC control panels and routers in the Mechanical Room.
- 6.11.7. Existing IP Network: Existing IP network consist of Gig-backbone: 10/100MB to the user, 1GB between the end user building and ADN, and a 10GB core backbone.
- 6.11.8. Network Media: Existing network media consist of single-mode fiber optic.
- 6.11.9. Head-end hardware/Software location: Location of head-end UMCS hardware/software will be in Bldg. 777.
- 6.11.10. Water Quality Analysis and Treatment: Water quality for Fort Bliss and surrounding area is 'hard'. Treatment will be required for use as make-up water in HVAC equipment. Water Quality Analysis reports are inserted as Appendix DD. Additional water analysis data from water treatment contractor (POC: Gary Hamilton, Delta Water Laboratories, 915-892-8227) are as follows:
- Chlorides: 70 ppm
 - P Alkalinity: 0 ppm
 - M Alkalinity: 100 ppm (Total alkalinity)
 - Total Hardness: 130 ppm (CaCO₃)
 - ph: 7.89
 - Silica: 4 to 7 ppm (Can go as high as 11 ppm)
 - Iron: 0.01- 0.5 Reactive
 - Total Dissolved Solids: 475 to 680 ppm
- Coordinate with water treatment contractor to confirm above data and current water treatment methods to obtain the required quantity and types of chemicals to be initially introduced into the closed loop heating and chilled water systems. Material Safety Data Sheets for current Ft. Bliss DPW chemical treatment method for hydronic water systems (Boiler heating hot water and chilled water) are contained in Appendix EE (Corrshield NT402).

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

6.11.12. Not Used

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

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

6.11.15. HVAC system preferences and requirements are:

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

(b) Mechanical and Fire Protection Room Heating and Ventilation; It is preferred that main mechanical and/or fire protection equipment spaces be heated with gas or hydronic unit heaters.

6.11.16. Piping Materials: Do not use Type M copper.

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

6.12. ENERGY CONSERVATION

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

[Not Supplied - PS_EnergyConservation : RENEWABLE_ENERGY_FEATURES]

6.13. FIRE PROTECTION

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

- 6.13.2. HVAC Equipment Restart: After a fire alarm shut-down is cleared at fire alarm panel, affected mechanical equipment shall automatically restart.
- 6.13.3. Sprinkler Freeze Protection: Provide temperature sensor and alarm to notify fire department of possible freezing conditions for wet pipe sprinkler systems in spaces where heat may not be available due to being unoccupied or heating system may have failed.
- 6.13.4. Riser Location: Install fire risers in dedicated space or mechanical room with external access for fire department.
- 6.13.5. Provide and install a Fire Department Connection near the street curb, PIV, and fire hydrant. Coordinate exact location of Fire Department Connection with LDE and Fort Bliss Fire Department.
- 6.13.6. Fire Sprinkler Backflow Prevention: Backflow prevention shall be in accordance with the Fort Bliss Cross-Connection Control Manual. This requirement may be more stringent than the requirement in UFC 3-600-01.
- 6.13.7. Fire Alarm System:
- 6.13.7.1. The RF Transceiver shall be compatible with the Fire Department receiving system, operating on an RF frequency.
- 6.13.7.2. The RF transceiver shall be a Monaco BT-XM or approved equal operating on a frequency of 165.0625 MHZ.
- 6.13.7.3. The Fire alarm receiving system is a Monaco D-21 system.
- 6.13.7.4. The information sent to the Fire Department receiving system shall be zone by zone information.
- 6.13.7.5. All tamper devices shall be sent to the D-21 system as a supervisory tamper.
- 6.13.7.6. All initiating devices shall be connected, Style D, to signal line circuits (SLC), Style 6.
- 6.13.7.7. All alarm appliances shall be connected to notification appliance circuits (NAC), Style Z.
- 6.13.7.8. Provide photoelectric smoke detectors with 2.5% obscuration, pigtails for permanent connections, continuous power indicator light, test button, and metal base.
- 6.13.7.9. RF transceiver shall be equipped with a directional antenna.
- 6.13.7.10. Fire alarm pull boxes shall be of metal construction, dual-action, and key operable.”
- 6.13.8. Provide keyed alike fire alarm panels, keys C415A, 17021, & PK625; C415 for MNS panels. PK625 on manual pull stations. Sample keys are available from Fort Bliss Fire Department upon request..
- 6.13.9. Not Used.
- 6.13.10. Do not use glass or lockable doors in fire extinguisher cabinets.
- 6.13.11. Mass Notification System. Mount a speaker system on the exterior of the building that will cover a 16' wide area around the perimeter of the buildings.

6.13.11.1. Connect the MNS to the Fort Bliss Fire Alarm System utilizing the Monaco BT-XM All equipment must be compatible with the existing Monaco D21 Central Receiving Unit utilized by the Fort Bliss Fire Department.

6.13.11.2. Program the following 8 pre-recorded messages into the system:

(a) MESSAGE #1. Label message "Fire". Five seconds of siren are played, followed by the message:

"Attention, attention. A fire emergency has been reported. Please leave the building using the nearest exit or exit stairway. "Do not use the elevators if installed within this facility".

(b) MESSAGE #2. Label message "Severe Weather." Five seconds of 100-kHz steady tone are played, followed by the message:

"This is the Fort Bliss Installation Operations Center. The National Weather Service has issued a severe weather alert for this area. Turn on your radios or televisions for the latest update and take required action. Again, this is the Fort Bliss Installation Operations Center. The National Weather Service has issued a severe weather alert for this area. Turn on your radios or televisions for the latest update and take required action.

(c) MESSAGE #3. Label message "Bomb" A horn sound is played for 5 seconds, followed by the message:

"Attention, attention. This building has received a bomb threat. All personnel are to evacuate immediately using the nearest exit and to report to our designated re-assembly area for accountability and additional instruction. Again, this building has received a bomb threat. All personnel are to evacuate immediately using the nearest exit and to report to our designated re-assembly area for accountability and for additional instruction.

(d) MESSAGE # 4. Label message "Shelter In Place" Three 1-kHz tones (one second each) are played, followed by the message:

"Attention, attention. All personnel "shelter in place". Turn off fans, heating, ventilation and air condition systems. Close all doors and windows and remain indoors until the "All Clear" announcement is given."

(e) MESSAGE #5. Label message "FPCON C" Three seconds of HI/LOW tones, followed by the message:

"Attention, attention. Fort Bliss is now at FPCON Charlie. Implement FPCON Alpha, Bravo and Charlie security plans immediately. Again, Fort Bliss is now at FPCON Charlie. Implement FPCON Alpha, Bravo and Charlie security plans immediately and stand by for additional information from the Fort Bliss Installation Operation Center.

(f) MESSAGE # 6. Label message "FPCON D" Three seconds of HI/LOW tones, followed by the message:

"Attention, attention. Fort Bliss is now at FPCON Delta. Implement all FPCON security plans, Alpha through Delta immediately. Again, Fort Bliss is now at FPCON Delta. Implement all FPCON security plans, Alpha through Delta immediately and stand by for additional information from the Fort Bliss Installation Operation Center.

(g) MESSAGE #7. Label message "All Clear". Five seconds of chime sound are played, followed by the message:

"The emergency has now ended. Please resume normal operations. Thank you for your cooperation."

(h) MESSAGE #8. Label message "Test" A 1-kHz tone is sounded for 2 seconds, followed by the message:

“May I have your attention, please? This is the Fort Bliss Installation Operations Center conducting a test of the mass notification system. Repeat, this is only a test.”

6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. Execute the project using LEED-NC Version 3.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: None..

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

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

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

MR Credit 2 Construction Waste Management.

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

Regional Priority Credits (Version 3 only)

The project zip code is 79906.

See LEED Multiple Contractor Responsibilities Table(s) for additional information.

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

6.14.7. Multiple Contractor Combined Project. When site work and building(s) are accomplished by separate contractors, it is a Multiple Contractor Combined Project for purposes of LEED scoring and documentation. This project is part of a Multiple Contractor Combined Project that includes site work and building(s) accomplished by separate contractors. See Appendix LEED Requirements for Multiple Contractor Combined Projects and Appendix LEED Multiple Contractor Responsibilities Table(s) for special requirements for this project.

6.14.8. Additional Information

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

6.14.8.2 Appendix M contains a modified LEED v3.0 Registered Project Checklist. This checklist identifies:

- 1) those specific Credits/Prerequisites that the DB Contractor must provide, listed in the "Y DB" column,
- 2) those Credits/Prerequisites that the Government will provide, listed in the "Y GOV" column,
- 3) those specific credits that the DB Contractor may provide above and beyond those required (applies only to Energy and Atmosphere Credit 1, where 6 credits are required by other Army Regulations, but an additional 4 credits may be achievable at the DB Contractor's option) listed in the "? D/B" column,
- 4) those Credits that the Government may provide, but should not be considered by the DB Contractor, listed in the "? GOV" column, and
- 5) those Credits that the DB Contractor is prohibited from pursuing, listed in the "NO" column.

6.14.8.3 In addition to the 30 specific Credits that the DB Contractor is required to provide by the Checklist in Appendix M, achieve an additional 19 credits to be selected by the DB Contractor.

6.14.8.4 Provide documentation for design and construction LEED Credits, regardless of LEED Credit responsibility called out in the LEED Credit Worksheet in Appendix M.

6.14.8.5 Statement in para 5.8.5 that all buildings with minimum LEED Silver (or better) requirement must earn LEED Enhanced Commissioning credit does not apply to this project. Work as described in that paragraph is required but because required CA contractual relationship may not be acceptable to GBCI for LEED certification earning of this credit is not required. Do not include credit EA3 in the minimum overall project points. Upload all documentation for EA3 to LEED Online.

6.14.8.6 In addition to the requirements stated elsewhere in this RFP, consider including the energy enhancements listed in Appendix JJ in the project. Include the rationale for not including any of these energy enhancements in the Design Analysis.

6.15. ENVIRONMENTAL

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

6.15.2. The impacts of the Fort Bliss Expansion have been adequately addressed in the Fort Bliss, Texas and New Mexico Mission and Master Plan Programmatic Environmental Impact Statement (MMPEIS). The environmental documents that apply to this task order are the City of El Paso Rule Regulation #9 (available at http://www.epwu.org/PDF/rules_regs.pdf), as well as the following documents included in Appendix E: Potable Regulatory Policy (Policy Letter #16, Cross connection control manual for Fort Bliss, Installation environmental Noise Management Plan, Installation hazardous waste management plan, and the Cost Schedule for Hazmat disposal. Comply with all Federal, State, and Local environmental requirements.

6.16. PERMITS

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

6.16.2. See Appendix FF for Fort Bliss Access Control Policy

See Appendix FF for information on Fire Prevention Contractor's Guide and Standard Excavation Request.

6.17. DEMOLITION

6.17.1 See Appendix E.

6.18. ADDITIONAL FACILITIES

N/A.

End of Section 01 10 00.0016

**SECTION 01 33 00.0016
SUBMITTAL PROCEDURES
(DESIGN-BUILD TASK ORDERS)**

1.0 GENERAL

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

1.14. INFORMATION ONLY SUBMITTALS

1.0 GENERAL

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

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred. The Government will retain zero(0) copies of the submittal and return zero(0) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain zero(0) copies of information only submittals.

End of Section 01 33 00.0016

**SECTION 01 33 16
DESIGN AFTER AWARD**

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

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3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

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

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

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

1.2. DESIGNER OF RECORD

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

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

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

3.1.2. Post Award Conference

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

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

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

3.1.3. Partnering & Project Progress Processes

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

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

3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in

the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

3.1.5. Pre-Construction Conference

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

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

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

3.2.1. Site/Utilities

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

3.2.2. Interim Design Submittals

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

over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

3.2.3. Over-the-Shoulder Progress Reviews

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

3.2.4. Final Design Submissions

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

3.2.5. Design Complete Submittals

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

3.2.6. Holiday Periods for Government Review or Actions

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

3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is

over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

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

3.3.2. Tracking Design Review Comments

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

3.3.3. Design and Code Checklists

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

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

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

3.4.2. Procedures

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

3.4.3. Conference Documentation

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

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

3.5. INTERIM DESIGN REQUIREMENTS

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

3.5.1. Drawings

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

3.5.2. Design Analyses

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

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

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

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jambs, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

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

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

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

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.
- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.

(d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.

(e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

(a) List all references used in the design.

(b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.

(c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.

(d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

(a) List all criteria codes, documents and design conditions used.

(b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

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

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

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

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

3.5.3. Geotechnical Investigations and Reports:

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

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

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

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

3.5.4. LEED Documentation:

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

indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

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

3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

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

3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources. Use only one source. Examples include specifications from MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. The UFGS are available through the "Whole Building Design Guide" website, using a websearch engine. Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected

specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information). Note that the UFGS are NOT written for Design-Build and must be edited appropriately. For instance, they assume that the Government will approve most submittals, whereas in Design-Build, the Designer of Record has that action, unless this Solicitation requires Government approval for specific submittals. The Designer of Record should also note that some UFGS sections might either prescribe requirements exceeding the Government's own design standards in applicable references or contain requirements that should be selected where appropriately required by the applicable references. At any rate, where the UFGS are consistent with other major, well known master commercial guide specifications, then generally retain such requirements, as good practices.

3.5.7. Building Rendering

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

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

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

3.5.8. Interim Building Design Contents

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

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

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

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

3.5.8.4. Structural Systems. Include:

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

3.5.8.5. Plumbing Systems

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

3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
 - (1) Room designations.
 - (2) Mechanical legend and applicable notes.
 - (3) Location and size of all ductwork and piping.
 - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
 - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
 - (6) Paint Preparation Area (where applicable to project scope)
 - (7) Exhaust fans and specialized exhaust systems.
 - (8) Thermostat location.
 - (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
 - (10) Location of all air handling equipment.
 - (11) Air balancing information.
 - (12) Flue size and location.
 - (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
 - (1) Capacity
 - (2) Electrical characteristics
 - (3) Efficiency (if applicable)
 - (4) Manufacturer's name
 - (5) Optional features to be provided
 - (6) Physical size
 - (7) Minimum maintenance clearances

- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

3.5.8.7. Fire Protection and Life Safety.

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

3.5.8.8. Elevators. Provide:

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

3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
 - (1) Room designations.
 - (2) Electrical legend and applicable notes.
 - (3) Lighting fixtures, properly identified.
 - (4) Switches for control of lighting.
 - (5) Receptacles.
 - (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
 - (7) Service entrance (conduit and main disconnect).
 - (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.

- (c) Load Center Panelboard Schedule(s): Indicate the following information:
- (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting).
 - (2) Branch Circuit Designations.
 - (3) Load Designations.
 - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
 - (5) Branch Circuit Connected Loads (AMPS).
 - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
- (1) Fixture Designation.
 - (2) General Fixture Description.
 - (3) Number and Type of Lamp(s).
 - (4) Type of Mounting.
 - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

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

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

- (a) Telecommunications Cabling

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

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

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

3.7. FINAL DESIGN REQUIREMENTS

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

3.7.1. Drawings

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

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

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

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

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

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

All CAD files shall be fully compatible with AutoCAD 2000 or higher. Save all design CAD files as AutoCAD 2000 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Autodesk Revit 9.0 or higher file formats.

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

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

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

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

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

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

3.7.2. Design Analyses

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

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

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

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

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

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

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

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

3.7.6. Acceptance and Release for Construction

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

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

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR

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

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

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

Activity and Address	Drawing Size (Full Size) [Not Supplied - SubmittalReqDistribution : FULL SIZE] Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) [Not Supplied - SubmittalReqDistribution : HALF SIZE] Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & .dwg)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attachment F)
Commander, U.S.Army Engineer District Fort Worth	0/0	0/0	0/0	0	1	0	0
Commander, U.S.Army Engineer District, Center of Standardization [Not Supplied - SubmittalReqDistribution : COS]	0/0	0/0	0/0	0	N/A	0	0
Installation	0/0	0/0	0/0	0	2	0	0

Activity and Address	Drawing Size (Full Size) [Not Supplied - Submittal Required : FULL SIZE] Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) [Not Supplied - Submittal Required : HALF SIZE] Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & .dwg)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attachment F)
U.S. Army Corps of Engineers Construction Area Office	0/0	0/0	0/0	0	1	0	0
Information Systems Engineering Command (ISEC)	0/0	0/0	0/0	1	*Partial Set (Work Station/System Furniture- IT Details)	N/A	1
Huntsville Engineer & Support Center, Central Furnishings Program	N/A	N/A	N/A	N/A	1 Interim/Refer to attachment B for the final submission Qty	N/A	N/A
Other Offices	0/0	0/0	0/0	0	N/A	0	0

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

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

3.9.2. Web based Design Submittals

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

to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to zero (0) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

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

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

3.10. AS-BUILT DOCUMENTS

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

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

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

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

2.1. FORMAT AND SCHEDULE

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

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

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

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

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

2.1.2. Interior Color Boards

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

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

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

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

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

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim
- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

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

2.1.3. Exterior Color Boards

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

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

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

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

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

2.2.2. Finish Color Schedule

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

2.2.3. Interior Finish Plans

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

2.2.4. Furniture Footprint Plans

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

2.2.5. Interior Signage

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

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

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

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

1.1. FORMAT AND SCHEDULE

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

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

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

Submit four copies of the final and complete FF&E information and samples in 8 1/2" 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 1/2". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

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

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

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

1.1.2. Furniture Order Form

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

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) GSA Contract Number, Special Item Number (SIN), and contract expiration date
- (f) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (g) Finish name and number (code to finish samples)
- (h) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (i) Dimensions
- (j) Item location by room number and room name
- (k) Quantity per room
- (l) Total quantity
- (m) Special instructions for procurement ordering and/or installation (if applicable)
- (n) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
 - (1) required features and characteristics
 - (2) ergonomic requirements
 - (3) functional requirements
 - (4) testing requirements
 - (5) furniture style
 - (6) construction materials
 - (7) minimum warranty

The following is an example for "m" features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:

- a. Arm Height: 6" - 11" (+-1/2")
- b. Arm Width: 2"– 4" adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16"-21" (+- 1")
- (7) Sliding Seat Depth Adjustment 15"-18" (+-1")
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
 - a. Overall width: 25" - 27"
 - b. Overall depth: 25"– 28"
- (10) Must have a minimum of the following adjustments (In addition to the above):
 - a. 360 Degree Swivel
 - b. Knee-Tilt with Tilt Tension
 - c. Back angle
 - d. Forward Tilt
 - e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)

- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

1.1.3. Manufacturer & Alternate Manufacturer List

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

1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be used in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on

drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

1.2.2. Workstation Plans

Show each typical workstation configuration in plan view. In addition, provide either elevations or an isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view. In addition, provide either elevation or an isometric view and identify components to clearly represent each desk configuration.

1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

1.3. FURNITURE SELECTION

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

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

1.4. CONSTRUCTION

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

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

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

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

1.5. FINISHES AND UPHOLSTERY

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

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture 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 commercial appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as commercial appliances, etc. for space planning purposes.

1.8. SUSTAINABILITY

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

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

1.9. FURNITURE SYSTEMS

1.9.1. General.

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

1.9.2. Connector Systems.

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

1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

1.9.4. Electrical And Information/Technology (IT)

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

1.9.5. Pedestals

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

1.10. EXECUTIVE FURNITURE

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

1.10.2. Specify furniture with wood veneer finish with mitered solid wood edge of same wood type. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

1.11. SEATING

1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. All task seating shall support up to a minimum of 250 lbs.

1.11.2. Desk and Guest Seating

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

1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted.

Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

1.11.4. Lounge, Waiting and Reception Area Seating

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

1.11.5. Break Room Seating

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

1.12. FILING AND STORAGE.

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

1.13. TRAINING TABLES.

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

1.14. FURNITURE WARRANTIES.

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

Furniture System, unless otherwise noted – 10 year minimum
Furniture System Task Lights – 2 year minimum, excluding bulbs
Furniture System Fabric – 3 year minimum
Wood Desks - 10 year minimum

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

Tables, unless otherwise noted - 10 year minimum
Table Mechanisms – 5 year minimum
Table Ganging Device - 1 year minimum
Items not listed above - 1 year minimum

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

1.0 General

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government and Contractor reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate for the review conference exactly what action will be taken or why the action is not required. After the design review conference and prior to the next design submittal for the package, the DOR's will annotate those comments that require DOR action, design revision, etc. to show how and where it has been addressed in the design documents, This shall be part of the required design configuration management plan. Comments considered critical by the conference participants shall be flagged as such.

2.0 DrChecks Review Comments

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and resolved prior to the next submittal. Print and include the DrChecks comments and responses and included in the design analysis for record in the next design submittal for that package.

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

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

2.3. After the conference, the DOR(s) shall formally respond to each applicable comment in DrChecks a second time prior to the next submittal, clearly indicating what action was taken and what drawing/spec/design analysis changed. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next submittal, reviewers will back-check answers to the comments against the new submittal, in addition to reviewing additional design work.

2.4. Clearly annotate in DrChecks those comments that, in the DB Contractor's opinion, require effort outside the scope of the contract. Do not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

3.0 DrChecks Initial Account Set-Up

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

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

4.0 DrChecks Reviewer Role

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

- 4.1. Log into DrChecks.
- 4.2. Click on the appropriate project.
- 4.3. Click on the appropriate review conference. An Add comment screen will appear.
- 4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.
- 4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.
- 4.6. Once comments are all entered, exit DrChecks by choosing "My Account" and then Logout.

5.0 DrChecks Comment Evaluation (Step 1 of 2)

The role of the DOR(s) is to evaluate and respond to the comments entered by the Government's and DB Contractor's reviewers. To respond to comments:

- 5.1. Log into DrChecks.
- 5.2. Click on the appropriate project.
- 5.3. Under "Evaluate" click on the number under "Pending".
- 5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)
- 5.5. Select the appropriate evaluation radio button (concur, non-concur, for information only, or check and resolve) and respond with a brief explanation in the Discussion field. An explanation other than to say "concur" is not necessary for "Concur", but may be useful for the Design Configuration Management purposes.
- 5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.
- 5.7. Once evaluations are all entered, exit DrChecks by choosing "My Account" and then Logout.

6.0 DrChecks Comment Evaluation (Step 2 of 2)

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

7.0 DrChecks Back-Check

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

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

- 7.1. Log into DrChecks.
- 7.2. Click on the appropriate project.
- 7.3. Under "My Backcheck" click on the number under "Pending".
- 7.4. If you agree with the designer's response select "Close Comment" and add a closing response if desired.
- 7.5. If you do not agree with the designer's response or the submittal does not reflect the response given, select "Issue Open", enter additional information.
- 7.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.
- 7.7. Once back-checks are all entered, exit DrChecks by choosing "My Account" and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

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

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
 - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
 - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
 - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
 - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification
IBC chapters 3 and 4
- 1.4. Construction Type
IBC chapter 6
- 1.5. Area Limitations
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas
IBC section 503, 505
- 1.7. Allowable area increases
IBC section 506, 507
- 1.8. Maximum Height of Buildings
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
 - 1.11.1. Exterior Walls - [] hour rating, IBC table 601, 602

- 1.11.2. Interior Bearing walls - [] hour rating
- 1.11.3. Structural frame - [] hour rating
- 1.11.4. Permanent partitions - [] hour rating
- 1.11.5. Shaft enclosures - [] hour rating
- 1.11.6. Floors & Floor-Ceilings - [] hour rating
- 1.11.7. Roofs and Roof Ceilings - [] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
- 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
- 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [], etc.)
- 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
- 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
- 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
- 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment
Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
- 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [] hour rating. IBC Table 302.1.1
- 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.

- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress
- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

Signature and Stamp

Date

OR

Architect of Record:

Signature and Stamp

Date

Mechanical Engineer of Record:

Signature and Stamp

Date

Electrical Engineer of Record:

Signature/Date

**ATTACHMENT E
LEED SUBMITTALS**

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

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

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

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

CATEGORY 3 – ENERGY AND ATMOSPHERE

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

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

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

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

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

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

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

INNOVATION & DESIGN PROCESS

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

ATTACHMENT F
Version 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 [Not Supplied - SubmittalReqDistribution : FULL_SIZE] size, suitable for half-size scaled reproduction.

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. “Facility Data” is defined as associated intelligent attribute data. The “Model” is defined as 3D graphics that includes Facility Data and output as described in the paragraph ‘Output’ below. Contractors will use the Model to produce accurate Construction Documents. All submitted BIM Models and associated Facility Data shall be fully compatible with Autodesk Revit 9.0 or higher

2.1.1. Reference. Refer to ERDC TR-06-10, “U.S. Army Corps of Engineers Building Information Modeling Road Map” from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE Fort Worth District, 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 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. Check 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, and CAD Data files.

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

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

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

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Fort Worth District BIM Manager will 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. 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. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

5.0 Section 5 - Ownership and Rights in Data

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

6.0 Section 6 – Contractor Electives

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

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

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

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

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

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

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

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible,

though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

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

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

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

7.0 Section 7 – BIM Project Execution Plan Template

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

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

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table.

The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

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

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

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

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

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

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

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

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

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

1.2. PAYMENT

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

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

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

3.2. QUALITY CONTROL PLAN

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

3.2.1. Content of the CQC Plan

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

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

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

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

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

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

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

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

3.2.1.8. Reporting procedures, including proposed reporting formats.

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

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

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

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

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

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

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

3.2.2.4. Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. Include the DCM plan as a subset of the DQC Plan. See Section 'Design After Award'.

3.2.3. Acceptance of Plan

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

3.2.4. Notification of Changes

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

3.3. COORDINATION MEETING

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

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

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

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). 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 Fort Worth District Corps of Engineers. 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 02.0016
TEMPORARY CONSTRUCTION FACILITIES**

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

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

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.1.1. This section contains requirements specifically applicable to this task order. The requirements of Base ID/IQ contract Section 01 50 02 apply to this task order, except as otherwise specified herein.

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

1.3.1. Bulletin Board (As Specified in Base contract)

1.3.2. Project and Safety Signs (Added to Stress standardization of signs, in the event that the Base ID/IQ Section 01 50 02 does not contain this information)

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

End of Section 01 50 02.0016

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Not Used

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NOT USED

APPENDIX C

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SEE APPENDIX J – DRAWINGS

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Not Used

APPENDIX E

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APPENDIX E
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- Cross Connection Control Manual for Fort Bliss
- Fort Bliss Directorate of Public Works Environmental Division Requirements for Planning, Design and Construction

Potable Regulatory Policy (Policy Letter #16)

REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY GARRISON COMMAND
BUILDING 1 PERSHING ROAD
FORT BLISS, TEXAS 79916-6812

IMSW-BLS-ZA

1 April 2006

POLICY LETTER #16

SUBJECT: Potable Water Regulatory Policy: Plumbing Customer Service Inspections (CSI) and Backflow Prevention Assembly Test Forms

1. **PURPOSE:** The Fort Bliss Water Services Company (FBWS) operates 9 water systems on Post: Fort Bliss Main Post, Biggs Army Air Field, Site Monitor, McGregor/Meyer Range Camp, Dona Ana Range Camp, Oro Grande Range Camp, Hueco Range Camp, SHORAD, and Redeye. FBWS is responsible for protecting the drinking water supply in accordance with State Regulations (Title 30 Texas Administrative Code 290.46(j), New Mexico Administrative Code 20.7.10.400(L)) from contamination or pollution which could result from improper water system plumbing construction or configuration.

2. Effective immediately, Customer Service Inspection certificates shall be completed prior to providing continuous water service to new construction or after significant plumbing renovations on any existing service or any existing service when the FBWS has reason to believe that cross-connections or other potential contaminant hazard exist or after any material improvement, correction, or addition to the water distribution facilities. As unacceptable plumbing practices are discovered, they shall be promptly eliminated to prevent possible contamination of the water supply. Also, any backflow prevention devices installed shall be installed in accordance with the Fort Bliss Cross-Connection Control Manual (FBCCCM), and tested in accordance with the FBCCCM.

3. **RESTRICTIONS:** The following unacceptable practices are prohibited:

a. No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water supply in accordance with the FBCCCM.

b. No cross-connection between the public water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.

c. No connection which allows water to be returned to the public drinking water supply is permitted.

POLICY LETTER #16

SUBJECT: Potable Water Service Agreement: Plumbing Customer Service Inspections (CSI) and Backflow Test Forms

d. No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.

e. No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.

3. This policy applies to work completed on all Fort Bliss facilities whether work is done by contract or in-house. Activities must insure that their contractors/ subcontractors follow this requirement.

4. Inspectors must possess proper credentials and be recognized as capable of conducting a customer service inspection certification by the State of Texas. Customer Service inspections may be performed by the following group members:

a. Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners.

b. Customer Service Inspectors licensed by the Texas Commission of Environmental Compliance (TCEQ).

5. Recognized Backflow assembly testers must possess a current license from the TCEQ.

6. Submit completed customer service inspection and/or backflow test forms to the Directorate of Environment (DOE), IMSW-BLS-Z, Bldg 622, Attn: Water Program Manager, Fort Bliss, Texas 79916, or in person at bldg 622 room 111, or by fax at 568-1333. Copies of the FBCCCM are available from the DOE Water Program Manager, office phone number 568-6364. Forms will be maintained by the Directorate of Environment for a minimum of 10 years and be made readily available for review by the State regulatory entity.

- 2 Enclosures
- 1. CSI Certificate
- 2. Backflow Assembly Test Report

ROBERT T. BURNS
 COL, AD
 Commanding

FORT BLISS CUSTOMER SERVICE INSPECTION CERTIFICATE

Name of PWS: _____ PWS I.D.# _____

Bldg No. or Facility Description: _____

Contract # or Work Order #: _____

Contract issued by: _____ Prime Contractor: _____

Reason for Inspection:

New construction

Existing service where contaminant hazards are suspected

Major renovation or expansion of distribution facilities

I _____, upon inspection of the private water distribution facilities connected to the aforementioned public water supply (PWS) do hereby certify that, to the best of my knowledge:

Compliance Non-compliance

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. No direct connection between the public drinking water supply and a potential source of contamination exists. Potential sources of contamination are isolated from the public water system by an air gap or an appropriate backflow prevention assembly in accordance with Commission regulations. |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. No cross-connection between the public drinking water supply and a private water system exists. Where an actual air gap is not maintained between the public water supply and a private water supply, an approved reduced pressure-zone backflow prevention assembly is properly installed and a service agreement exists for annual inspection and testing by a certified backflow prevention assembly tester. |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. No connection exists which would allow the return of water used for condensing, cooling or industrial processes back to the public water supply. |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. No pipe or pipe fitting which contains more than 8.0% lead exists in private water distribution facilities installed on or after July 1, 1988. |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. No solder or flux which contains more than 0.2% lead exists in private water distribution facilities installed on or after July 1, 1988. |

I further certify that the following materials were used in the installation of the private water distribution facilities:

Service lines Lead Copper PVC Other

Solder Lead Lead Free Solvent Weld Other

Copy of inspector's certification card submitted to DOE. yes no *(If no, please attach copy of inspector's certification card.)*

I recognize that this document shall become a permanent record of the aforementioned Public Water System and that I am legally responsible for the validity of the information I have provided.

Remarks: _____

Signature of Inspector

Registration Number

Title

Type of Registration

Date

Fort Bliss
Backflow Prevention Assembly Test Report
 ATZC-DOE, Building 622, Fort Bliss, TX 79916
 Phone: (915) 568-1041 Fax: (915) 568-1333

General Information

Area / Range Camp _____ Building Name _____
 Building Number _____ Building Location _____
 Point of Contact _____ Phone _____

Current Assembly Information

Manufacturer _____ Model _____
 Serial No. _____ Size _____ Tag _____
 Type of service: Containment/Domestic
 Containment/Fire System
 Containment/Lawn Irr.
 Isolation

Specific physical location of assembly:

Equipment or system isolated:

Removed Assembly Information

Manufacturer _____
 Model _____
 Size _____
 Serial No. _____

Gauge Information

ID _____
 Manufacturer _____
 Model _____
 Serial No. _____
 Last date of calibration _____

Test Results

Status Pass Fail

RP

CV1 AR _____
 RV _____
 CV2 Tight? Yes No
 CV1 CR _____
 CV2 _____
 Buffer _____

DC

CV1 _____
 CV2 _____

PVB SVB

_____ AIV _____
 _____ CV _____

Additional Requirements

Yes N/A
 Thermal Expansion Control Present? No Unknown
 (Containment domestic only)
 Requirements made known? Yes No N/A
 Adequate Freeze Protection Present? Yes No N/A
 Requirements made known? Yes No N/A

Comments or Repairs made:

 Test Type Initial Annual Repair Relocate

The backflow prevention assembly detailed on this report has been tested and maintained as required and is certified to be operating within acceptable parameters. I also certify that I tested this assembly and the test results are true.

Technician ID _____ Name _____ Phone _____
 Signature _____ Time of Test _____ Date _____
 Firm _____ Address _____ City _____ State _____ Zip _____

Cross Connection Control Manual for Fort Bliss

United States Army Air Defense Artillery Center Fort Bliss, Texas

Cross-Connection Control Manual



Cross-Connection Control Manual

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ACRONYMS and ABBREVIATIONS

AG	Air Gap
ANSI	American National Standards Institute
ASSE	American Society of Sanitary Engineers
AVB	Atmospheric Vacuum Breaker
DC	Double Creek Valve Assembly
FCCCHR	Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California
NMED	New Mexico Environment Department
PVB	Pressure Vacuum Breaker
RP	Reduced Pressure Principle Assembly
SVB	Spill-Resistant Pressure Vacuum Breaker
TCEQ	Texas Commission on Environmental Quality
UPC	Uniform Plumbing Code

INTRODUCTION

Congress passed the 1974 Safe Drinking Water Act (SDWA), Public Law 93-523, to protect public drinking water supplies from harmful contaminants. Because Ft. Bliss is located in New Mexico and Texas, the Texas Commission on Environmental Quality (TCEQ) and the New Mexico Environment Department (NMED) are responsible for implementing the standards of the SDWA within their respective states. The primary function of Ft. Bliss as a water purveyor is to provide safe drinking water. As a result, they may incur liability for the quality of water provided. The TCEQ and the NMED prohibit connections to the public water supply where a contamination hazard exists, unless the public water supply is protected by approved backflow prevention methods, devices, or assemblies.

Ft. Bliss has established and will provide for a Cross-Connection Control Program pursuant to Title 30, Texas Administrative Code, Chapter 290, Public Drinking Water; the Texas Health and Safety Code, Chapter 341, Minimum Standards of Sanitation and Health Protection Measures; and the New Mexico Environment Department, Title 20 Environmental Protection, Chapter 7, Wastewater and Water Supply Facilities. This Program safeguards the Ft. Bliss water distribution system from contamination by containing hazards at the service connection and/or within premises served by the Ft. Bliss water distribution system and by the installation, testing, and maintenance of backflow prevention methods, devices, or assemblies.

This manual is intended to augment the Ft. Bliss Cross-Connection Control Program and to serve as the minimum standard for implementing the Program. The manual adheres to the standards in the latest editions of The Manual for Cross-Connection Control by the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) at the University of Southern California and the Uniform Plumbing Code (UPC). Included in the manual are technical specifications and standards to define proper backflow prevention assembly applications, installation details and criteria, test procedures, care of test equipment, and test report forms. The manual assigns or clarifies responsibilities of the Cross-Connection Control Program Manager, the backflow prevention technician, and private sector contractors.

Because Ft. Bliss must comply with the regulations of New Mexico and Texas, the provisions of this manual are applicable to both states. Wherever a provision of a state occurs that does not apply to the other state, the provision shall be noted as such.

No manual can remain current indefinitely. All holders of this manual should anticipate additions, deletions, and amendments. The Ft. Bliss Cross-Connection Control Program Manager will make available subsequent changes.

Approved Backflow Prevention Assembly

An assembly that has been manufactured in full compliance with the American Water Works Association standards C510 and C511 and appears on the most current List of Approved Backflow Prevention Assemblies, published by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Auxiliary Water System

Any water supply on or available to the premises other than the Ft. Bliss water distribution system. These auxiliary waters are not under the sanitary control of Ft. Bliss and may include water from another public water supplier, wells, used or reclaimed water, or industrial fluids.

Backflow

The unintended or undesirable reversal of the normal water flow caused by either backsiphonage or backpressure.

Backflow Prevention Methods, Devices, and Assemblies

The types of backflow prevention methods, devices, and assemblies shall be based on the existing or potential degree of hazard, and backflow condition. The definitions for each type of backflow prevention method, device, or assembly listed below are contained in subsequent sections of this manual. The types are as follows:

Air gap	Method
Atmospheric vacuum breaker	Device
Double check valve	Assembly
Pressure vacuum breaker	Assembly
Reduced pressure principle	Assembly
Spill-resistant pressure vacuum breaker	Assembly

The definitions for each type of backflow prevention method, device, or assembly listed above are contained in subsequent sections of this manual

Backflow Prevention Technician

A person deemed knowledgeable and competent in the installation, testing, maintenance, and repair of backflow prevention assemblies as determined by successful completion of a training course approved by the Cross-Connection Control Program Manager.

Backpressure

A form of backflow due to an increase of system pressure that is greater than supply pressure.

Backsiphonage

A form of backflow due to negative or decreased pressure in the water supply system.

Containment Cross-Connection Control

Provides protection of the water distribution system from the backflow of contaminants. This is accomplished by the installation of an air gap or an approved backflow prevention assembly at the water service connection. Containment cross-connection control does not provide protection to the occupants of the premises, but shall be considered as additional backflow protection and shall not negate the use of backflow prevention on internal hazards within a premises potable water system.

Contamination

The presence of any foreign substance (organic, inorganic, radiological, or biological) in water that tends to degrade its quality to constitute a health hazard or impair the usefulness of the potable water system.

Continuous Pressure

A point in the potable water system that may be subjected to operating pressure for more than twelve hours in a twenty-four hour period.

Cross Connection

A point in the potable water system that is connected directly, or has the potential of being connected, to a source of non-potable substance through which contaminants may enter the potable water system under any condition.

Cross Connection — Controlled

A cross connection with an approved backflow prevention method, device, or assembly properly installed and maintained so that it will continuously afford protection commensurate with the degree of hazard.

Cross-Connection Control Program Manager

The person designated to administer the Cross-Connection Control Program and who is currently recognized as a backflow prevention assembly technician.

Ft. Bliss

A publicly owned water and sewer agency located in and serving the people of Ft. Bliss.

Health Hazard

An actual or potential threat of contamination if introduced into the potable water system that may cause death, injury, illness or spread of disease.

Isolation Cross-Connection Control

Provides protection to the occupants of a premises by the installation of approved backflow prevention methods, devices, or assemblies at each cross connection within the premises' potable water system.

Non-Health Hazard

An actual or potential threat of pollution if introduced into the potable water system that would constitute a nuisance, inconvenience, or be aesthetically objectionable.

Pollution

The presence of any foreign substance in the potable water system that tends to degrade its quality but not constitute a health hazard or impair the usefulness of the water.

Premises Potable Water System

Those parts of the premises or other areas beyond the water service connections that are utilized in conveying potable water to points of use.

System Hazard

An actual or imminent threat of contamination to the water distribution system presenting a danger to public health.

Water Distribution System

The network of conduits used for the delivery of potable water from the source to the water service connection.

Water Service Connection

The point of connection to the water distribution system carrying potable water to the building, other points of use, or distribution on the property.

Cross-Connection Control Program Manager

The Directorate of the Environment is responsible for the sanitary control of the Ft. Bliss water distribution system and the premises potable water system.

A member of the Directorate of the Environment shall be designated as the Cross-Connection Control Program Manager. The manager is responsible for all administrative duties and for maintaining an aggressive cross-connection control program within the Ft. Bliss water distribution system and all premises potable water systems.

The manager's responsibilities include but are not limited to:

1. Administration and enforcement of all the provisions of the cross-connection control program.
2. The prevention of contaminants from entering a premises potable water system by the use of backflow prevention methods, devices, and assemblies installed at each cross connection within the premises potable water system.
3. The prevention of contaminants originating within a premises potable water system from entering the Ft. Bliss water distribution system by the use of backflow prevention methods and assemblies installed at each water service connection.
4. The prevention of contaminants from entering the City of El Paso's water distribution system from the Ft. Bliss water distribution system by the use of backflow prevention methods and assemblies installed at each water service connection to Ft. Bliss.
5. The completion of a detailed cross-connection control survey of the entire water distribution system and all premises potable water systems every five years.
6. Affirm that all testing performed at Ft. Bliss meets the requirements of this manual. This is accomplished by reviewing test reports. The Cross-Connection Control Program Manager also may select a percentage of tests to witness or confirm by testing after the technician.
7. Ensure that all certified backflow prevention technicians are properly certified in New Mexico and Texas.
8. Review plumbing plans and inspect plumbing systems as they are installed for compliance with the cross-connection control program.
9. Inspect installations of backflow prevention methods, devices, and assemblies for compliance with this manual installed by Ft. Bliss personnel or by private sector contractors.
10. Require unacceptable plumbing practices to be promptly eliminated to prevent actual or potential contamination of the potable water system.

RESPONSIBILITIES

11. Establish an annual schedule of inspecting and testing all backflow prevention methods, devices, and assemblies.
12. Keep accurate records of installations, tests, inspections, and repairs made to backflow prevention assemblies for a minimum period of three years.

Backflow Prevention Technician

The Backflow Prevention Technician is responsible for safeguarding the Ft. Bliss water distribution system and all premises potable water systems. The technician's responsibilities include but is not limited to:

1. Register with the Cross-Connection Control Program Manager prior to testing backflow prevention assemblies within the jurisdiction of the Cross-Connection Control Program Manager. Each technician shall be issued an identification number that must appear on all backflow prevention assembly test report forms.
2. Submit reports of assembly testing and repairs to the Cross-Connection Control Program Manager within one week from the time the test was conducted. Testing of backflow prevention assemblies shall not be considered complete unless a satisfactory test report has been received by the Cross-Connection Control Program Manager
3. Inform the Cross-Connection Control Program Manager if any existing backflow prevention assembly is not installed commensurate with the degree of hazard, pressure conditions, or if the assembly is not installed in its required orientation.
4. Shall not alter the design or operation of backflow prevention methods, devices, and assemblies.
5. Maintain training requirements in New Mexico and Texas. New Mexico follows the FCCCHR policy whereby training requirements are renewed every three years. The TCEQ tester recognition is indefinite and does not require renewal. In order for technicians to be able test assemblies throughout Ft. Bliss, their training shall be renewed every three years.

Ft. Bliss Personnel and Private Sector Contractors

1. Ft. Bliss personnel and private sector contractors shall fully comply with the Ft. Bliss Cross-Connection Control Program. They are responsible for installing backflow prevention methods, devices, and assemblies in their required orientation, and in accordance with the proper degree of hazard and pressure condition as indicated in this manual.
2. Ft. Bliss personnel and private sector contractors shall notify the Cross-Connection Control Program Manager that backflow prevention methods, devices, and assemblies have been properly installed and are ready for inspection and testing. They shall be responsible for all parts and labor needed to prepare the assembly for its acceptance test.

RESPONSIBILITIES

3. Newly installed assemblies shall not be placed into service until an acceptance test has been performed indicating satisfactory results.

The Cross-Connection Control Program Manager shall utilize an information management system consisting of two databases — Survey and Testing.

Survey Database

1. The Cross-Connection Control Program Manager shall complete a detailed cross-connection control survey of the entire water distribution system and all premises potable water systems every five years. This will be accomplished by surveying twenty percent of all premises every year.
2. The survey shall be performed by experienced cross-connection control inspectors and shall include inspection of all exposed and visibly accessible potable water piping, water consuming equipment, lawn irrigation systems, and fire protection systems.
3. Cross-connection control inspectors shall use a survey form similar to the one shown on page 10.
4. The survey findings shall be documented into a cross-connection control Survey Information Management Database. The survey database shall produce reports that will include the location and identification of water uses, adequacy of existing protection, and corrective actions. The report will include the size and type of backflow prevention methods, devices, or assemblies needed, and a prioritized list of findings.

The survey database also shall produce water conservation reports listing the location and identification of all applicable plumbing fixtures and flow rates.

5. All of the items in the survey that require corrective action are considered a health hazard and shall be corrected as soon as possible. The following prioritized list shall be followed in planning corrective actions:

Priority 1 — Contamination imminent

Where conditions or activities exist in which the introduction of a contaminant to the premises potable water system or the water distribution system is imminent.

Priority 2 — Contamination potential

Where conditions or activities exist in which there is a potential for the introduction of a contaminant to the premises potable water system or the water distribution system.

Priority 3 — No action required

Where cross connections are under control by the presence of an approved backflow prevention method, device, or assembly and there is no imminent or potential threat of contamination to the premises potable water system or the water distribution system.

Priority 4 — Installation correction

Where cross connections are under control by the presence of an approved backflow prevention method, device, or assembly; however, the installation may not be installed in full compliance with the UPC or FCCCHR and shall require corrective action.

Priority 5 — Piping system note

Where a portion of the piping system does not present a threat of contamination to the premises potable water system or the water distribution system but may be a concern such as piping leaks or safety hazards.

6. The survey shall include inspection of plumbing fixtures for water conservation compliance. The maximum water consumption flow rates and quantities for plumbing fixtures shall be in accordance with TCEQ, rule 290.252 and UPC, section 402.0. The following table describes the fixtures and maximum flow rates:

Maximum Flow Rates and Consumption for Plumbing Fixtures	
Plumbing Fixture	Maximum Flow Rate or Quantity
Water closet	1.6 gallons per flush
Urinal	1.0 gallons per flush
Shower head	2.5 gallons per minute
Sink, lavatory faucet, faucet aerator	2.2 gallons per minute
Faucet serving transient public	0.25 gallons per use & self-closing valve
Drinking fountain	Operated by self-closing valve
Emergency shower/eye wash	None

Testing Database

1. The Cross-Connection Control Program Manager is responsible for all backflow prevention assembly testing within the jurisdiction of the Directorate of the Environment.
2. All backflow prevention assemblies shall be tested for proper operation by backflow prevention technicians registered with the Cross-Connection Control Program Manager.
3. Backflow prevention technicians shall use the test report form shown on page 17. The form may be recreated from the testing database
4. All backflow prevention assembly test reports — pass or fail — shall be entered into the Testing Information Management Database. The testing database shall produce individual and summary reports. The reports shall include relevant information such as area, building, assembly, test findings, repairs, thermal expansion measures, adequacy of freeze protection, test equipment used, and technician identification.
5. The testing database shall incorporate automated defaults for ensuring proper testing information. Test reports shall default to "Fail" until proper test findings are entered. The database also shall track annual and past due tests.

Preparation for Testing Backflow Prevention Assemblies

Prior to testing backflow prevention assemblies the backflow prevention technician shall:

1. Notify affected onsite personnel that the water service will be shut off during backflow prevention assembly testing.
2. Notify the authority having jurisdiction over fire protection systems, and any alarm-monitoring agency, that the water supply to the fire protection system will be shut off during the test procedure.
3. Examine the area for safety hazards, water leaks, or relief valve discharging.
4. Determine that the backflow prevention assembly is installed commensurate with the degree of hazard, pressure conditions, and required orientation.
5. Check that the assembly is the correct size and has the essential components for testing such as resilient seated, full ported shutoff valves and test ports.
6. Note the manufacturer, model, serial number, size, application, and physical location.

Backflow Prevention Assembly Testing

1. The Cross-Connection Control Program Manager is responsible for all backflow prevention assembly testing within the jurisdiction of the Directorate of the Environment.
2. All backflow prevention assemblies shall be tested for proper operation by backflow prevention technicians registered with the Cross-Connection Control Program Manager.
3. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.
4. A copy of the test report indicating satisfactory operation of the backflow prevention assembly, and any repairs, shall be forwarded to the Cross-Connection Control Program Manager within one week from the time the test was completed.
5. Assemblies that fail the operational test shall be repaired, overhauled, and retested immediately by a recognized backflow prevention technician. Testing of the assemblies shall not be considered complete until a test report certifying that the assembly is operating correctly has been received by the Cross-Connection Control Program Manager.
6. Upon the completion of a satisfactory test, the backflow prevention technician shall attach a laminated tag to the assembly with the following information on one side:

TESTING PROCEDURES

"Directorate of the Environment, ATZC-DOE, Building 622, Fort Bliss, TX 79916, Phone: (915) 568-6364, Fax: (915) 568-1333"

The reverse side of the tag shall indicate the assembly's manufacturer, model, serial number, size, and tag number. The applicable values of check valves No. 1 & 2, relief valve, air inlet valve, check valve, and the test date shall also be indicated.

7. Testing of backflow prevention assemblies shall be in accordance with Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The following steps shall be used when testing reduced pressure principal backflow prevention assemblies:

Reduced Pressure Principle

1. Determine the apparent static pressure drop across check valve No. 1 in the direction of flow.
2. Determine that the differential pressure relief valve operates to maintain the zone between the two check valves at least 2.0 psi less than supply pressure.
3. Determine that check valve No. 2 closes tight in reverse flow.
4. Determine that the confirmed static pressure drop across check valve No. 1 is at least 3.0 psi greater than the relief valve opening point.
5. Determine that the static pressure drop across check valve No. 2 is at least 1.0 psid.
6. Determine that the comparison of the two readings of check valve No. 1 (1 and 4) is within 1.0 psid.

Double Check Valve

1. Determine that the static pressure drop across check valve No. 1 is at least 1.0 psid.
2. Determine that the static pressure drop across check valve No. 2 is at least 1.0 psid.

Pressure Vacuum Breakers

1. Determine that the pressure in the body when the air inlet valve opens is at least 1.0 psi.
2. Determine that the static pressure drop across the check valve is at least 1.0 psid.

Spill-Resistant Pressure Vacuum Breakers

1. Determine that the pressure in the body when the air inlet valve opens is at least 1.0 psi.
2. Determine that the differential pressure of the check valve in the direction of flow shall be at least 1.0 psid.

Note: For the SVB to operate correctly, the check valve must have a greater value than the air inlet valve.

Test Equipment Calibration

1. Backflow prevention assembly test equipment shall be calibrated annually in accordance with ANSI and ASSE 1064 standards by a qualified calibration facility.
2. The test equipment manufacturer, model, serial number, and last date of calibration shall be recorded on the backflow prevention assembly test report form.

Maintenance and Repair

To maintain backflow prevention assemblies in proper operating condition, the technician shall adhere to the following:

1. Test assemblies in accordance with this manual.
2. Use currently calibrated testing equipment.
3. Consult manufacturer's repair/maintenance manuals.
4. Observe general safety procedures.
5. Use only manufacturer's replacement parts.
6. Be prepared to repair assembly at time of testing by maintaining an inventory of replacement parts.
7. Avoid flipping rubber check valve discs. Flipping shall be considered a temporary measure only to enable continuation of water service until a new replacement disc is installed.
8. Retest assembly for proper operation immediately following repair.
9. Slowly repressurize assembly when returning assembly to normal operating condition.

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TEST REPORT FORM

<p>Fort Bliss 0710020</p> <p>Backflow Prevention Assembly Test Report</p> <p>ATZC-DOE, Building 622, Fort Bliss, TX 79916</p> <p>Phone: (915) 568-1041 Fax: (915) 568-1333</p>			
<p>General Information</p> <p>Area / Range Camp _____ Building Name _____</p> <p>Building Number _____ Building Location _____</p> <p>Point of Contact _____ Phone _____</p>			
<p>Current Assembly Information</p> <p>Manufacturer _____ Model _____</p> <p>Serial No. _____ Size _____ Tag _____</p> <p>Type of service: <input type="checkbox"/> Containment/Domestic <input type="checkbox"/> Containment/Fire System <input type="checkbox"/> Containment/Lawn Irr. <input type="checkbox"/> Isolation</p> <p>Specific physical location of assembly: _____</p> <p>Equipment or system isolated: _____</p>		<p>Removed Assembly Information</p> <p>Manufacturer _____</p> <p>Model _____</p> <p>Size _____</p> <p>Serial No. _____</p>	
		<p>Gauge Information ID _____</p> <p>Manufacturer _____</p> <p>Model _____</p> <p>Serial No. _____</p> <p>Last date of calibrator _____</p>	
<p>Test Results Status <input type="checkbox"/> Pass <input type="checkbox"/> Fail</p>		<p>Additional Requirements <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p> <p>Thermal Expansion Control Present? <input type="checkbox"/> No <input type="checkbox"/> Unknown (Containment domestic only)</p> <p>Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</p>	
<p style="text-align: center;">RP</p> <p>CV1 AR _____</p> <p>RV _____</p> <p>CV2 Tight? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>CV1 CR _____</p> <p>CV2 _____</p> <p>Buffer _____</p>	<p style="text-align: center;">DC</p> <p>CV1 _____</p> <p>CV2 _____</p>	<p style="text-align: center;">PVB</p> <p>AIV _____</p> <p>CV _____</p>	<p style="text-align: center;">SVB</p>
		<p>Adequate Freeze Protection Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</p> <p>Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</p>	
<p>Comments or Repairs made: _____</p>			
<p>Test Type <input type="checkbox"/> Initial <input type="checkbox"/> Annual <input type="checkbox"/> Repair <input type="checkbox"/> Relocate</p>			
<p>The backflow prevention assembly detailed on this report has been tested and maintained as required and is certified to be operating within acceptable parameters.</p> <p>I also certify that I tested this assembly and the test results are true.</p>			
<p>Technician ID _____ Name _____</p>		<p>Phone _____</p>	
<p>Signature _____</p>		<p>Time of Test _____ Date _____</p>	
<p>Firm _____</p>		<p>Address _____ City _____ State _____ Zip _____</p>	

This form may be recreated from the Testing Database

Cross-Connection Control Manual**BACKFLOW PREVENTION METHODS, DEVICES, AND ASSEMBLIES**

Backflow Prevention Method, Device, and Assembly Application Table						
	Hazards			Pressures		
	Sewage	Health	Non-health	Back-Pressure	Back-Siphonage	Continuous Pressure
AG	Yes	Yes	Yes	Yes	Yes	Yes
AVB	No	Yes	Yes	No	Yes	No
DC	No	No	Yes	Yes	Yes	Yes
PVB	No	Yes	Yes	No	Yes	Yes
RP	No	Yes	Yes	Yes	Yes	Yes
SVB	No	Yes	Yes	No	Yes	Yes

AG	Air gap
AVB	Atmospheric vacuum breaker
DC	Double check valve assembly
PVB	Pressure vacuum breaker assembly
RP	Reduced pressure principle assembly
SVB	Spill-Resistant pressure vacuum breaker assembly

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

The AVB, PVB, SVB, and RP shall be used where health hazard matters are concerned. The DC shall only be used in non-health applications where convenience such as not draining the premises potable water system is the concern.

CONTAINMENT CONTROL REQUIREMENTS**Containment Cross-Connection Control**

1. No water service connection shall be permitted to any premises handling substances deleterious or hazardous to the public health without an air gap separation or an approved backflow prevention assembly installed at the water service connection.
2. Table "Minimum Containment Requirements" shows typical installations that require backflow prevention assemblies at the water service connections of the premises. This table may be supplemented by the Cross-Connection Control Program Manager upon the discovery of a potential hazard to the public water supply.

The table does not indicate use of the double check valve assembly (DC) in containment applications. The use of a DC must be restricted to non-health use only. The Cross-Connection Control Program Manager may allow the use of existing DCs on potable water supplies serving fire protection systems if the hydraulic design of the system cannot accommodate the pressure loss of a RP. Once performance of the water distribution system is upgraded existing fire protection systems shall be fitted with RPs.

3. All approved backflow prevention methods, devices, and assemblies shall be installed in their required orientation, in accordance with the proper degree of hazard and pressure condition as indicated in this manual.
4. Premises considered to pose a threat of contamination to the water distribution system shall be subject to a water use inspection. The Directorate of the Environment or its representatives shall have the right of entry to any land or buildings at reasonable times to make water use examinations or inspections. If cross connections are discovered during the premises water use survey that could result in the backflow of contaminants into the public water supply, Ft. Bliss shall immediately implement appropriate corrective actions.
5. At any premises where contamination hazards exist and there is adequate isolation cross-connection control in effect, the Cross-Connection Control Program Manager may determine that an air gap separation or an approved backflow prevention assembly may not be required at the water service connection.

Cross-Connection Control Manual**CONTAINMENT CONTROL REQUIREMENTS**

This table is not an all-inclusive list and may be supplemented by the Cross-Connection Control Manager.

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

Typical premises or water uses that require containment control:	Method or assembly
Agricultural	AG or RP
Aircraft, missile plant	AG or RP
Animal grooming, processing, feedlot	AG or RP
Automotive repair, plant	AG or RP
Auxiliary water supply	AG or RP
Beverage processing	AG or RP
Cannery, packing house, rendering plant	AG or RP
Car washing	AG or RP
Chemical manufacturing	AG or RP
Clinic	AG or RP
Cold storage facility	AG or RP
Commercial laundry	AG or RP
Complex piping system	AG or RP
Construction water service point	AG or RP
Cooling system	AG or RP
Dairy, product processing	AG or RP
Dental office, laboratory	AG or RP
Docks, dockside facility	AG or RP
Dye plant	AG or RP
Fire protection system	AG or RP
Food processing plant	AG or RP
Garment finisher	AG or RP
Green house	AG or RP
Heating system	AG or RP
Hospital, mortuary, funeral home	AG or RP
Industrial system	AG or RP
Laundry	AG or RP

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Typical premises or water uses that require containment control:	Method or assembly
Lawn irrigation system	AG or RP
Lease space (shopping center, warehouse)	AG or RP
Manufacturing natural or synthetic rubber	AG or RP
Medical, surgical	AG or RP
Metal finishing, molding, forming, plating	AG or RP
Microchip fabrication	AG or RP
More than one connection to the public water supply	AG or RP
Nursing, convalescent home	AG or RP
Paper processing	AG or RP
Petroleum processing, storage	AG or RP
Photographic processing	AG or RP
Plastic injection	AG or RP
Power plant	AG or RP
Radiator shop	AG or RP
Radioactive material	AG or RP
Ready mix concrete	AG or RP
Reclaimed potable water system	AG or RP
Sand, gravel plant	AG or RP
School, laboratory	AG or RP
Sewage lift station, treatment plant	AG or RP
Slaughter house	AG or RP
Steam generating	AG or RP
Tall buildings	AG or RP
Taxidermy	AG or RP
Temporary service	AG or RP
Toxic substance	AG or RP
Uncontrolled cross connections	AG or RP
Veterinary	AG or RP
Water Storage vehicle	AG or RP
Water treatment	AG or RP
Well	AG or RP
Where inspection is restricted	AG or RP

ISOLATION CONTROL REQUIREMENTS**Isolation Cross-Connection Control**

1. No installation of any water operated equipment that may cause contamination of the premises potable water system shall be permitted unless it is equipped with an approved backflow prevention method, device, or assembly.
2. Requirements for backflow prevention methods, devices, and assemblies installed within the premises potable water system are for the safety and protection of the occupants of the premises.
3. In addition to performing cross-connection control surveys, the Cross-Connection Control Program Manager shall conduct inspections in response to water quality complaints to determine compliance with the provisions of the Cross-Connection Control Program. In the event cross connections require isolation control, the Cross-Connection Control Program Manager shall have approved backflow prevention methods, devices, and assemblies installed at specific locations within the premises potable water system.
4. Mandatory isolation cross-connection control requirements are shown in the table, "Minimum Isolation Cross-Connection Control Requirements" on page 21. This table is not an all-inclusive list of hazards that may be found and may be supplemented by the Cross-Connection Control Manager.
5. All approved backflow prevention methods, devices, and assemblies shall be installed in their required orientation, in accordance with the proper degree of hazard, and pressure condition as indicated in this manual.

Cross-Connection Control Manual**ISOLATION CONTROL REQUIREMENTS**

This table is not an all-inclusive list and may be supplemented by the Cross-Connection Control Manager.

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

Typical water uses that require isolation control:	Method, device, or type of assembly					
	AG	RP	DC	PVB	SVB	AVB
Air conditioning system	Yes	Yes	No	Yes	Yes	Yes
Air washer	Yes	Yes	No	Yes	Yes	Yes
Aspirator	Yes	Yes	No	Yes	Yes	Yes
Autoclave	Yes	Yes	No	No	No	No
Auxiliary water supply	Yes	Yes	No	No	No	No
Bedpan washer	Yes	Yes	No	Yes	Yes	Yes
Boiler	Yes	Yes	No	No	No	No
Carbonation equipment	Yes	Yes	No	No	No	No
Chemical dispenser	Yes	Yes	No	Yes	Yes	Yes
Chilled potable water system	Yes	Yes	No	No	No	No
Chiller	Yes	Yes	No	No	No	No
Compressors (water cooled)	Yes	Yes	No	No	No	No
Cooling tower	Yes	Yes	No	No	No	No
Cuspidor	Yes	Yes	No	Yes	Yes	Yes
Decorative pond	Yes	Yes	No	Yes	Yes	Yes
Degreasing equipment	Yes	Yes	No	No	No	No
Drinking fountain	Yes	Yes	No	No	No	No
Evaporative cooler	Yes	Yes	No	Yes	Yes	Yes
Faucet with pull-out spout	Yes	Yes	No	Yes	Yes	Yes
Fire protection system	Yes	Yes	No	No	No	No
Fountains	Yes	Yes	No	Yes	Yes	Yes
Garbage disposal	Yes	Yes	No	Yes	Yes	Yes
Domestic heat exchanger	Yes	No	No	No	No	No
Heating system	Yes	Yes	No	No	No	No
Hose bibb	Yes	Yes	No	Yes	Yes	Yes
Hydrant (wall, yard)	Yes	Yes	No	Yes	Yes	Yes

Cross-Connection Control Manual**ISOLATION CONTROL REQUIREMENTS**

Typical water uses that require isolation control:	Method, device, or type of assembly					
	AG	RP	DC	PVB	SVB	AVB
Industrial fluid	Yes	Yes	No	Yes	Yes	Yes
Kitchen equipment	Yes	Yes	No	Yes	Yes	Yes
Laboratory equipment	Yes	Yes	No	Yes	Yes	Yes
Lawn irrigation system	Yes	Yes	No	Yes	Yes	Yes
Medical equipment	Yes	Yes	No	Yes	Yes	Yes
Non-potable potable water system	Yes	Yes	No	No	No	No
Non-pressure vessel	Yes	Yes	No	Yes	Yes	Yes
Photo processing equipment	Yes	Yes	No	Yes	Yes	Yes
Pressure vessel	Yes	Yes	No	No	No	No
Receptors such as tanks, vats, sumps	Yes	Yes	No	Yes	Yes	Yes
Reclaimed water	Yes	Yes	No	No	No	No
Sewer, pump, ejector	Yes	Yes	No	No	No	No
Shampoo basin	Yes	Yes	No	Yes	Yes	Yes
Shower with hose	Yes	Yes	No	Yes	Yes	Yes
Sink (hand, janitor, dish, etc.)	Yes	Yes	No	No	No	No
Solar water heating equipment	Yes	Yes	No	No	No	No
Sterilizer	Yes	Yes	No	No	No	No
Swimming pool	Yes	Yes	No	Yes	Yes	Yes
Trap primer	Yes	Yes	No	No	No	No
Tub	Yes	Yes	No	Yes	Yes	Yes
Urinal	Yes	Yes	No	Yes	Yes	Yes
Water closet	Yes	Yes	No	Yes	Yes	Yes
Water closet flushometer tank	Yes	Yes	No	Yes	Yes	Yes
Water cooled equipment	Yes	Yes	No	Yes	Yes	Yes
Watering trough	Yes	Yes	No	Yes	Yes	Yes

GENERAL REQUIREMENTS**Auxiliary Water Systems and/or Wells**

Premises having auxiliary water systems and/or wells that are connected to the water distribution system shall have the following options:

1. Permanently abandon use of the auxiliary water system and/or well by "plugging the well" in accordance with the Directorate of the Environment, or
2. Completely and permanently, sever the auxiliary water system and/or well from the potable water system in accordance with the Directorate of the Environment and install an air gap or a reduced pressure principle backflow prevention assembly at the water service connection.

Backflow Prevention Assembly Enclosures

1. Backflow prevention assemblies may be installed indoors provided provisions for drainage and accessibility for testing and maintenance are met.
2. Backflow prevention assemblies installed outdoors shall meet the following requirements:
 - a. Color (color shall be appealing to Fort Bliss's overall color scheme).
 - b. Durability (ability to withstand weather extremes, wind, sand, temperature change and remain exceptionally tough).
 - c. Vandal Protection: (ability to withstand hits, kicks, etc... without denting or cracking, intruder resistant and tagging resistant)
 - d. UV Protection (prevent discolorations of fabrics or breakdown of materials)
 - e. Vector Resistant (does not provide a habit for poisons vectors such as black widow, brown recluse, scorpions, rattle snakes, etc.).
 - f. Design (adequate drainage, protect from freezing, easily accessible for testing, maintenance, and repair).
3. Enclosures must be installed and maintained so that backflow prevention assemblies are safely accessible for testing, maintenance, and repair.

Carbonators

1. Water supplies to carbonators shall be provided with a reduced pressure backflow prevention assembly.
2. There shall be no copper piping between the assembly and carbonator equipment.

Chemical Dispensers

1. Water supplies to chemical dispensers shall be provided with an air gap, reduced pressure backflow prevention assembly, or a spill resistant pressure vacuum breaker assembly.

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

2. Chemical dispensers shall be supplied directly from the premises potable water system.
3. Chemical dispensers shall not be supplied from other fixtures such as janitor sink faucets.

Construction Water Service

1. The Cross-Connection Control Program Manager shall designate a hydrant or stand pipe to assist contractors during construction.
2. A water meter and a reduced pressure backflow prevention assembly shall be maintained at all times of operation at the hydrant or stand pipe.

Fire Protection Systems

1. Fire protection systems are systems of pipes and equipment used exclusively to supply water for extinguishing fire. Potable water supplies serving new and existing fire protection systems, including but not limited to standpipes and automatic sprinkler systems, shall be protected with an air gap or a reduced pressure principle assembly.
2. Whenever a backflow prevention assembly is installed in the potable water supply to a new fire protection system, the hydraulic design of the system shall account for the pressure drop through the assembly.
3. Whenever a backflow prevention assembly is retrofitted in the potable water supply to an existing fire protection system, the hydraulic design of the system shall be checked to verify that there is sufficient water pressure available for satisfactory operation of the system.
4. The hydraulic design calculations for new and existing fire protection systems shall be submitted to the Cross-Connection Control Program Manager for approval prior to the installation.

Heat Exchangers

1. Heat exchangers used for domestic water heat transfer shall be double walled.
2. Single wall heat exchanges shall be prohibited and removed from operation as per UPC.

Labeling

1. To prevent sanitary fixtures from being connected to non-potable waters, and for safety and sanitation, the UPC requires that each plumbing fixture be provided with potable water.
2. In all buildings where potable water and non-potable water systems are installed, each system shall be clearly identified. Labels designating the liquid

GENERAL REQUIREMENTS

or gas being conveyed and the direction of flow will be colored coded as follows:

Potable water — green background with white lettering.

Nonpotable water — yellow background with black lettering.

3. The labeling shall occur every twenty feet and at least once per room, and shall be visible from floor level.
4. Each outlet and hose bibb in the nonpotable system shall be posted: "CAUTION: NONPOTABLE WATER, DO NOT DRINK"

Lawn Irrigation Systems

1. A person may not sell, design, consult, install, maintain, alter, repair, or service an irrigation in Texas unless the person is a licensed irrigator by the TCEQ. A person who is licensed as an installer may only connect an irrigation system to a water supply while being under the direct supervision of a licensed irrigator.
2. The premises potable water system shall be protected from lawn irrigation systems with an approved atmospheric vacuum breaker, pressure vacuum breaker, spill-resistant pressure vacuum breaker, or reduced pressure assembly installed commensurate with the device's/assembly's pressure condition and required orientation.
3. The water distribution system shall be protected from lawn irrigation systems with an approved pressure vacuum breaker, spill-resistant pressure vacuum breaker, or reduced pressure assembly installed commensurate with the assembly's pressure condition and required orientation.

Make up Water to Boilers and Chillers

1. Make up water connections to steam and hot water boilers shall be provided with a reduced pressure backflow prevention assembly.
2. The assembly shall be located in the inlet piping to the boiler's pressure reducing valve.

New Water Service Connections

The Cross-Connection Control Manager shall review all requests for new water service connections to determine if containment cross-connection control is needed. If it is determined that a containment backflow prevention assembly is required, the assembly must be installed, inspected and tested for proper operation before water service is established.

GENERAL REQUIREMENTS**Parallel Installations**

1. Parallel installations of two or more backflow prevention assemblies of the same type is an effective means of insuring that uninterrupted water service is maintained during testing or repair, and is strongly recommended when such continuity is desired. Parallel installations shall be in accordance with the "Parallel Installation Table" on page 26.
2. The design and plan of implementation for parallel installations shall be submitted to the Cross-Connection Control Program Manager for approval prior to the installation.
3. Sites with service lines 10" or less shall utilize at least one line-sized assembly.
4. Where two line-sized assemblies are installed in parallel, one of the assemblies shall remain closed.
5. Sites with service lines 12" or larger shall utilize assemblies sized in accordance with the "Parallel Installation — Rated Flow Table" on page 12. The combined flow capacity of the parallel assemblies shall equal or exceed the flow capacity of the service line. For example: The combined flow capacity of two 8" assemblies (2 x 1600 gpm = 3200 gpm) would be sufficient on a 12" water service line (3000 gpm).
6. During testing and repair of parallel assemblies, the flow demand shall be reduced to match the flow rate of the remaining "on line" assembly. When a parallel assembly is left closed during normal operation, it shall be tested for proper operation before the main assembly is tested.
7. Where three parallel assemblies are sized in accordance with the "Parallel Installation — Rated Flow Table", one of the assemblies shall remain closed.

Parallel Installation Table		
Application	Service lines 10" and less	Service lines 12" and larger
Site can tolerate interruption of water service.	1 line sized BFP	2 rated flow sized BFPs in parallel
Site cannot tolerate interruption of water service, but can operate with reduced flow.	1 line sized BFP and one smaller in parallel to match reduced flow demand	2 rated flow sized BFPs in parallel
Site cannot tolerate interruption of water service or reduced flow.	2 line sized BFPs in parallel	3 rated flow sized BFPs in parallel

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Parallel Installation - Rated Flow	
Size of assembly or service line	Rated flow (gpm)
2-1/2	225
3	320
4	500
6	1000
8	1600
10	2300
12	3000
14	3700
16	4400

Tenant and Lease Facilities

1. Tenant and lease facilities such as fast food restaurants, service stations, snack bars, and sites used or managed by other than Ft. Bliss personnel, are considered to be premises having potable water systems that are impractical to ascertain whether or not proper isolation cross-connection control exists. Tenant / Lease facilities will require containment cross-connection control.
2. The Cross-Connection Control Manager shall maintain jurisdiction of containment backflow prevention assemblies on tenant and lease facilities and shall be included in the annual testing schedule.

Thermal Expansion

1. The installation of "non-return devices" such as backflow prevention assemblies, check valves, dual check valves, pressure reducing or pressure regulating valves, and water softeners between the water service connection and the domestic water heater may create a "closed domestic potable water system" preventing pressure relief through the building supply.
2. A UPC listed thermal expansion tank shall be installed between the "non return device" and the water storage tank heated by indirect means and heat input limited to 200,000 Btu/hr, water temperature limited to 210° F, and water capacity that does not exceed 120 gallons.
3. A thermal expansion tank shall be provided in accordance with ASME Code, Section VIII, Division 1, on boilers operating at pressures not exceeding 160 psig and water temperatures not exceeding 210° F when either of the following limitations is exceeded: heat input of 200,000 Btu/hr; or nominal

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

water-containing capacity of 120 gallons (Texas Department of Licensing and Regulation, 16 Texas Administrative Code, Chapter 65). The thermal expansion tank shall be located on the cold water supply, the tank's air pressure matched to the system water pressure, and sized to total water heater capacity and supply pressure.

4. The backflow prevention technician shall indicate on the backflow prevention assembly test report form if the requirements for thermal expansion control are met.

Water Closets and Urinals

1. Water closet and urinal flushometer valves shall be equipped with an UPC listed atmospheric vacuum breaker.
2. The critical level of the vacuum breaker shall be at least six inches above the flood level rim of a water closet or the highest part of the urinal.
3. Water closet and urinal tanks shall be equipped with a UPC listed ball cock.

Water Treatment Units

Waste or discharge from reverse osmosis or other types of water treatment units shall enter the drainage system through an air gap.

GENERAL REQUIREMENTS

Defined

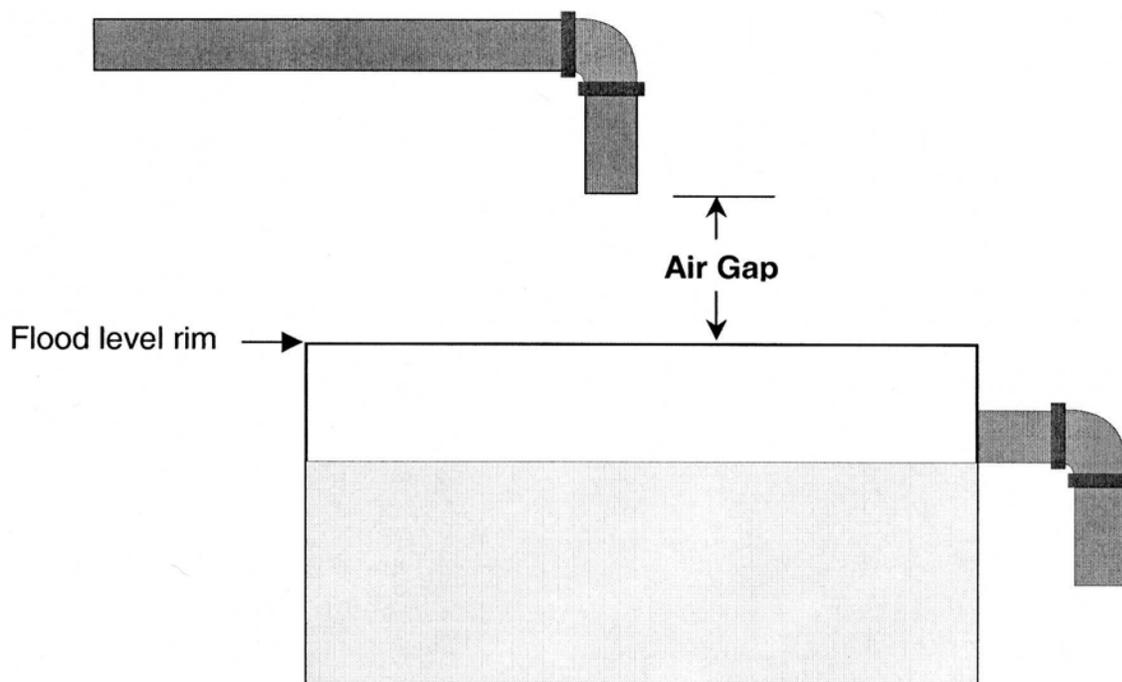
An air-gap is the unobstructed vertical distance through the free atmosphere between the discharge end of a potable water supply pipe and the flood level rim of an open or non-pressure vessel

Installation Requirements

1. The air gap must be at least twice the diameter of the water supply outlet above the flood level rim of a non-vessel or one inch, whichever is greater.
2. The air gap shall be installed with adequate access and clearance for inspection and located outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
3. A permanent platform is necessary whenever the air gap is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.

Inspection Requirements

Air gaps shall be inspected at the time of installation. In conjunction with testing backflow prevention assemblies at a particular site, or other activities, the technician shall inspect all air gaps to verify that the required vertical distance is maintained and that there is no hose connected to it. The air gap may be inspected more often when required by the Cross-Connection Control Program Manager.



Cross-Connection Control Manual
ATMOSPHERIC VACUUM BREAKER**Defined**

An atmospheric vacuum breaker consists of a float check, check seat, and an air inlet port. The AVB shall protect against health hazards under backsiphonage conditions only.

Installation Requirements

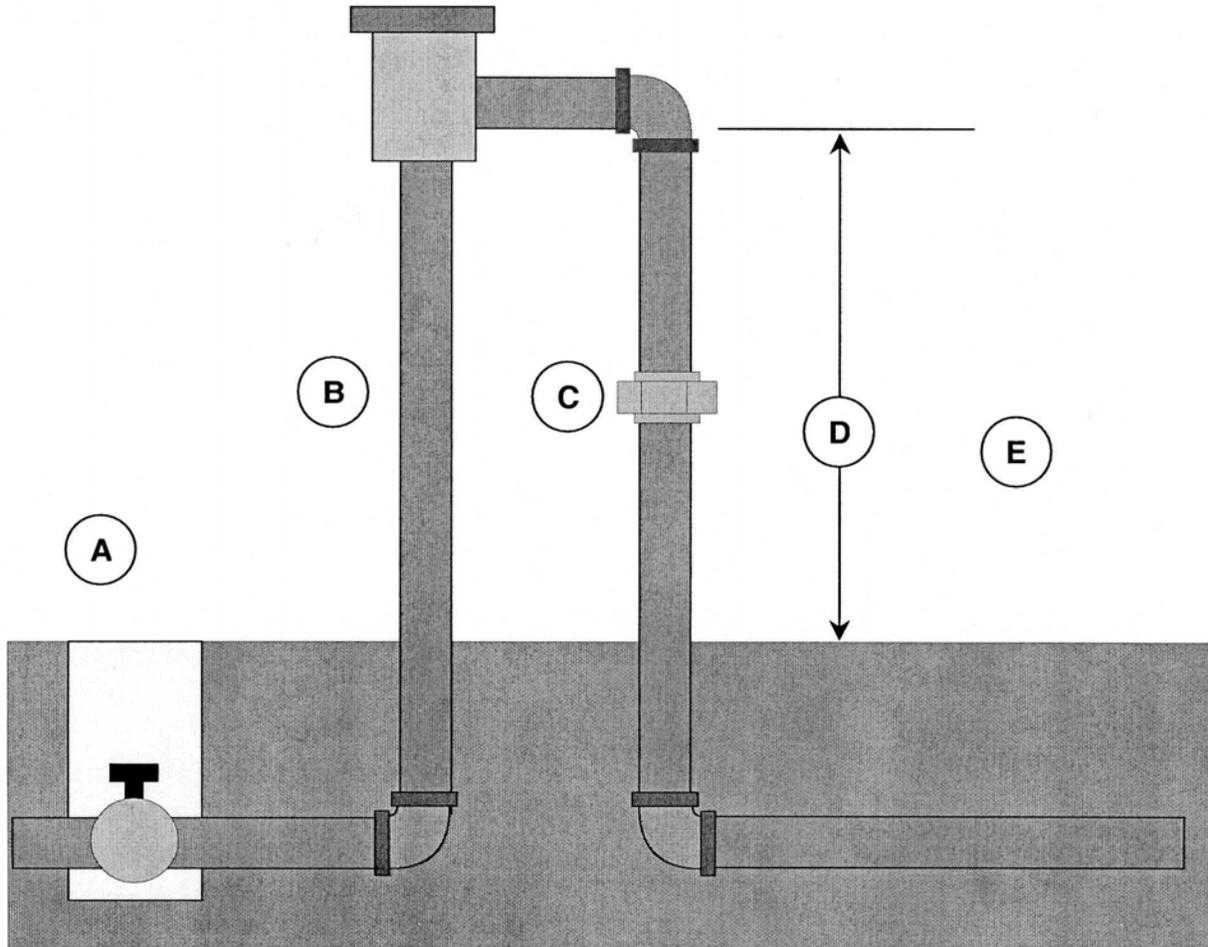
1. The AVB shall be used in isolation applications only. It shall not be used in containment applications.
2. The AVB shall be installed between 6" and 60" above grade, floor, or platform and at a minimum of 6" above the highest point of the device's outlet piping. The installation shall include unions.
3. There shall be no valves in the outlet piping of the AVB.
4. There shall be adequate drainage provisions to accommodate water discharge from flushing and operation.
5. Whenever the AVB is insulated, the insulation must be easy to remove in order to facilitate inspection and repair.
6. AVBs must be installed horizontal and plumb.
7. Immediately after installation and before service is restored, the device must be thoroughly flushed. This is accomplished by completely removing the float check and opening the inlet shut-off valve to flush debris that may foul the device.
8. The size of the AVB shall not be less than the size of the water supply piping.
9. The AVB shall be installed in accordance with the device's operating pressure and temperature rating.
10. The AVB shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
11. A permanent platform is necessary whenever the device is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the device and must meet all applicable safety standards and codes.
12. The AVB shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Inspection Requirements

The AVB shall be inspected at the time of installation and on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

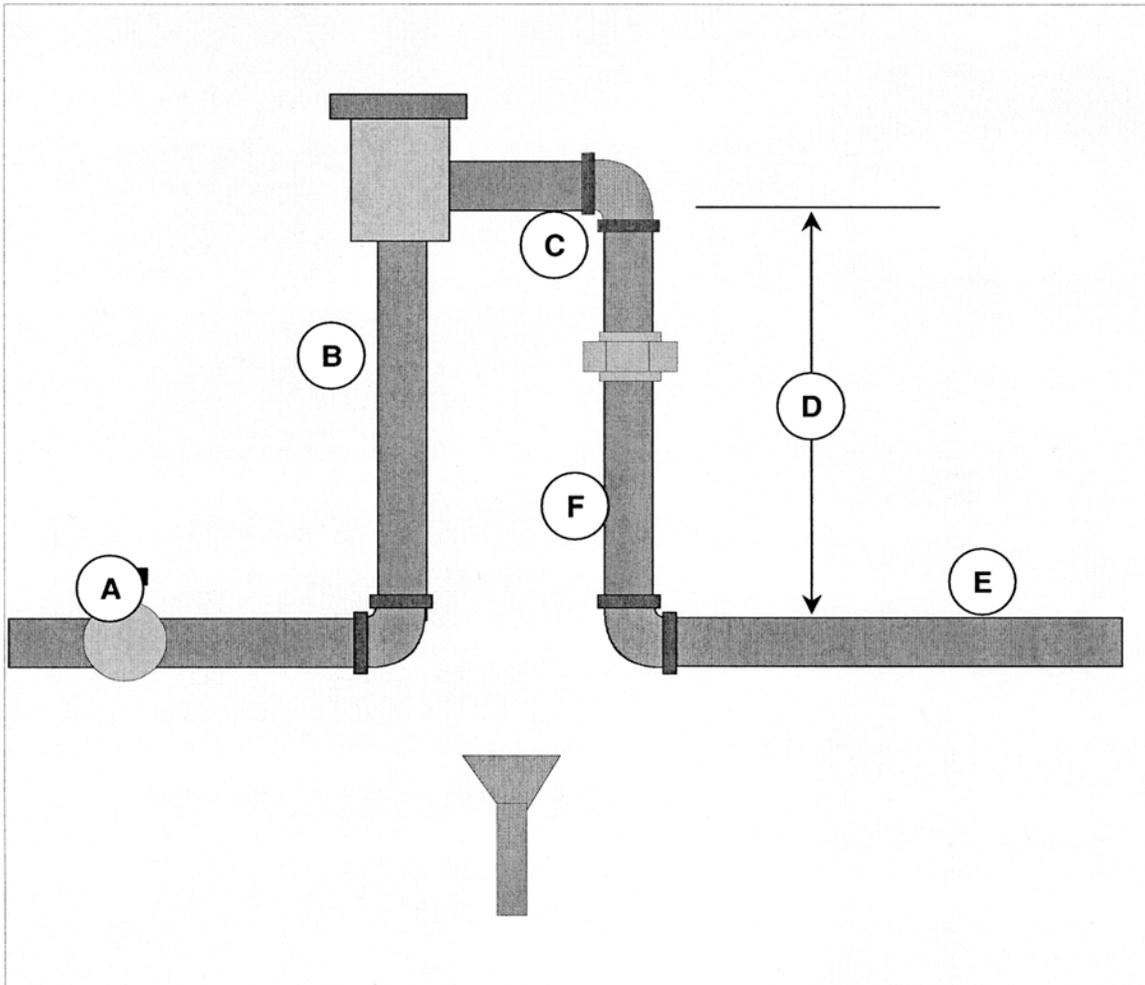
Cross-Connection Control Manual

ATMOSPHERIC VACUUM BREAKER



Outdoor Isolation Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union — above grade
D	Minimum 6" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform.
E	No valves allowed in outlet piping

Cross-Connection Control Manual
ATMOSPHERIC VACUUM BREAKER



Outdoor Isolation Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union
D	Minimum 6" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform.
E	No valves allowed in outlet piping
F	Provide adequate drainage

DOUBLE CHECK VALVE ASSEMBLY**Double Check Valve Assembly Defined**

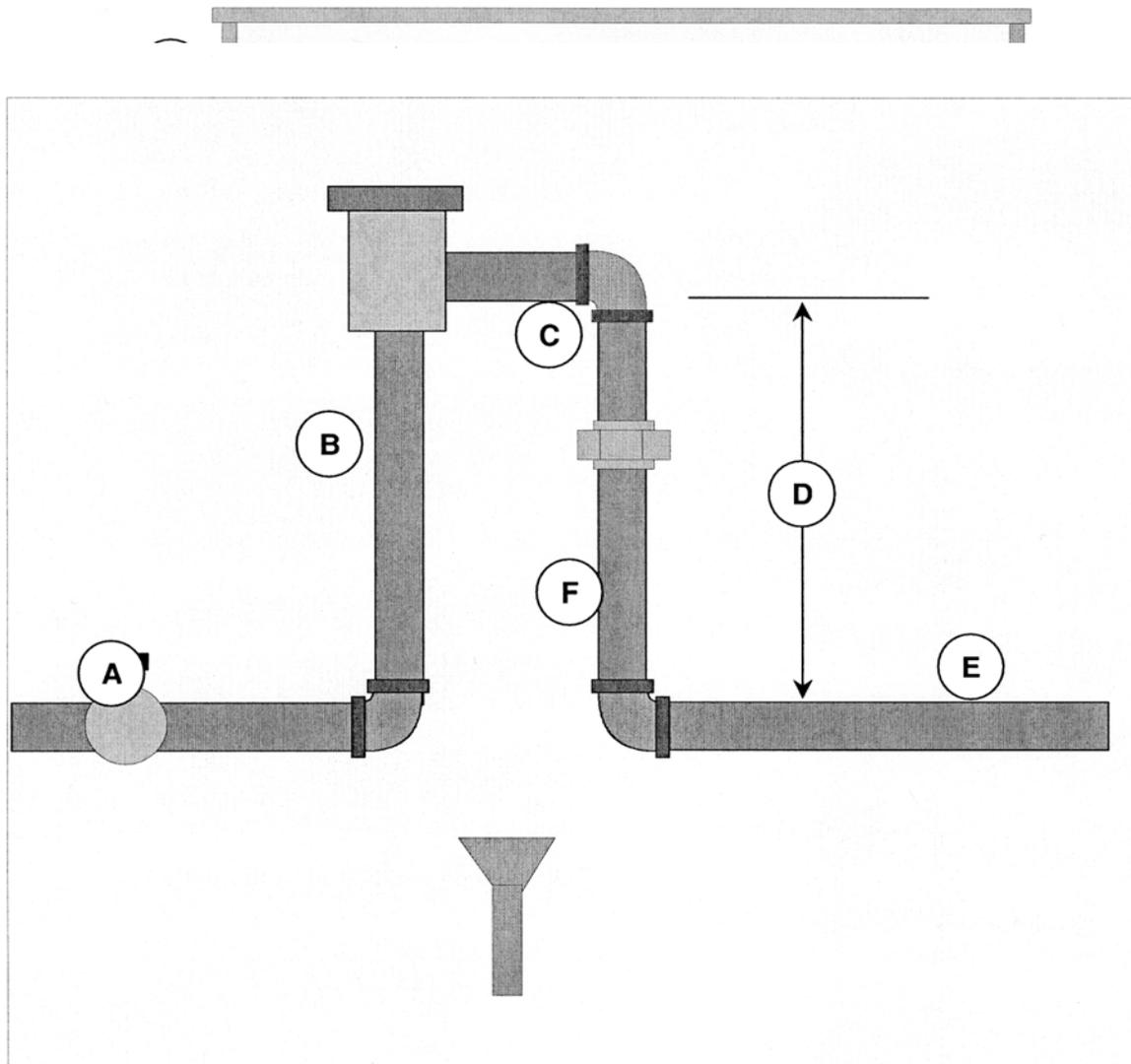
A double check valve backflow prevention assembly consists of two independently acting internally loaded check valves, four properly located resilient seated test ports, and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

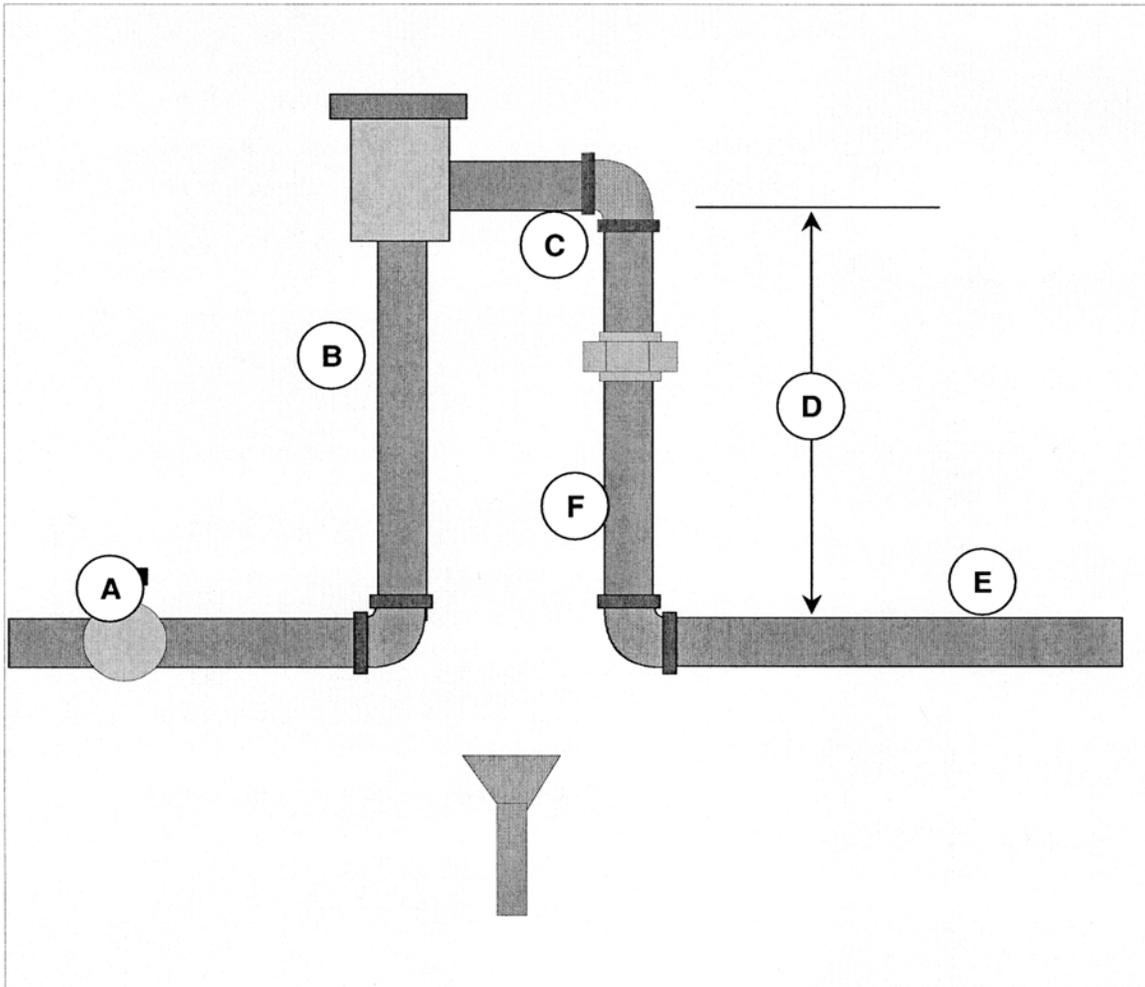
1. The DC must be installed between 12" and 36" above grade from the lowest part of the assembly for outdoor installations, and between 12" and 60" above floor or grade from the lowest part of the assembly for indoor installations.
2. The DC shall not be subjected to flooding. There shall be adequate drainage provisions to accommodate water discharge from flushing and testing.
3. Whenever the DC is insulated, the insulation must be easy to remove in order to facilitate testing and repair.
4. DCs must be installed horizontal and plumb unless specifically noted in the "List of Approved Backflow Prevention Assemblies" published by FCCCHR.
5. Thermal expansion and/or water hammer in the outlet piping of the assembly can cause excessive pressure (backpressure). A water hammer arrestor, thermal expansion tank, resilient seated check valve, or surge suppresser installed in the outlet piping is recommended to avoid damage to the piping system and the assembly.
6. Assemblies 2-1/2" and larger must be adequately supported.
7. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by completely removing the No. 1 check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.
8. The size of the DC shall not be less than the size of the water supply piping.
9. The DC shall be installed in accordance with the assembly's operating pressure and temperature rating
10. The DC shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
11. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
12. The DC shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Cross-Connection Control Manual

DOUBLE CHECK VALVE ASSEMBLY



Outdoor Installation	
A	Shutoff valve and valve box
B	Thrust blocking
C	Service line — cement line ductile iron, copper, or galvanized piping
D	Sleeve with insulation (typical)
E	4" concrete slab (3000 psi, reinforced w/1/2 rebar & 4" mesh, scored)
F	12" minimum / 36" maximum from lowest part of assembly
G	Metal supports on assemblies 2½" and greater (typical)
H	Unions or flanges — above grade (typical)



Indoor Installations	
A	Service line — cement lined ductile iron, copper, or galvanized piping
B	Sleeve with insulation (typical)
C	12" minimum / 36" maximum from lowest part of assembly
D	Metal supports
E	Unions or flanges
F	Provide adequate drainage

Defined

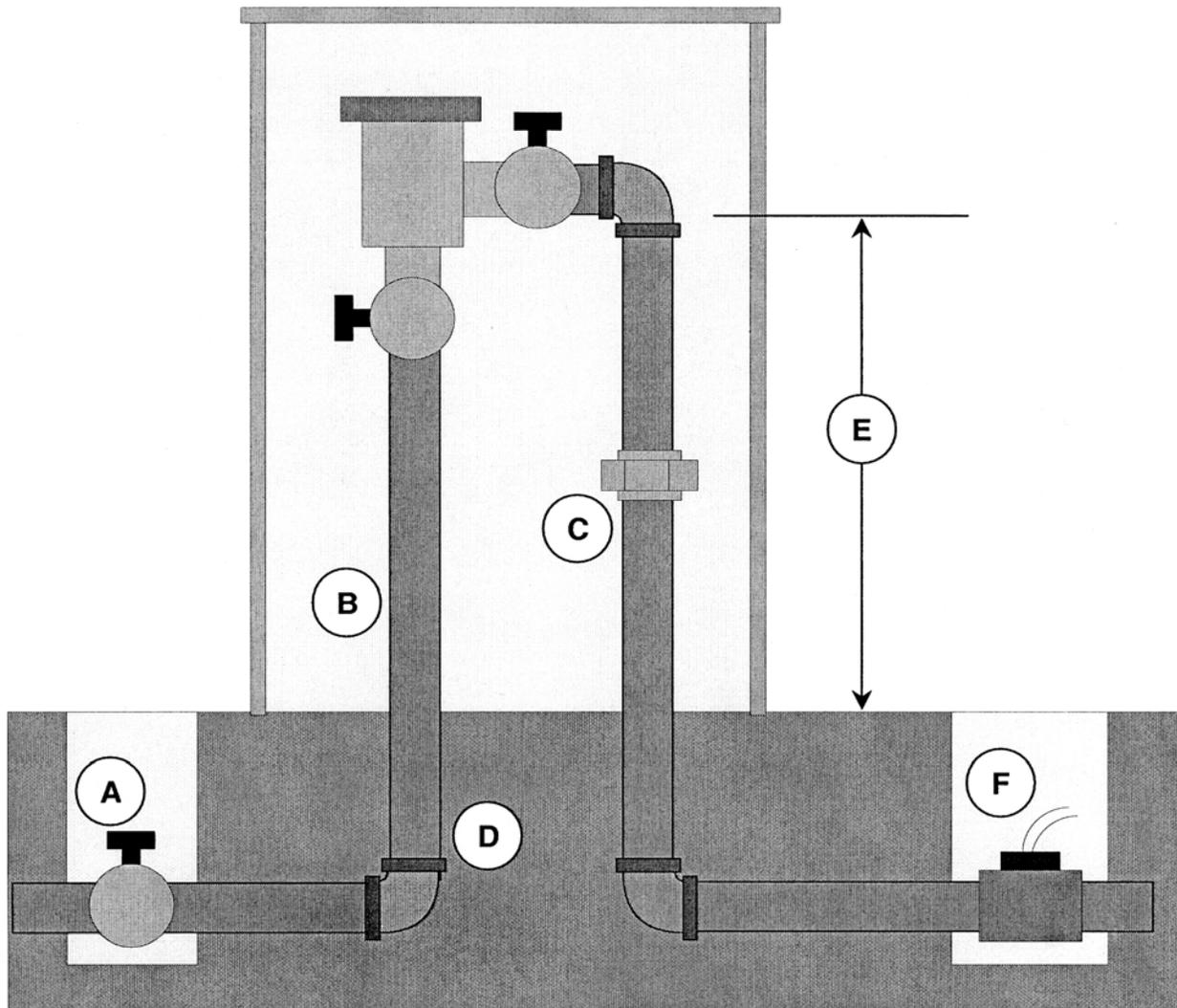
A pressure vacuum breaker assembly consists of an independently operating internally loaded check valve and an independently operating loaded air inlet valve on the discharge side of the check valve. The assembly shall be equipped with two properly located resilient seated test ports and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The PVB shall be installed between 12" and 60" above grade, floor, or platform and at a minimum of 12" above the highest point of the assembly's outlet piping. The assembly installation shall include unions.
2. There shall be adequate drainage provisions to accommodate water discharge from flushing and testing.
3. Whenever the PVB is insulated, the insulation must be easy to remove in order to facilitate testing and repair.
4. PVBs must be installed horizontal and plumb.
5. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by completely removing the air inlet valve and the check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.
6. The size of the PVB shall not be less than the size of the water supply piping.
7. The PVB shall be installed in accordance with the assembly's operating pressure and temperature rating.
8. The PVB shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
9. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
10. The PVB shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.
11. In containment applications, the PVB shall only be used for dedicated lawn irrigation systems such as parks, medians, and golf courses.

Cross-Connection Control Manual

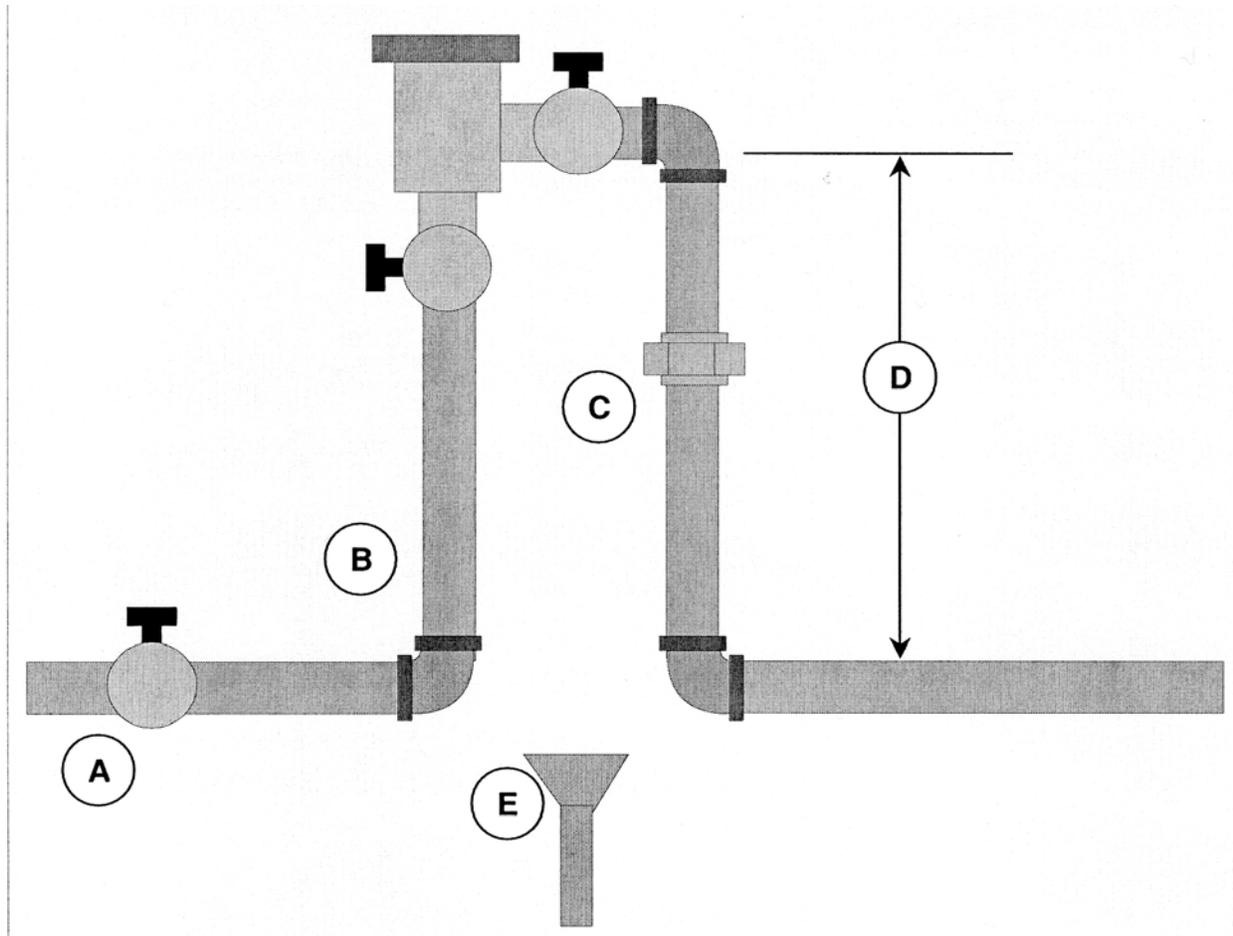
PRESSURE VACUUM BREAKER



Outdoor Installations	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union — above grade
D	Protective enclosure
E	Minimum 12" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform
F	Master or zone valve — if applicable

Cross-Connection Control Manual

PRESSURE VACUUM BREAKER



Indoor Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union
D	Minimum 12" above all outlet piping. Installations more than 60" above grade or floor require a permanent platform
E	Provide adequate drainage

REDUCED PRESSURE PRINCIPLE ASSEMBLY**Defined**

A reduced pressure principle backflow prevention assembly consists of two independently acting internally loaded check valves and a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve. The assembly shall be equipped with two properly located resilient seated test ports, and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The RP must be installed between 12" and 36" above grade from the lowest part of the assembly for containment installations, and between 12" and 60" above floor or grade from the lowest part of the assembly for isolation installations. The assembly shall not be subjected to flooding.
2. Drainage requirements for the RP must be hydraulically calculated to handle the maximum relief valve discharge rate; see "Relief Valve Discharge Rates" chart on page 43. Most manufacturers' air-gap drains are designed to only handle occasional "spitting" from the relief valve and will not accommodate a full discharge. An approved air-gap separation at the relief valve is required.
3. RPs must be installed in locations where intermittent and continuous discharge from the relief valve will not be objectionable.
4. Whenever the RP is insulated, precautions must be taken to prevent blockage of the relief valve opening and access to components. The insulation must be easy to remove in order to facilitate testing and repair.
5. RPs must be installed horizontal and plumb unless specifically noted in the "List of Approved Backflow Prevention Assemblies" published by the FCCCHR.
6. Thermal expansion and/or water hammer in the outlet piping of the assembly can cause excessive pressure. A water hammer arrestor, thermal expansion tank, spring-loaded resilient seated check valve, or surge suppresser installed in the outlet piping is recommended to avoid damage to the piping system and the assembly.
7. Fluctuating inlet pressure may cause intermittent discharge of the relief valve and eventual fouling of the assembly. In a static condition, the zone between the two check valves must be maintained at least 2.0 psi below the supply pressure. A resilient seated check valve installed in the inlet piping of the RP is recommended to maintain constant pressure of the zone during water supply pressure fluctuations.
8. Assemblies 2-1/2" and larger must be adequately supported.
9. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by

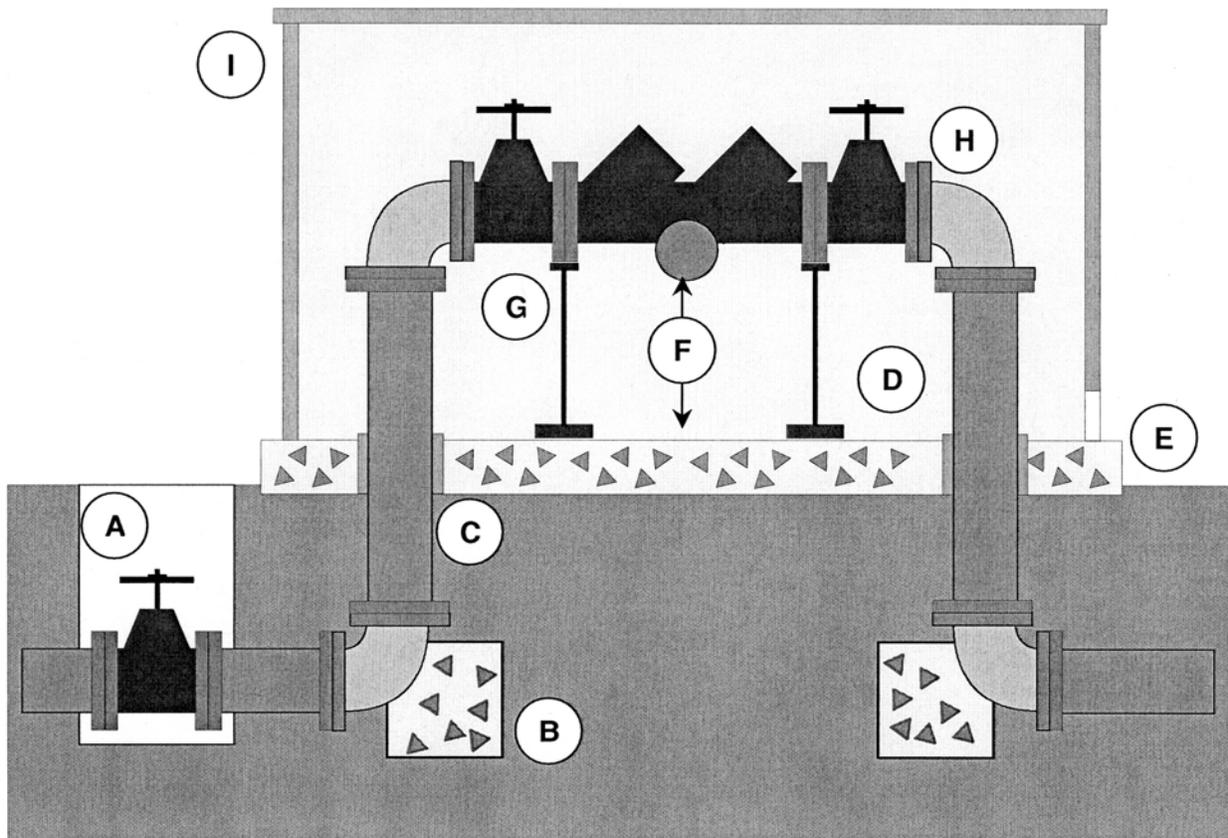
REDUCED PRESSURE PRINCIPLE ASSEMBLY

completely removing the No. 1 check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.

10. The size of the RP shall not be less than the size of the water supply piping.
11. The RP shall be installed in accordance with the assembly's operating pressure and temperature rating.
12. The RP shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
13. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
14. The RP shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Cross-Connection Control Manual

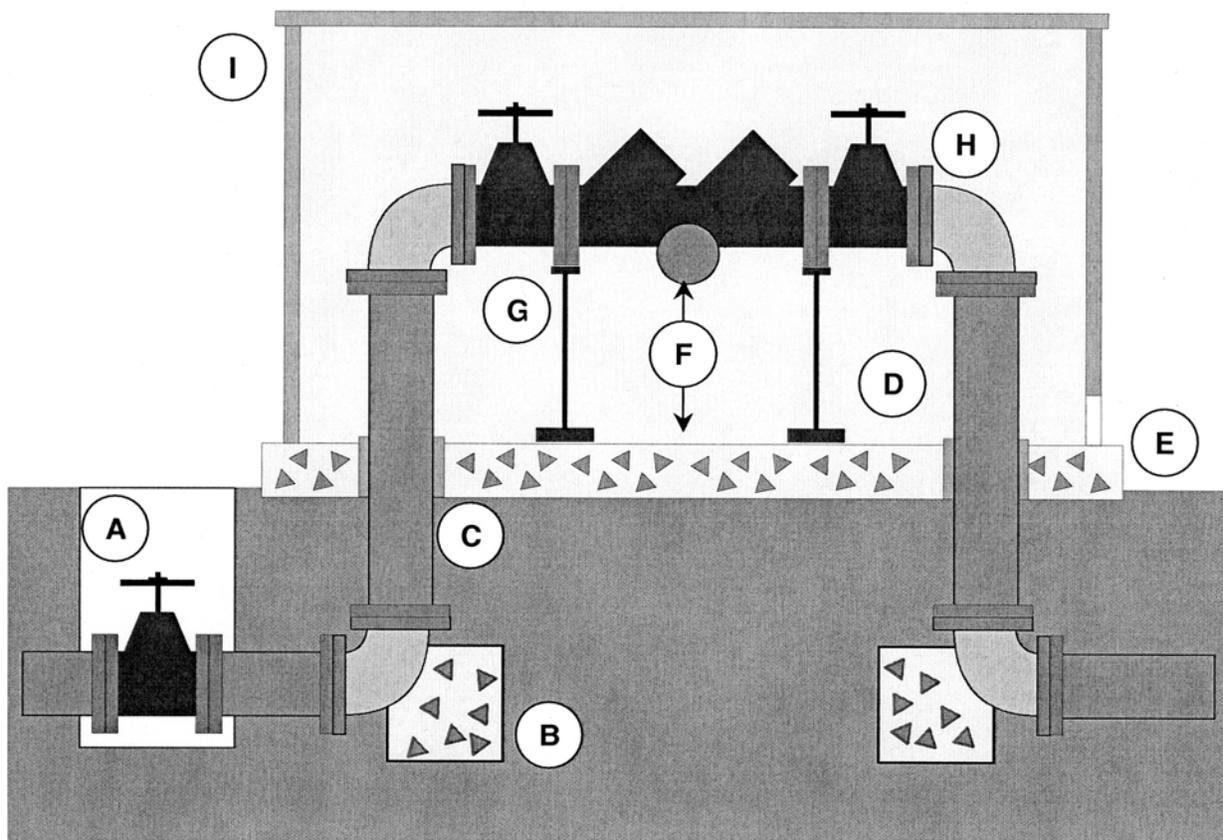
REDUCED PRESSURE PRINCIPLE ASSEMBLY



Indoor Installations	
A	Service line — cement lined ductile iron, copper, or galvanized piping
B	Sleeve with insulation (typical)
C	12" minimum / 60" maximum from lowest part of assembly
D	Metal supports
E	Unions or flanges
F	Provide adequate drainage (see "Relief Valve Discharge Rates" page 43)

Cross-Connection Control Manual

REDUCED PRESSURE PRINCIPLE ASSEMBLY

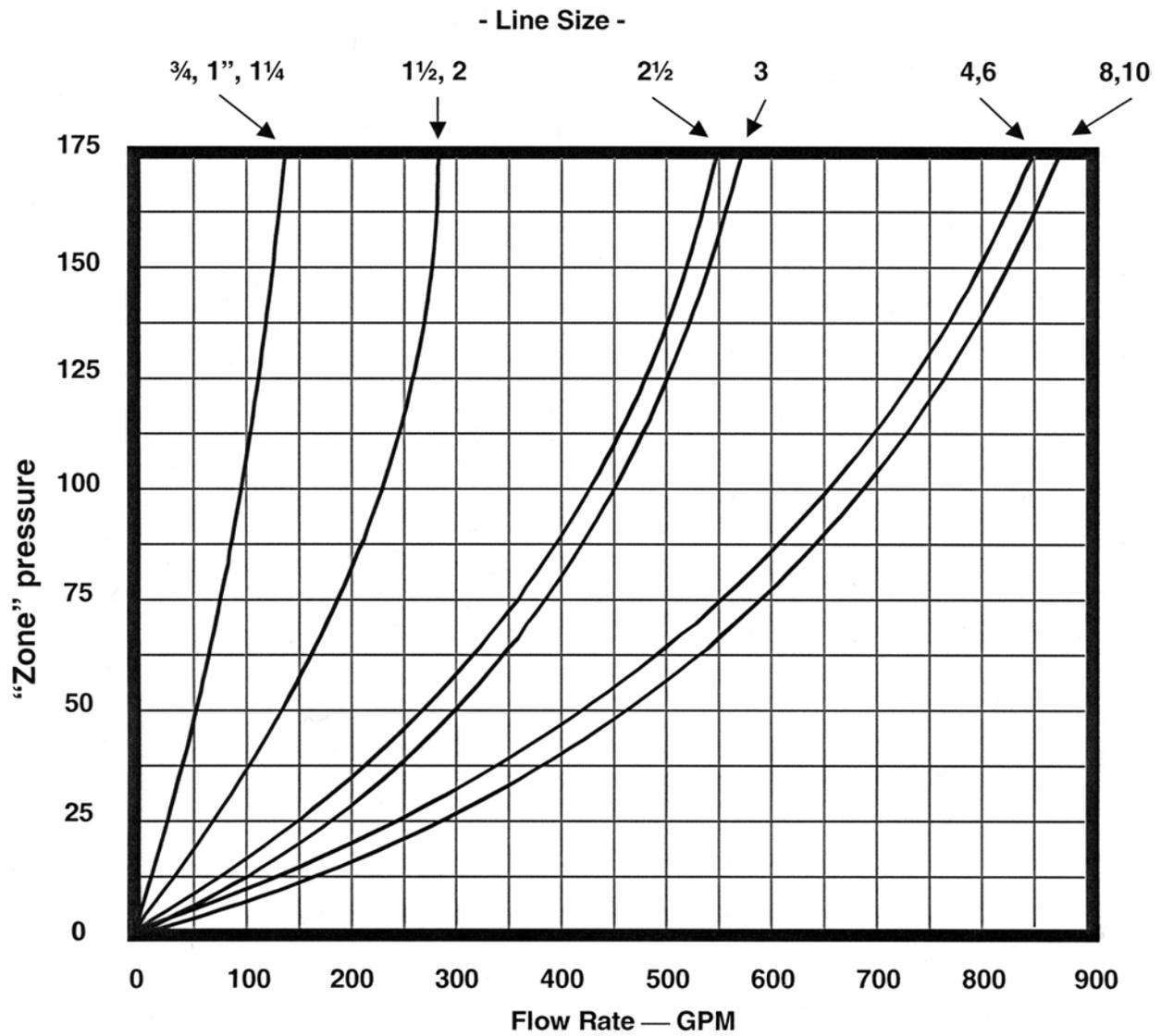


Outdoor Installations	
A	Shutoff valve and valve box
B	Thrust blocking
C	Service line — cement lined ductile iron, copper, or galvanized piping
D	Sleeve with insulation (typical)
E	4" concrete slab (3000 psi, reinforced w/1/2" rebar & 4" mesh, scored)
F	12" minimum / 36" maximum from lowest part of assembly
G	Metal supports on assemblies 2½" and greater (typical)
H	Unions or flanges — above grade (typical)
I	Protective enclosure with drain (see "Relief Valve Discharge Rates" page 43)

Cross-Connection Control Manual

REDUCED PRESSURE PRINCIPLE ASSEMBLY

Relief Valve Discharge Rates



Flow Rate	Drain Size	Flow Rate	Drain Size
55	2	350	5
112	3	450	6
170	4	760	8

SPILL-RESISTANT PRESSURE VACUUM ASSEMBLY**Defined**

A spill-resistant pressure vacuum breaker assembly consists of an independently operating internally loaded check valve and an independently operating loaded air inlet valve on the discharge side of the check valve. The assembly shall be equipped with one properly located resilient seated test port and vent valve and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The SVB is intended for indoor installations.
2. The installation requirements for the SVB are the same as the requirements for the PVB.

Education and Training

The Cross-Connection Control Program Manager will establish and maintain cross-connection control education and training for Ft Bliss personnel. Continuous education and training of personnel is essential to insure that people involved in every part of the program have current information. Examples of continuous education and training are as follows:

1. Contractor orientation on acceptable new construction practices. This is applicable to all crafts prior to beginning work.
2. Awareness workshops for Ft. Bliss personnel such as engineers, inspectors, designers, janitorial, and all crafts.
3. Manufacturer hands on training on the use of product used at Ft. Bliss.
4. Forty-hour certification courses repeated every three years.
5. Distribution of printed material for building occupants.

Severability

If any provision, section, subsection, sentence, clause, or phrase of this manual, or the application of same to a given set of circumstances, is for any reason held to be invalid, the validity of the remaining portions of the manual shall not be affected.

Violations

The following shall be grounds for the discontinuance of water service:

- Removal or bypassing of any backflow prevention method, device, or assembly;
- Falsification of test reports;
- Obtaining water from a fire hydrant in violation of cross-connection control requirements;
- Connecting a fire protection system to a premises potable water system;
- Allowing uncontrolled cross connections to exist; or
- Failure to cooperate in the installation, maintenance, testing or inspection of backflow prevention assemblies as required by this guidance. Water service shall not be restored until such conditions are corrected.

Discontinuance of water service may be immediate, and without written notice, whenever, in the judgment of the Cross-Connection Control Program Manager, such action is necessary to protect the safety of the premises or the purity of the water distribution system.

Cross-Connection Control Manual

APPROVAL

Approved this ____ day of _____, 2001

By _____

Cross-Connection Control Manual**REFERENCES and WORKS CITED**

- 16 Texas Administrative Code, Chapter 65. Administrative Rules of the Texas Department of Licensing and Regulation.
- City of Albuquerque, Cross Connection Prevention and Control Ordinance. Albuquerque. 1995.
- El Paso Water Utilities Public Service Board. Cross-Connection Control Program, Manual of Procedures. El Paso. 1996.
- Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California. Manual of Cross-Connection Control. 9th ed. Los Angeles, 1993.
- International Association of Plumbing and Mechanical Officials. Uniform Plumbing Code. 2000 ed. Walnut, 1999.
- Lower Valley Water District, Cross-Connection Control Program, Manual of Procedures. Socorro. 1999.
- New Mexico Environment Department, Title 20 Environmental Protection, Chapter 7. Wastewater and Water Supply Facilities.
- Texas Administrative Code. Chapter 290, Public Drinking Water.
- Texas Health and Safety Code, Chapter 341. Minimum Standards of Sanitation and Health Protection Measures.

Revision Number: 4
Revision Date: 30 March 2009

**Fort Bliss Directorate of Public Works Environmental Division
Requirements for Planning, Design, and Construction**



PURPOSE

This document provides guidance on environmental requirements, policies, and general concerns based upon previous experiences pertaining to the Fort Bliss Army Installation. The purpose of this document is to ensure that all information gaps regarding environmental issues associated with proposed construction projects are closed. The information contained herein serves as an environmental reference for project stakeholders throughout all phases of construction-related activities (conceptual, proposal phase, design, and construction). Topics addressed are derived from a combination of feedback provided for NEPA project document reviews, and information communicated to stakeholders at construction-related project meetings by Directorate of Public Works-Environmental Division (DPW-E) staff. This is a living document, and as such, all information is subject to change as policies are revised, legal requirements change, and new environmental impacts are identified.

Note: All construction activities need to be reviewed by DPW-E prior to any ground disturbance to ensure there are no environmental issues, including historic properties.

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AIR QUALITY

Refrigeration (Comfort Cooling/Dining Facilities/Cold Storage)

The use of non-ODC (ozone depleting compounds) shall be used in any refrigeration unit. Class II ODC will be phased out starting 2020 and use of non-ODC will meet phase out deadline and requirements under Clean Air Act, Title VI (40 CRF 82).

ARCHEOLOGY

Archeological sites, artifacts, and historic buildings on Fort Bliss are protected by Federal law and Army regulations. Surface collection, excavation, or willful destruction of archeological sites and artifacts (arrowheads, pottery, bottles, etc.) is subject to criminal penalties including fines and incarceration. Disturbing human graves or remains is strictly protected by law. Willful excavation or disturbance of human burials is subject to criminal penalties including fines and incarceration. In the event of inadvertent discovery of archeological sites, artifacts, or human remains, cease work and contact DPW-E Archeology staff.

ASBESTOS

Asbestos Management Requirements

IAW 40 CFR 61 NESHAP, an asbestos survey is required to determine if regulated asbestos containing material (RACM) in excess of the regulatory thresholds will be disturbed. In the event that RACM will be removed above the regulatory thresholds, a 10- day notice to the State will be required to be submitted. All demolitions will require the 10-day notification regardless of whether a building contains asbestos. Asbestos disposal requires a Hazardous Waste Manifest for tracking purposes. Hazardous Waste Manifests for asbestos will be signed by the Asbestos Contractor as the Generator's Representative. In addition, asbestos must be disposed of by the contractor at an off-post approved landfill that accepts asbestos-containing material at the contractor's expense. All other regulated and hazardous wastes must be properly handled, stored, and disposed of in accordance with local, state, and federal laws and regulations.

LEAD

Lead Management Requirements

Prior to building demolition, a Toxicity Characteristic Leaching Procedure (TCLP) sample for lead shall be sampled and analyzed in accordance with EPA's SW 846 procedure. If the sample is determined to be above the TCLP threshold, the lead-containing material must be disposed of by the contractor at an off-post approved landfill that accepts lead-containing material at the contractor's expense. In the event that building material will be segregated, the waste stream will be identified and a TCLP sample shall be analyzed for Lead IAW EPA's SW 846 procedure. Only non lead-containing material may be offered for reuse.

Whole building demolition debris

Consists of all building components (painted and non-painted) to include wood, brick, cement (foundations), plaster, drywall, etc. that are torn down during demolition and collected for disposal. Waste characterization is based on analyses of samples that are "representative" of the waste. Therefore, proportionate quantities of the various structural components can be obtained (e.g., by coring or drilling through the materials) and combined for analyses in accordance with the TCLP requirements.

Partial Demolition (Building Renovation)

May consist of a variety of components (painted and non-painted) such as those in whole building demolition debris, but does not entail entire building/structure. Same sampling procedures as discussed above may be used. A second option involves careful predetermination and characterization of the individual components to allow for special waste handling and segregation procedures during the operations. Careful segregation is more feasible for renovations/partial demolitions than for whole building demolition and may reduce the volume of hazardous waste. Where segregation is not practical for a particular operation the overall "representative" sample approach should be used. A cost analyses may be beneficial to determine waste management practices

EPAS

The Army's Environmental Performance Assessment System (EPAS) program is administered through the DPW-E Multimedia Compliance Branch. The goal of this program is to administer environmental compliance audits objectively and comprehensively, provide professional and technically correct audits, and foster environmental responsibility in all personnel who can affect the environment at Fort Bliss. EPAS staff will coordinate with the appropriate construction project personnel to schedule audits.

HAZARDOUS MATERIAL

Definition

Any item or chemical which is a "health hazard" or "physical hazard" as defined by the Occupational Safety and Health Act (OSHA) in 29 CFR 1910.1200, which includes the following:

- (1) Chemicals which are carcinogens, toxic, or highly toxic agents, reproductive toxins; irritants, corrosives, sensitizers, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucus membranes.
- (2) Chemicals which are combustible liquids, compressed gases, explosives, flammable liquids, flammable solids, organic peroxides, oxidizers, pyrophorics, unstable (reactive) or water-reactive.

(3) Chemicals which in the course of normal handling, use, or storage operations may produce or release dusts, gases, fumes, vapors, mists or smoke which have any of the above characteristics.

(4) Any item or chemical which is reportable or potentially reportable or notifiable as inventory under the requirements of the Hazardous Chemical Reporting (40 CFR 370), or as an environmental release under the reporting requirements of the Toxic Chemical Release Reporting: Community Right To Know (40 CFR 372), which include chemicals with special characteristics which in the opinion of the manufacturer can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other receptacles).

(5) Any item or chemical which, when being transported or moved, is a risk to public safety or an environmental hazard and is regulated as such by one or more of the following:

- (a) Department of Transportation Hazardous Materials Regulations (49 CFR 100–180).
- (b) International Maritime Dangerous Goods Code of the International Maritime Organization.
- (c) Dangerous Goods Regulations of the International Air Transport Association.
- (d) Technical Instructions of the International Civil Aviation Organization.
- (e) U.S. Air Force Joint Manual, Preparing Hazardous Materials for Military Air Shipments (AFJMAN 24–204).

Hazardous Material Storage-Interior

Any maintenance bay (Tactical Equipment Maintenance Facility (TEMF)) or other facility containing hazardous materials must allocate (in design documents) space for hazardous material storage areas (in accordance with compatibility of materials being stored). Specifically, the inside of the facility must contain a designated area for flammable lockers, and secondary containment for hazardous materials being used. Fluid distribution rooms within TEMFs require secondary containment for all hazardous materials (e.g., petroleum, oil, lubricant, and antifreeze products). Floor drains within fluid distribution rooms are not permitted.

Hazardous Material Storage-Exterior

The outside of the facility must contain a designated area for a self-contained Hazstore building (with segregated compartments to provide for storage of incompatible materials such as acids, caustics, reactive metals, ractive organic compounds, flammable solvents, and oxidizers) or buildings depending on quantities used. This area must also be able to be accessed by a 10K forklift. Hazardous material is always separated from hazardous waste and for this reason, Hazstore buildings should be considered discrete requirements for each media (materials and waste).

Best Management Practices (BMPs) for storm water require that secondary containment be provided to preclude rain flows from carrying hazardous material contaminants.

Roofs are BMPs that are usually built over these secondary containment areas to preclude evacuation of rain waters after each event from containment area. Unroofed areas have valves that allow rain water release from containments but are problematic because units leave valves open continuously to avoid opening and closing the valves after rain events. These areas are usually secured by fencing by the unit to protect costly materials for accountability reasons.

HAZARDOUS WASTE

Definition

A waste identified in Section 3, Part 261, Title 40, Code of Federal Regulations (40 CFR 261.3) or applicable foreign law, rule, or regulation.

Hazardous Waste Generation-Contractor

Hazardous waste generated incidental to the execution of service or construction contracts should be disposed of by the contractor performing the basic contract, at the contractor's expense, using the installation's generator identification number on the manifest. Such actions must be coordinated with the installation environmental coordinator and documented in writing.

Hazardous Waste Storage

Definition

As defined in 40 CFR 260.10, the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere.

Description

Storage of hazardous waste requires control, segregation of compatibles, and secondary containment. HazStor buildings are preferred by DPW-E because they set a standard for storage and send a clear message that hazardous waste is highly regulated. Non-compliance with hazardous waste storage regulations results in expensive fines (\$15,000/day). HazStor buildings are weather tight, have ramps, secondary containment, shelving, and barriers to separate incompatibles. Although HazStor buildings are not required, their characteristics must be incorporated into all hazardous waste storage designs. Any new construction designs should include ramping (drums are heavy), material incompatibility (physical barriers), secondary containment, control, and proper signage. Two HazStor modulares (12'x24'); one being 3-compartments, and one being a single compartment is sufficient for each side of the current 2-sided motorpools.

HISTORICAL ARCHITECTURE

DPW-E maintains a list of buildings that require review under Section 106 of the National Historic Preservation Act prior to expenditure of funds for modification, repair,

renovation, or other change to the interior or exterior, including landscape. New construction and exterior renovations to existing facilities not on the list also requires review if the facility is within the viewshed. Contact DPW-E prior to starting work on any project involving new construction or changes to existing facilities or landscapes.

LANDSCAPING (AT ANY BUILDING)

Implementing the following recommendations will promote long term success resulting in water conservation, reduction in expenditures, and fewer maintenance needs.

(1) Use species from the “Top 10 Trees for Fort Bliss Landscape Projects” poster (copies available upon request). Tree selections include Honey Mesquite (*Prosopis glandulosa* var. *glandulosa*), Chinese Pistache (*Pistacia chinensis*), Western Soapberry (*Sapindus drummondii*), Honey Locust (*Gleditsia triacantha* var. *inermis*), Desert Willow (*Chilopsis linearis*), Afghan Pine (*Pinus eldarica*), and Escarpment Live Oak (*Quercus fusiformis*). These species are “water smart” plants, have fewer pests (if any), and once established, require little of no fertilization and will increase the chances for long term landscape success. These trees are either native or adaptable to the arid environment of Fort Bliss.

(2) An exhaustive list of low-water use trees, shrubs, and other plant options for our region can be consulted on species lists prepared by El Paso County, Texas. The Environmental Division has copies of these lists as well.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

All construction actions must undergo NEPA analysis prior to project ground-breaking. NEPA reviews may include project designs, specifications, and plans. A complete description of the action should be presented at the time of the generation of the 1391. The Fort Bliss NEPA Team will review and then generate a Tab J for the project that may include NEPA documentation. If the proposed action has been reviewed in previous documentation, that documentation must be supplied. If the project is part of a wider action or if project descriptions indicate a potential for significant action or for not meeting the screening criteria as set forth in 32 CFR 651.29, then the Tab J will not include the requisite NEPA documentation. Funding for separate NEPA analysis will then need to be obtained by you or the proponent through the proper funding process. This NEPA documentation can be at the level of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), so early planning is essential. The NEPA Coordinator, with concurrence of the NEPA Board, can assist in determining the level of analysis required, generating the proper documentation, and if possible, in changing the proposed action to one that will require a lower level of environmental review.

PESTICIDES

Pesticides are chemicals designed to kill a variety of pests, pose a health risk if mishandled, and are highly regulated. Only certified applicators that are coordinated with the Installation Pest Management Program (IPMP) are allowed to handle and apply

pesticides at Fort Bliss. Technicians are not approved to apply pesticides on the installation.

All contracts involving pesticide applications must be coordinated with the Installation Pest Management Coordinator (IPMC) at DPW-E. The types and amounts of pesticides used on the installation must be recorded and submitted to the IPMC using the IPMP formats.

PETROLEUM STORAGE TANKS

Automated Used POL Collection Systems

In the past, automated, pneumatic used oil and used antifreeze collection systems have been installed in several TAC shops. These systems have had numerous problems and have not worked well for Fort Bliss.

These systems are high maintenance and very expensive to repair. Common problems include but are not limited to:

- (1) The system continues to pump used oil/antifreeze into the Aboveground Storage Tank (AST) until it overflows or squirts fluid out thru the tank vent.
- (2) The collection sump overflows because the sensor in the sump does not trigger the pump. The expense to replace the pressure sensor device alone was \$5,000 at one site.
- (3) The underground lines get plugged-up from the debris in the used oil and antifreeze.
- (4) The underground lines need to be tightness tested annually and if they fail, the floor must be torn up to repair them. Cathodic protection is required for steel POL lines buried in concrete but these lines do not have it. All POL lines need to be installed aboveground to avoid these issues.

Automated systems are over-engineered and rely too heavily on mechanical devices that fail. There needs to be human involvement in the disposal of these used POL fluids to prevent spills and releases to the environment. In summary, these systems are too automated, resulting in lack of attention toward environmental issues.

The design plans usually refer to the used oil and antifreeze as “waste” oil and “waste” antifreeze. When the systems are installed, the word “waste oil” or “waste antifreeze” is usually painted on the tanks and piping. When a state or federal regulator sees the word “waste oil” he assumes that the oil is hazardous and contains solvents or other constituents besides oil. Therefore, label all used oil above ground oil tanks as “USED OIL”, and used antifreeze labeled as “USED ANTIFREEZE”.

Even if an AST has an automatic tank monitor (like a Veeder Root brand ATG), it should also have a visual gauge on the tank so that personnel can easily check the fluid level at a glance. This helps to prevent overfills and spills of used POL. If this gauge is a Morrison Clock Gauge, ensure that the gauge has a marking to indicate the capacity for the tank. Many people do not know how to read a clock gauge so they cannot tell when it is full. A simpler gauge that shows ¼, ½, ¾, Full is preferable.

Petroleum Storage Tanks

- (1) The used oil and antifreeze collection systems that have been installed in several motor pools at Fort Bliss are not well designed and have not worked well. They require frequent, expensive repairs and they also cause frequent overflows of their aboveground storage tanks. A better design is needed. Perhaps the best plan would be a simpler one where the soldiers empty the used POL into an AST by hand.
- (2) If fuel tankers are to be parked at motor pools, they need to have a secondary containment that will hold the contents of the largest tanker in the containment plus about 10% for rainwater. The containment needs to have a lockable drain on the low side to remove rainwater.
- (3) Underground Storage Tanks (USTs) are highly regulated and environmentally risky. ASTs make more sense.
- (4) Underground piping is an additional environmental burden. They need to be cathodically protected to prevent corrosion and they need to be tested for leaks annually. Try to avoid installing underground piping for POL.
- (5) Aboveground POL tanks should have double-wall construction, spill/overflow protection, and a release monitoring system (automatic tank gauge with alarm). The alarm should be located where someone can hear it. These tanks are the object of continuous fill/pump operations. A staircase adjacent to the tanks to make it safer for additions of fluids is appropriate. Currently, heavy 5 gallon containers are raised over the head making it unsafe and also more risky for spills. Secondary containment berms around the tanks are a good idea; spills can be contained in a limited area and easily cleaned up.
- (6) Aboveground POL tanks need to be located on a concrete pad. Even double-wall ASTs are prone to overfills and spillage so they need to be situated on a paved surface to avoid expensive cleanups of contaminated soil.

STORM WATER

Guidance for Construction Storm Water Pollution Prevention Plans (SWP3's) & Permits

Spills - All potentially polluting material should be labeled and stored in original containers where possible and be sealed or covered to prevent contact with storm water or storm water runoff. MSDS's of all materials must be maintained on site. A list of these materials should also be included in the SWP3. All spills or releases of hazardous waste, materials, fuels, oils or lubricants should be reported to Fort Bliss Fire Department (915) 568-1117 or (915) 568-5283. The Fire Department will notify other Fort Bliss entities including Environmental Division which will notify regulatory authorities if reportable quantity thresholds are exceeded.

Storage Tanks - Storage of liquid materials, including fuels, requires impervious secondary containment equal to 110% of stored capacity. A spill response kit shall be maintained at each fuel storage and dispensing location. Drip pans or other temporary containments shall be used during fuel transfers to prevent leaks at the most vulnerable locations; for example hose couplings and beneath the nozzle at the point of transfer to the vehicle. Any rain water accumulated in secondary

containments must be considered contaminated if oil or oil sheen is visible. Disposal of contaminated rain water must be coordinated with the installation the Petroleum Storage Tank Manager (915) 568-6959 or Storm Water Manager (915) 568-0794.

Disposing of hyper chlorinated water - During disinfection of newly installed waterlines, chlorinated water to be discharged to the environment (or storm water conveyance system) shall be neutralized to achieve a maximum residual chlorine concentration of 4 parts per million, in accordance with AWWA standard C651.

Construction Water Service - The Fort Bliss Water Services Company ((915) 569-5360) shall designate a hydrant or stand pipe to assist contractors during construction. A water meter and an approved backflow prevention assembly shall be maintained at all times of operation at the hydrant or standpipe. The water fill area shall be designed and maintained to insure that water does not accumulate causing a vector attractant or erosion. All backflow prevention assemblies shall be tested for proper operation by a backflow prevention technician registered with the Cross-Connection Control Program Manager (CCCM). Contact the CCCM at (915) 569-5359 to schedule testing. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

Hazardous Waste – Construction Site Operators must contact the Environmental Division, Hazardous Waste Program Manager for installation policies and guidance on hazardous waste management prior to accumulation of any HW waste at their sites. The Construction Site Operator is responsible for complying with state/federal hazardous waste management regulations, installation permit provisions, and installation HW Management Plan and SOPs and must provide the HW Program Manager with their waste transporter and disposal facility EPA identification numbers. Hazardous waste generated as result of construction or other activities on Fort Bliss property must be disposed of under authority of the Fort Bliss permit number and manifests must be signed by an authorized Fort Bliss Representative. Review and signature of the manifest must be scheduled with the Hazardous Waste Program Manager at (915) 569-6393 or (915) 568-7041.

Solid Waste / Recycling - The Fort Bliss landfill is only accessible to those contractors with a permit issued by the Directorate of Public Works, Building 777. All military construction, renovation and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition (C&D) waste by weight, from landfill disposal. Contract specifications will include submission of a contractor's C&D Waste Management Plan prior to the start of site clearance. All weight tickets for materials resold, recycled or reused will be reported to the Environmental Division, solid waste program manager.

Air / Dust Control - Water shall be applied at all construction/demolition sites to include unpaved roads for egress and ingress, staging and storage areas, stockpiles and debris piles, and parking lots for employees and workers. Dust shall be controlled during earth work, grading, and related activities that can create dust. All open-bed trucks shall have a cover or tarp to control dust when handling or hauling earth, aggregate or debris. Crushed rock, gravel or crushed asphalt can be used or applied on in-plant or on-site roads, staging areas, and or park areas to minimize water usage and control dust.

Waste Water - No foreign items, construction debris, chemicals, oils, etc., shall be introduced into the sanitary sewer collection system. Storm water runoff shall be directed away from the sanitary sewer collection system and storm water shall not be disposed into the sanitary collection system. State licensed temporary toilet facilities (i.e. Porta Potties) shall be utilized. There shall be no temporary toilet vaults or septic tanks installed without proper authorization from ENVIRONMENTAL DIVISION.

Document Submission Requirements - A copy of the completed SWP3 including planned start and stop dates, completed NOI and copy of actual construction general permit to should be provided to:

Directorate of Public Works

Master Planning

Attn: IMWE-BLS-PWM (Bldg. 777)

Pleasanton & Chaffee Roads

Fort Bliss, TX 79916

(915) 568-2757, 5949, or 5933

The City of El Paso and Fort Bliss storm water conveyance systems are interconnected. As a result, a courtesy copy should also be provided for informational purposes to the City of El Paso,

Kareem Dallo, P.E. or Ziad Al-Dasouqi, P.E.

Development Services Department

City Hall, 5th floor

2-Civic Center Plaza

El Paso TX 79901

Off: (915) 541-4788

Additional Information - Question regarding storm water pollution prevention plans on Fort Bliss should be directed to Mr. Kelly Blough, Multimedia Compliance Branch, Construction Storm Water Program Manager, Environmental Division, Attn: IMWE-BLS-PWE (Bldg 622), Pleasonton & Taylor Roads, Fort Bliss, TX 79916, (915) 568-0794 (kelly.blough@us.army.mil) or Mr. Jack Lady (915) 568-0558 (jack.lady@us.army.mil).

Summary of Fort Bliss – Texas Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice to state not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to Texas Commission on Environmental Quality.

SWP3 = Storm Water Pollution Prevention Plan – Document following Texas Commission on Environmental Quality approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent – Texas Commission on Environmental Quality form that a construction site operator submits to the state in order to receive construction site permit coverage.

Summary of Fort Bliss – New Mexico Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice of intent not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to US Environmental Protection Agency Region VI.

SWP3 = Storm Water Pollution Prevention Plan – Document following USEPA region VI approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent – Federal form that a construction site operator submits to the USEPA Region VI in order to receive construction site permit coverage.

SOLID WASTE MANAGEMENT & RECYCLING

Construction Waste Management-Reporting Landfill Diversion

Army policy dated Feb. 06, 2006 states that all military construction, renovation, and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition waste by weight, from landfill disposal. Contract specifications shall include submission of a contractor's C&D Waste Management Plan. Plan & diversion weights shall be submitted to the Solid Waste Program Manager, Directorate of Public Works-Environmental Division.

Recycling

Fort Bliss has single-stream recycling. This means that all recyclables will go into one container; no segregating. Papers (white, bagged shredded paper, magazines, cardboard, colored paper, newspapers), plastics (#1 and #2) and metal (tin & aluminum cans) all go into any blue recycling container (no more separating). Blue, deskside recycling containers are available by calling the Recycling Center at 568-1537. If your building has custodial service, the custodians will empty your recycling desk-side bin once a week. If you do not have custodial service, personnel will need to empty their recycling desk-side bins into the new outdoor recycling dumpster.

Any building that has a trash dumpster outside will also have a recycling dumpster. Architects-engineers (A-E) need to remember to include space outdoors for a recycling dumpster. Dining facilities need to include space for a roll-off because they generate lots of recyclables.

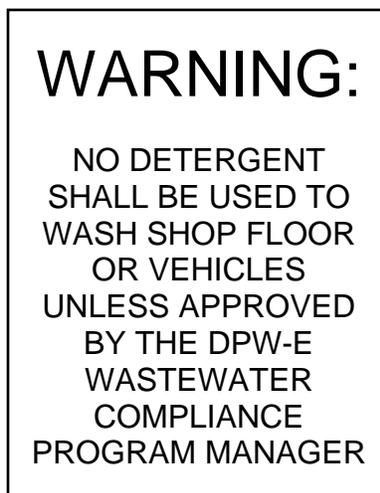
The dimensions for a recycling dumpster are 6 ft. wide X 5.5 ft deep X 6 ft. tall. The dimensions for roll-off are 22' 2" long X 7'7" wide X 6'6" tall.

WASTEWATER

Vehicle Maintenance Facilities and other repair facilities requiring washracks will have Oil Water Separators (OWS). All shop drains to the sewer systems will be placed so that they will not receive pollutants from repair activities. Repair activities (welding, painting, battery shops, grinding areas, etc.) will not produce waste streams that will find their way into the sewer drains.

OWS Signage

Proper OWS signage must also be included as described below:



(1) The oil/water separator (OWS) sign shall be approximately 2'-6" high by 2'-0" wide and white in color. Message lettering shall be all caps in black Helvetica and a minimum of 1-1/2" high. "WARNING" lettering shall be all caps in black Helvetica and a minimum of 3" high.

(2) The Contractor shall provide a minimum of two (2) signs per building for small and medium TEMFs and four (4) signs per building for large and extra large TEMFs. There shall be no less than one (1) sign centrally located per every four repair bays (eight repair work areas) and with no less than one (1) sign per side of building.

(3) Sign shall be permanently secured to the wall or structure with the bottom of sign at approximately 4'-0" above finished floor near the floor trench drains.

Dining Facilities/Kitchens must have grease traps and associated equipment to comply with local Fats, Oils, and Greases (FOG) requirements per El Paso Water Utilities Rule #15.

El Paso Water Utilities Public Service Board (PSB) Rule No. 9, together with applicable provisions of Rules and Regulations No. 1, No. 5, No. 6, and No. 15 set forth the uniform requirements for the discharge by any person of wastewater into El Paso's wastewater system.

Rule No. 9 states that no user shall discharge or cause to be discharged into El Paso's wastewater system any pollutant or wastewater except in conformity with Rule No. 9, the requirements of the act, the General Pretreatment Regulations in 40 C.F.R. Part 403, and applicable state laws. Rule No. 9 lists prohibited discharges, local pollutant limits, pre-treatment requirements, permitting requirements, permit conditions, reporting and monitoring requirements. Any discharges into the wastewater system must first be cleared by the Fort Bliss DPW-E.

Vehicle washing will be performed on approved wash racks where drains discharge through an Oil Water Separator. Washing that generates pollutants that exceed local wastewater limits and prohibited discharge standards must have appropriate controls to remove those pollutants prior to entering the sewer system. Vehicles that are excessively dirty (large amounts of mud or excessive amount of greases and oils) must be washed at the Central Wash Vehicle Facility to prevent from overloading the smaller motor pool wash racks.

Septic Tank and Leach Field Systems that are required because of the lack of connection to the sanitary sewer will only receive domestic type wastewater. No industrial or industrial like wastewater discharges (wash racks, defueling stations, OWS, etc) may be disposed into the septic tank. Septic Tanks, holding tanks and leach fields will not be authorized if a sanitary sewer tie-in is nearby. Septic tanks do not require a permit in the New Mexico Ranges but must be built to New Mexico standards.

WATER QUALITY

Potable Water Regulatory Policy

The Fort Bliss Water Services Company (FBWS) operates 9 water systems on Post: Fort Bliss Main Post, Biggs Army Air Field, Site Monitor, McGregor/Meyer Range Camp, Dona Ana Range Camp, Oro Grande Range Camp, Hueco Range Camp, SHORAD, and Redeye. The Directorate of Public Works (DPW) operates the Brigade Combat Team Facilities (BCTs) aka: East Biggs Water System, and the Combined Aviation Brigade Area (CAB) water system which is part of the Biggs AAF water system. DPW and FBWS are responsible for protecting the drinking water supply in accordance with State Regulations (Title 30 Texas Administrative Code 290.46(j), New Mexico Administrative Code 20.7.10.400(L)) from contamination or pollution which could result from improper water system plumbing construction or configuration. This policy only applies to the areas of the water system under the purview of the DPW. FBWS is responsible for their own policy for areas under their purview. Therefore, construction projects requiring potable water from the FBWS owned water system must be coordinated through FBWS, otherwise the following is applicable:

Customer Service Inspection certificates shall be completed prior to providing continuous water service to new construction or after significant plumbing renovations on any existing service or any existing service when the DPW has reason to believe that cross-connections or other potential contaminant hazard exist or after any material improvement, correction, or addition to the water distribution facilities which are under their respective purview. As unacceptable plumbing practices are discovered, they shall be promptly eliminated to prevent possible contamination of the water supply. Also, any backflow prevention devices installed shall be installed in accordance with the Fort Bliss Cross-Connection Control Manual (FBCCCM), and tested in accordance with the FBCCCM. Copies of the FBCCCM are available from the DPW-E Water Quality Manager.

The following practices are prohibited:

- (1) No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water supply in accordance with the FBCCCM.
- (2) No cross-connection between the public water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.
- (3) No connection which allows water to be returned to the public drinking water supply is permitted.
- (4) No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.
- (5) No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.

This policy applies to work completed on all Fort Bliss facilities whether work is done by contract or in-house. Activities must insure that their contractors/subcontractors follow this requirement.

Inspectors must possess proper credentials and be recognized as capable of conducting a customer service inspection certification by the State of Texas. Customer Service inspections may be performed by the following group members:

- (1) Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners.
- (2) Customer Service Inspectors licensed by the Texas Commission of Environmental Compliance (TCEQ).

Recognized Backflow assembly testers must possess a current license from the TCEQ.

Submit completed customer service inspection and/or backflow test forms to:

Directorate of Public Works Environmental Division (DPW-E)

IMWE-BLS-PWE

Bldg 622

Attn: Water Quality Manager

Fort Bliss, Texas 79916

Completed forms may also be submitted in person at Building 622, or by fax at 568-1333. Forms will be maintained by the DPW-E for a minimum of 10 years and be made readily available for review by the State regulatory entity.

Lawn Irrigation

A person may not sell, design, consult, install, maintain, alter, repair, or service irrigation in the state of Texas unless the person is licensed by the Texas Commission on Environmental Quality (TCEQ). A person who is licensed as an installer may only connect an irrigation system to a water supply while being under the direct supervision of a licensed irrigator.

POINTS OF CONTACT

Air Quality 915-568-5724
Archeology 915-568-6746/6999
Asbestos/Lead Paint 915-568-0931
EPAS 915-568-7578/569-6297
Hazardous Materials 915-568-6989
Hazardous Waste 915-568-7041
Historical Architecture 915-568-3134/7464
Landscaping 915-568-6977
NEPA 915-568-3908
Pesticides 915-568-6977
Storage Tanks 915-568-6959
Storm Water 915-568-0794
Solid Waste Management & Recycling 915-568-5724
Wastewater/Water Quality 915-568-0558

APPENDIX F

CONCEPTUAL AESTHETIC
CONSIDERATIONS



JLENS TADSS Architectural Theme

APPENDIX G

GIS DATA

NOT USED

APPENDIX H

EXTERIOR SIGNAGE

Exterior Signage

All signs will either be pre-manufactured from materials meeting or exceeding the EPA required minimum recycled content or fabricated by DPW. Low quality and “homemade” signs are prohibited.

Locate signs where they are visible and unobstructed.

All signs use Helvetica. Exceptions to be approved by DPW.

Traffic signs will follow guidelines in the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.

Sign Mounting and Location

Locate identification signs typically at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).

Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed so as not to obscure any other identification, information or vehicular regulatory signs.

The minimum distance between sign and driveway or intersection should normally be 100 feet.

Mounting Signs on Buildings.

No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance.

No sign may be attached or mounted to roofs and parapets.

No sign shall be painted or applied directly onto the surface of a building.

No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.

No sign shall interrupt the vertical and horizontal features of the façade.

No sign may be attached to utility poles except for pole identification or warning.

Sign Descriptions:

Building Number: 30-inch by 10-inch reflective white metal panel with 8-inch black Helvetica Regular letters.

Identification Signs shall be per Technical Manual (TM) 5-807-10, Signage. Type B and Type C shall be brown metal mounted on brown metal posts. Colors shall be white letters and numbers on standard brown background. Include the Building Number and Street address such as “2475 Defense Av”.

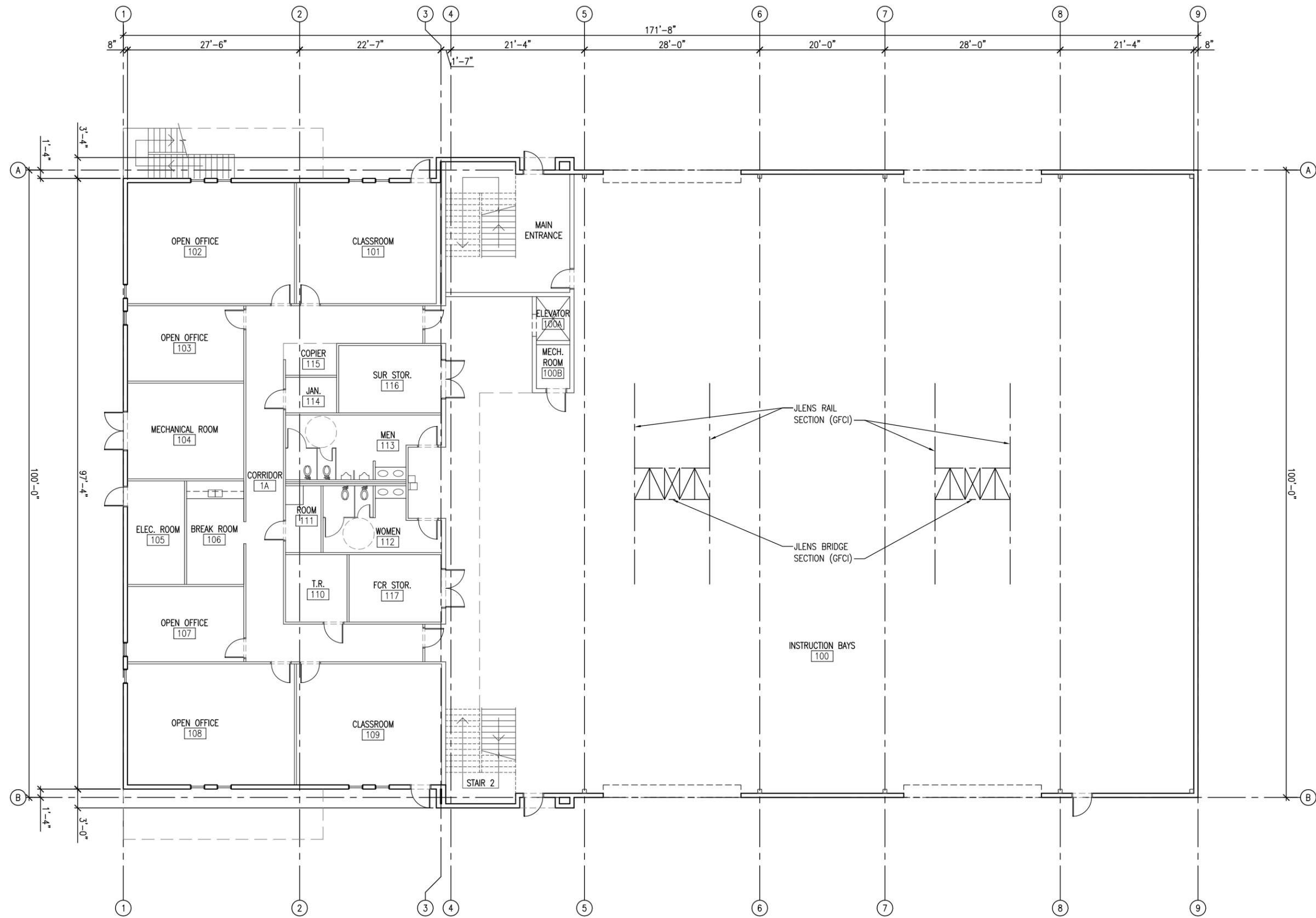
APPENDIX I

ACCEPTABLE PLANTS LIST

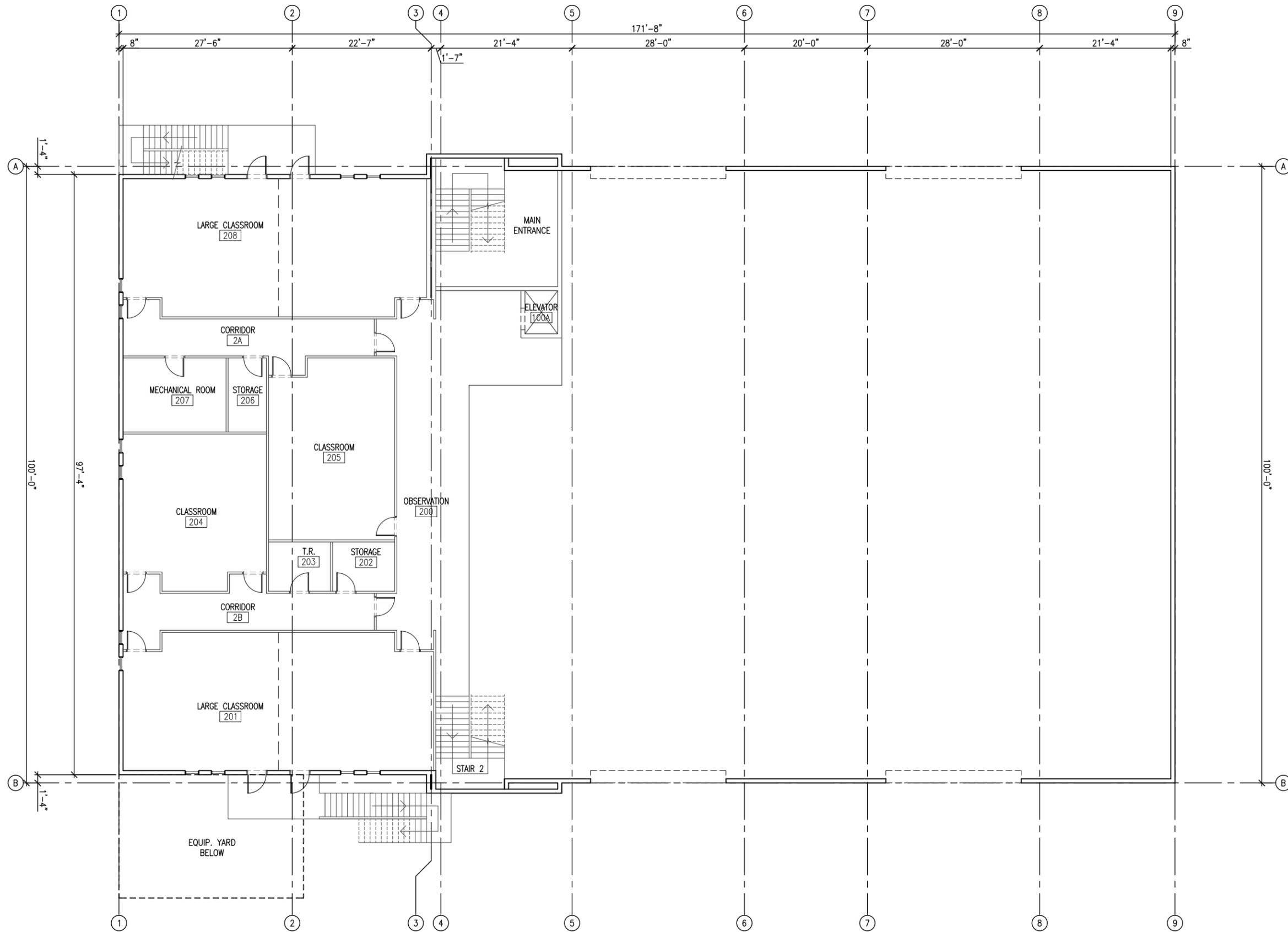
NOT USED – NO REQUIREMENTS

APPENDIX J

DRAWINGS

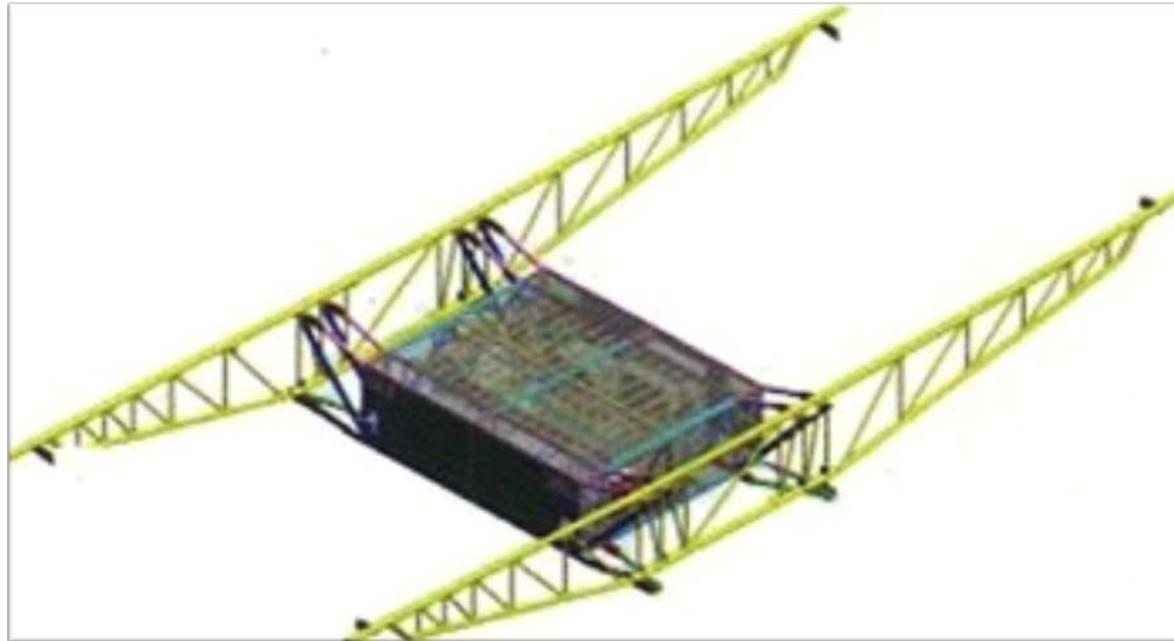


JLENS TADSS - FIRST FLOOR



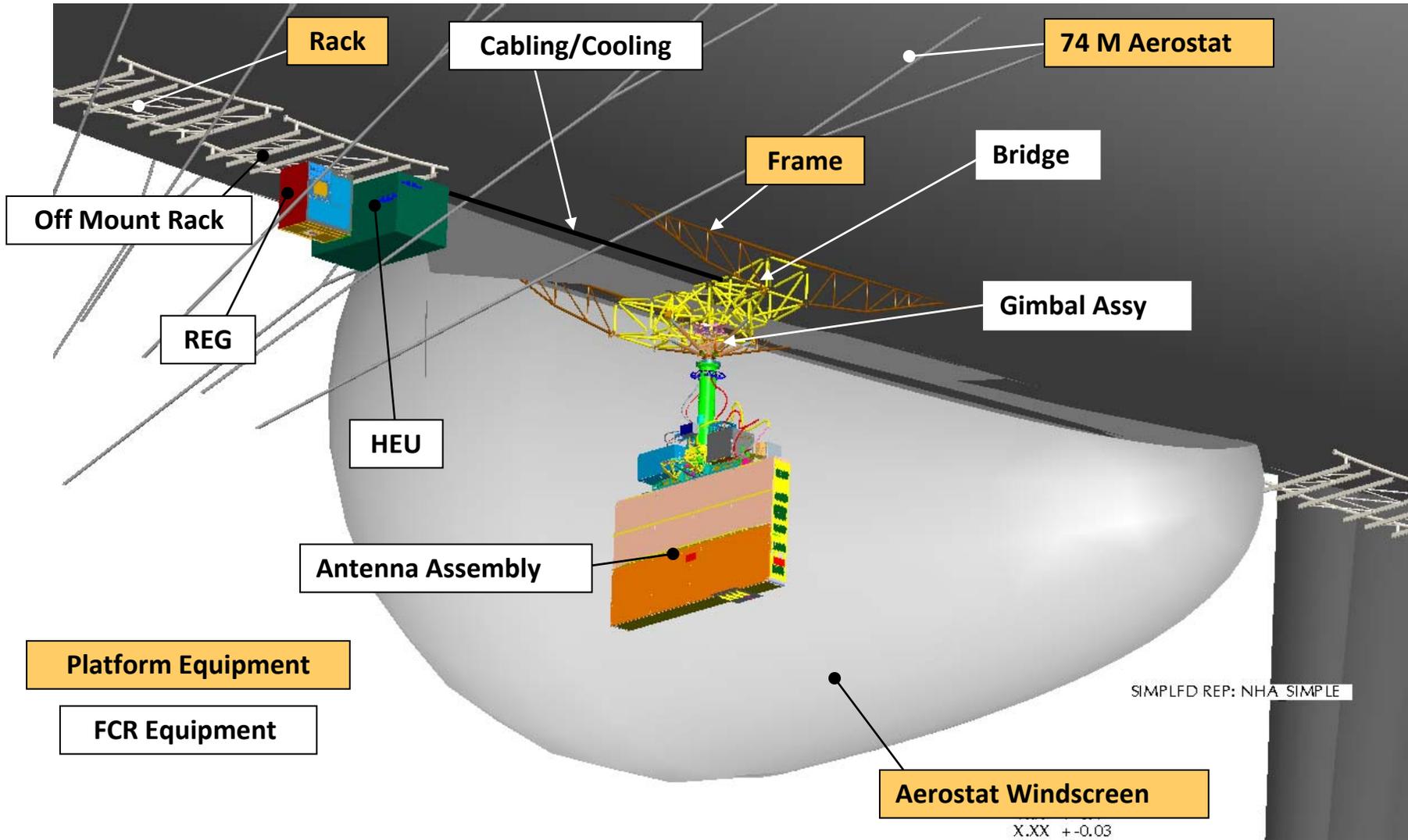
JLENS TADSS - SECOND FLOOR

HW For Radar Equipment Enclosure / Bridge



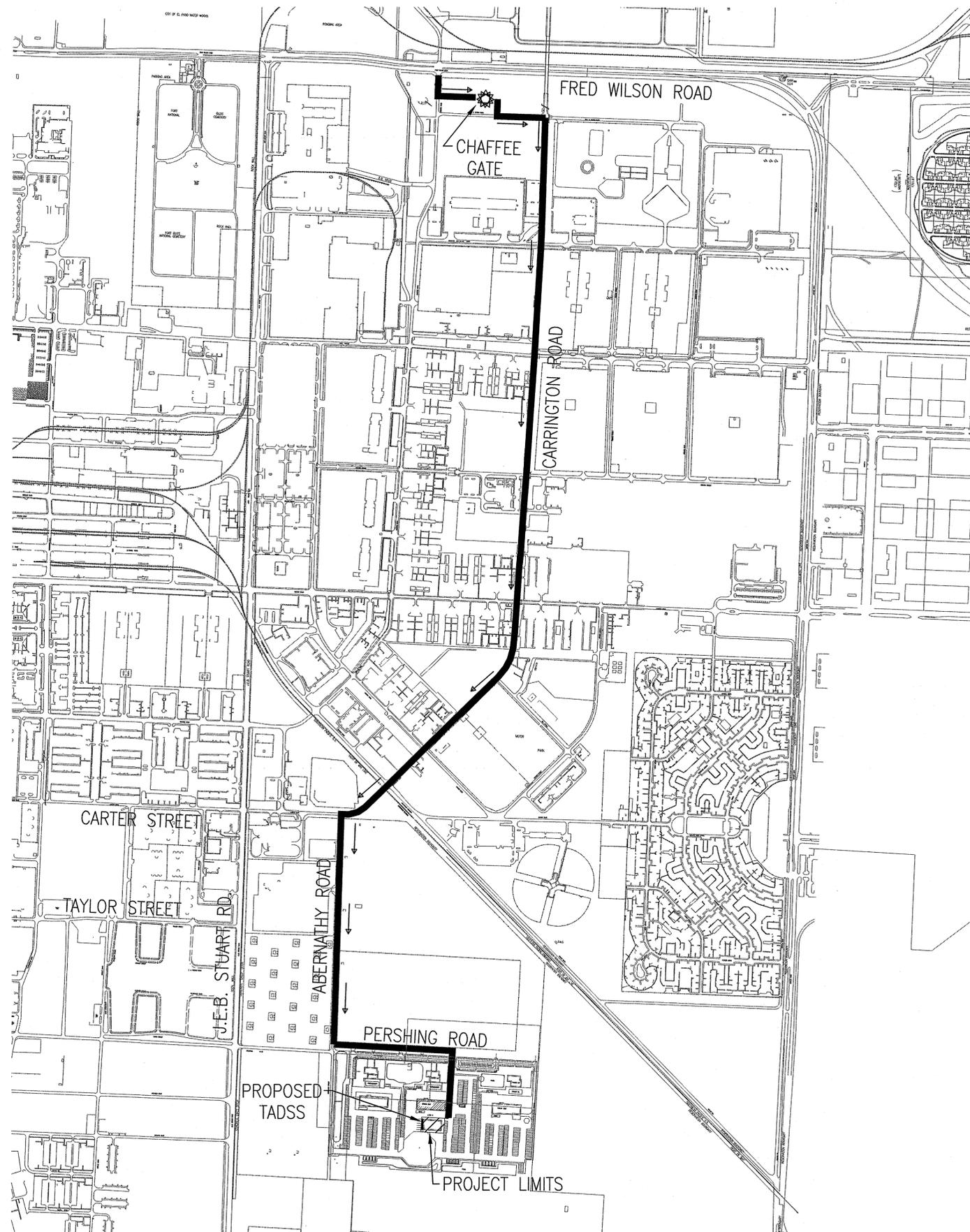
**Bridge & Rail System for Main Payload with Equipment Enclosure
(Each Sensor Requires a Different Bridge)**

JLENS FCR Mechanical Overview



PG# SHEET NAME TITLE

#1	G-101	COVER SHEET
#2	G-301	PROJECT LOCATION MAP AND INDEX SHEET
#3	G-302	GENERAL NOTES
GEOTECHNICAL BORING PLANS		
#4	B-101	GEOTECHNICAL BORING LOCATION MAP
#5	B-201	GEOTECHNICAL BORING LOGS
#6	B-202	GEOTECHNICAL BORING LOGS
#7	B-203	GEOTECHNICAL BORING LOGS
#8	B-204	GEOTECHNICAL BORING LOGS
DIMENSION CONTROL PLANS		
#9	C-101	DIMENSION CONTROL PLAN
GRADING PLANS		
#10	C-201	GRADING PLAN
UTILITY PLANS		
#11	C-501	UTILITY PLAN
PAVING PLANS		
#12	C-601	PAVING PLAN
JOINTING PLANS		
#13	C-801	JOINTING PLAN
CIVIL DETAILS		
#14	C-902	CIVIL DETAILS
#15	C-933	CIVIL DETAILS
#16	C-935	CIVIL DETAILS
#17	C-983	CIVIL DETAILS



LEGEND:

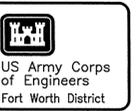
-  HAUL ROUTE
-  PROJECT LIMITS

GENERAL NOTES:

1. ALL COMMERCIAL TRAFFIC (TRUCKS AND POVs) MUST ENTER AND EXIST THROUGH THE CHAFFEE GATE. CONSTRUCTION TRAFFIC IS NOT PERMITTED TO ENTER THROUGH ANY OTHER GATE.
2. ALL COMMERCIAL TRAFFIC MUST STAY ON THE DESIGNATED HAUL ROUTE ROADWAYS AT ALL TIMES.
3. CONTRACTOR'S LAYDOWN AND STORAGE AREA IS RESTRICTED TO THE AREA SHOWN ON THIS SHEET. CONTRACTOR IS RESPONSIBLE FOR FENCING AND SECURITY OF HIS LAYDOWN AND STORAGE AREA. ACCESS TO THE SITE SHALL BE PERMITTED ONLY FROM CARRINGTON STREET. THE MAXIMUM SIZE OF THE LAYDOWN AND STORAGE AREA WILL BE 40,000 SF. COORDINATE FINAL LOCATION WITH FORT BLISS DPW
4. CONTRACTOR SHALL ESTABLISH AN ACCOUNT FOR BILLING OF EACH UTILITY SERVICE WITH THE DIRECTORATE OF PUBLIC WORKS PRIOR TO REQUESTING SERVICE FROM THE UTILITY PROVIDER.
5. CONTRACTOR SHALL ARRANGE WITH EACH PRIVATE UTILITY FOR CONNECTION OF CONSTRUCTION TRAILERS TO THE BASE'S UTILITY SYSTEMS. CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH THE UTILITY'S PUBLISHED STANDARDS. CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE CONNECTION TO THE PRIVATE UTILITY SYSTEMS AND THE SETTING OF THE METERS.

WATER/SANITARY SEWER: FORT BLISS WATER SERVICES CO.
 ELECTRIC: RIO GRANDE ELECTRIC COOPERATIVE, INC.
 NATURAL GAS: TEXAS GAS SERVICE

6. CONSTRUCTION WATER WILL BE AVAILABLE FROM A FIRE-HYDRANT METER CONNECTION TO BE LOCATED WITHIN OR NEAR THE PROJECT AREA. THE EXACT LOCATION OF THE FILL STATION SHALL BE COORDINATED WITH DPW AND FORT BLISS WATER PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE PERMITTED ONE WATER FILL STATION. CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH THE SETTING OF THE FIRE HYDRANT METER, CONSTRUCTION OF A FILL STAND, AND THE COST OF WATER PASSING THROUGH THE METER.
7. CONTRACTOR SHALL KEEP HAUL ROUTE AND ADJACENT ROADS FREE OF DIRT AND DEBRIS AT ALL TIMES.
8. CONTRACTOR SHALL PROTECT ALL PAVEMENTS AND EXISTING UTILITIES FROM HEAVY EARTH MOVING EQUIPMENT. PROVIDE TRAFFIC CONTROL MEASURES AT ALL EQUIPMENT CROSSINGS.
10. HAUL ROUTE LOCATION IS SUBJECT TO CHANGE AT THE DISCRETION OF THE USACE.
11. DUST CONTROL MEASURES WILL BE REQUIRED THROUGHOUT ANY TEMPORARY STOCKPILING OPERATIONS PRIOR TO REMOVAL FROM THE PROJECT AREA. REFER TO NOTE 12.
12. CONTRACTOR WILL BE RESPONSIBLE TO HAUL EXCESS EXCAVATED MATERIAL FROM THE AREA OF WORK TO A LOCATION OFF THE FORT BLISS INSTALLATION. CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH LOADING, TRANSFERRING AND DUMPING OF MATERIAL, INCLUDING ANY ASSOCIATED FEES OR PERMITS. ALL COSTS SHOULD BE INCLUDED IN THE CONTRACTOR'S BID PRICE. NO PERMANENT STOCKPILE WILL BE ALLOWED.



Hult-Zollars, Inc.
 Firm Registration No. F-761

Date	Rev.	Description	Work

Designed by: M. CLARK	Date: 11-30-11	Rev.
Drawn by: M. CLARK	Set No.	
Checked by: S. GRAVES	Contr. No.	
Reviewed by:	File name: 881708-001-001.mxd	
Submitted by:	Plot scale: 1:1	
Chief, Arch. Branch		

U.S. ARMY ENGINEER DISTRICT,
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

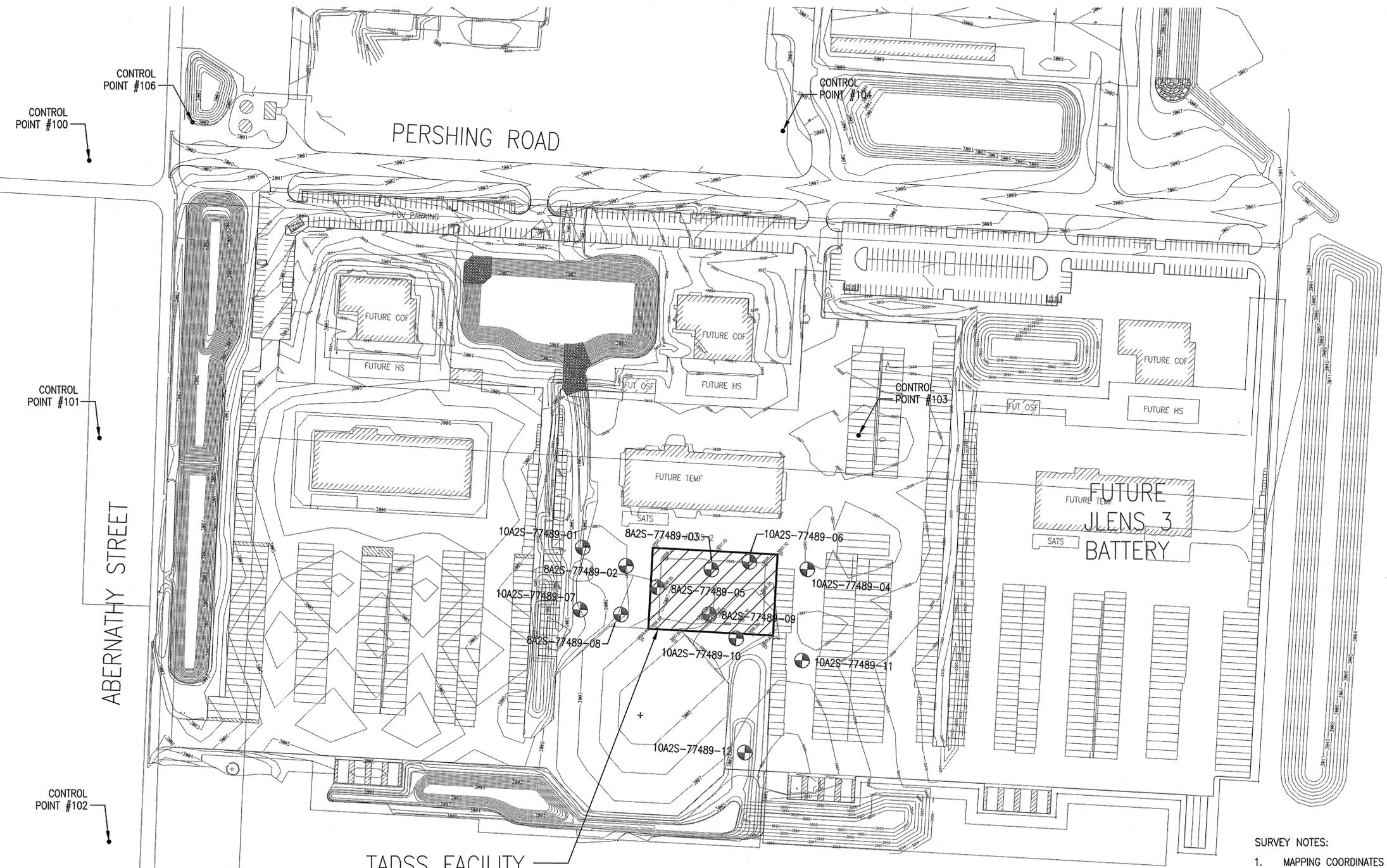
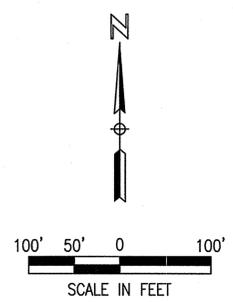
HULT-ZOLLARS
 1717 MCKINNEY AVE.
 SUITE 1400
 DALLAS, TEXAS 75202

JLENS - TADSS FACILITY
 FORT BLISS, TEXAS

PROJECT LOCATION MAP
 AND INDEX SHEET
 DESIGN PACKAGE 120

Sheet reference number:
G-301
 Sheet 2 of 17

P:\1717\171708\171708.dwg (11/30/11) 10:20AM H:\PROJ\171708\171708.dwg (11/30/11) 10:20AM H:\PROJ\171708\171708.dwg (11/30/11) 10:20AM



NOTES:

1. BORING (DRILLING) LOGS AS PRESENTED ON THIS SHEET ARE FOR INFORMATION ONLY AND DO NOT GUARANTEE ACTUAL TYPES OF MATERIAL TO BE ENCOUNTERED.
2. THE BORING LOGS ARE REPRODUCED FROM APPENDIX A OF THE FOUNDATION AND PAVEMENT DESIGN ANALYSIS REPORT PREPARED BY THE US ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT, ENGINEERING AND CONSTRUCTION DIVISION, ENGINEERING BRANCH, DATED SEPTEMBER, 2011.
3. THE FOUNDATION AND PAVEMENT DESIGN ANALYSIS REPORT IS A SEPARATE DOCUMENT (NOT PART OF THE CONTRACT DOCUMENTS) FURNISHED BY THE PROJECT OWNER. THE CONTRACTOR IS URGED TO OBTAIN A COPY OF THE REPORT FOR REFERENCE AS IT DESCRIBES SUB-SURFACE CONDITIONS THAT MAY BE ENCOUNTERED DURING INSTALLATION OF FOUNDATIONS AND CONTAINS OTHER INFORMATION PERTINENT TO CONSTRUCTION OF THE PROJECT.
4. CONTROL POINTS EAST OF ABERNATHY STREET MAY LIKELY NO LONGER BE IN PLACE DUE TO MULTIPLE CONSTRUCTION CONTRACTS WORKING IN AND AROUND THE AREA.

SURVEY NOTES:

1. MAPPING COORDINATES AND BEARINGS IS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE 4203 ZONE, NORTH AMERICAN DATUM OF 1983. UNIT OF MEASURE: U.S. SURVEY FOOT. COORDINATES SHOWN HEREON ARE SURFACE USING A COMBINED FACTOR OF 1.0002030881. TO CONVERT TO GRID *COORDINATES MULTIPLY BY 0.999 FOR THIS PROJECT.
2. ELEVATION IS REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988. UNIT OF MEASURE: U.S. SURVEY FOOT.
DESIGNATION: D 110
PID: CE0070
STATE/COUNTY: TX/EL PASO
DESCRIPTION: THE STATION IS LOCATED ABOUT 8.2 KM (5.10 MI) NORTHEASTERLY ALONG THE SOUTHERN PACIFIC RAILROAD FROM THE UNION PASSENGER STATION IN EL PASO, 0.3 KM (0.20 MI) SOUTH OF THE INTERSECTION OF FORREST ROAD, 31.1 M (102.0 FT) EAST OF THE EAST CURB OF STATE HIGHWAY 54, 12.2 M (40.0 FT) WEST OF THE NEAR RAIL, 5.7 M (18.7 FT) WEST OF RAILROAD MILEPOST 1301, 1.3 M (4.3 FT) EAST OF A UTILITY POLE, 0.6 M (2.0 FT) SOUTH OF A WITNESS POST, 0.3 M (1.0 FT) BELOW THE LEVEL OF THE TRACT, AND THE MONUMENT PROJECTS 0.05 M (0.16 FT) ABOVE THE GROUND SURFACE. ELEV.= 3870.00
3. UTILITIES SHOWN ARE BASED ON OBSERVABLE ABOVE GROUND EVIDENCE.

HORIZONTAL/VERTICAL CONTROL POINTS

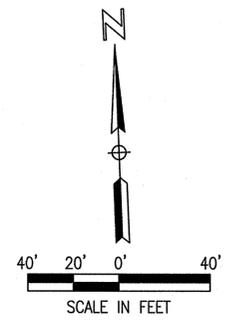
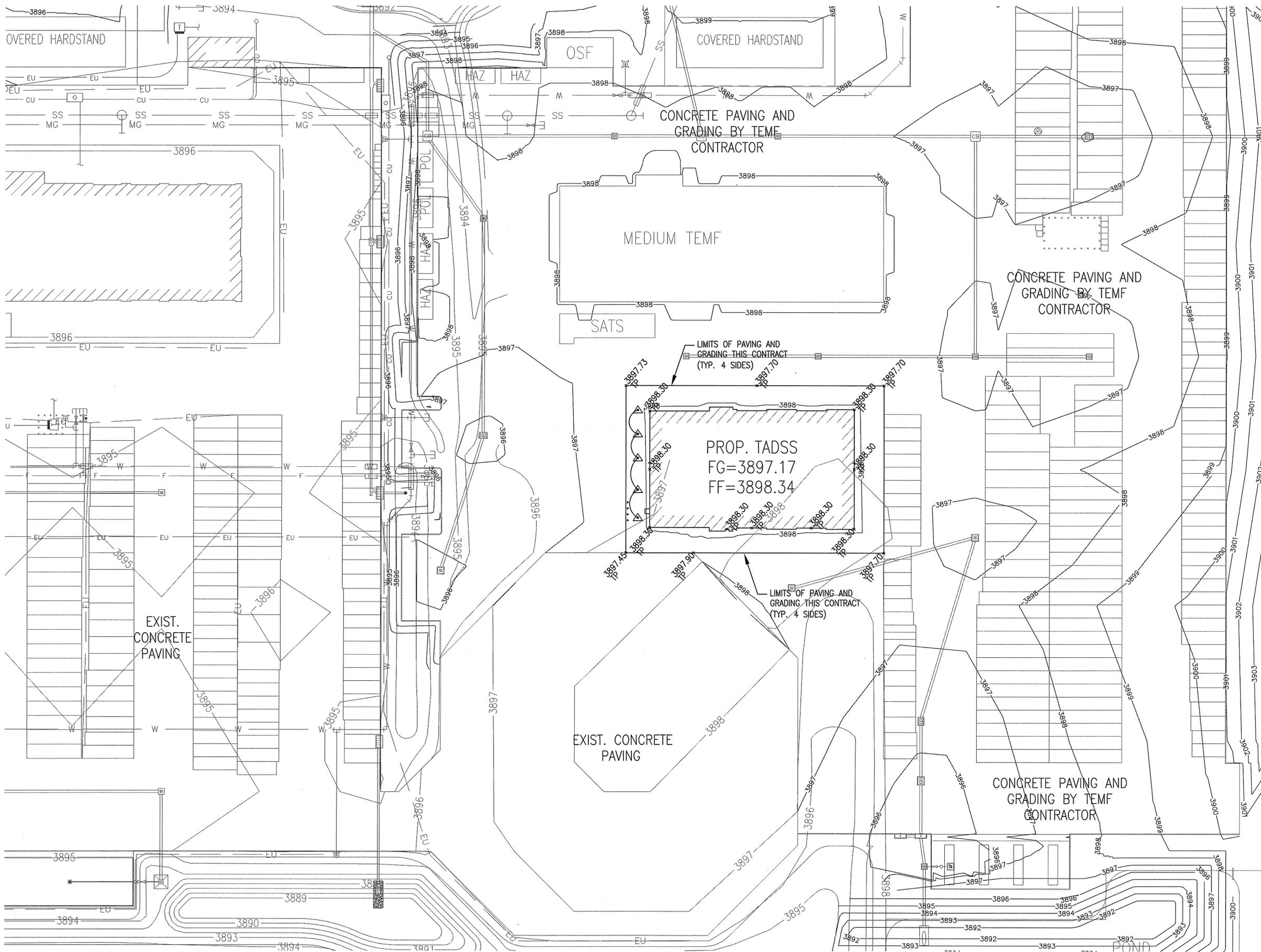
POINT	DESCRIPTION	NORTHING	EASTING	ELEVATION
100	SET 5/8" REBAR WITH FXSA CAP	10672505.360	407099.769	3889.41
101	SET 5/8" REBAR WITH FXSA CAP	10672025.380	407118.312	3892.19
102	SET 5/8" REBAR WITH FXSA CAP	10671328.200	407135.816	3894.43
103	SET 5/8" REBAR WITH FXSA CAP	10672030.650	408435.803	3897.89
104	SET MAG NAIL WITH FLAGGING	10672557.050	408303.810	3897.07
105	SET 5/8" REBAR WITH FXSA CAP	10673465.950	407234.095	3888.36
106	SET 5/8" REBAR WITH FXSA CAP	10672571.710	407279.540	3890.10
107	SET 5/8" REBAR WITH FXSA CAP	10672593.350	406333.990	3887.09

Mark	Description	D.D. No.	Action

Designed by: S. GRIMES	Date: 11-30-11	Rev.
Dwn by: S. GRIMES	Ser No.	
Reviewed by: S. GRIMES	Contr. No.	
Submitted by: HUITZOLIARS	File name: BFB7489-2001-901.mxd	Plot scale: 1:1
Chief, Arch. Branch	1717 McKinney Ave. SUITE 1400	Dallas, Texas 75202

J LENS - TADSS FACILITY
FORT BLISS, TEXAS
GEOTECHNICAL BORING LOCATION MAP
DESIGN PACKAGE 120

Sheet reference number:
B-101
Sheet 4 of 17



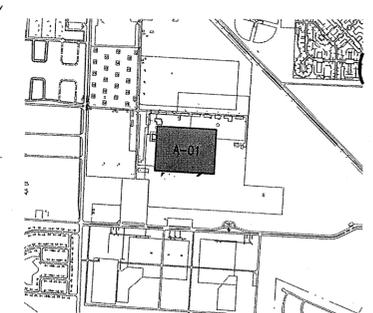
LEGEND

- 70.0 TC TOP OF CURB ELEVATION
- 72.2 TP TOP OF PAVEMENT ELEVATION
- 70.0 HP HIGH POINT
- 72.2 LP LOW POINT
- FG FINISH GRADE ELEVATION
- FF FINISH FLOOR ELEVATION
- VG VALLEY GUTTER
- GB — GRADE BREAK
- 3890 — CONTOUR BY TEMF CONTRACTOR (FINISH GRADE/TOP OF PVMT)
- PROPOSED GRADING LIMITS
- 3895 — EXISTING CONTOUR
- SURFACE FLOW
- 7
C-900 DETAIL No. SHEET No.

NOTES

1. ALL FILL SHALL BE PLACED IN 6-INCH LIFTS AND COMPACTED TO 95% OF MAXIMUM DENSITY BETWEEN -3% AND +3% OF OPTIMUM MOISTURE CONTENT.
2. PROTECT ALL EXISTING UTILITIES TO REMAIN FROM DAMAGE. ANY DAMAGE SHALL BE CORRECTED BY CONTRACTOR AT NO COST TO GOVERNMENT. REF.
3. CONTRACTOR SHALL BRING TO THE ATTENTION OF THE CONTRACTING OFFICER'S REPRESENTATIVE ANY CONFLICT DISCOVERED IN THE FIELD, PRIOR TO PROCEEDING WITH ANY WORK.
4. CONTRACTOR SHALL INSTALL AND MAINTAIN EROSION CONTROL MEASURES PER THE EROSION CONTROL PLANS AND SWPPP, AS WELL AS MAINTAIN ALL STREETS FREE OF MUD, DIRT AND DEBRIS FOR THE DURATION OF PROJECT.
5. ALL PROPOSED CONTOURS ARE SHOWN AS FINAL PROPOSED GRADE. REFERENCE PAVING PLAN FOR DEPTH AND TYPE OF SURFACE MATERIAL.

KEY MAP



Hult-Zollars, Inc.
Firm Registration No. F-761

Date	Rev.	Description	By	Check
11-30-11				

Designed by: M. CLARK	Drawn by: B. CRUTCHFIELD	Checked by: S. GRAY	Reviewed by: S. GRAY
Submitted by: HULT-ZOLLARS		Chief, Tech. Branch	

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

HULT-ZOLLARS
1717 MCKINNEY AVE.
SUITE 1400
DALLAS, TEXAS 75202

JLENS - TADSS FACILITY
FORT BLISS, TEXAS

GRADING PLAN
DESIGN PACKAGE 120

Sheet reference number:
C-201
Sheet 10 of 17

Mark	Description	D.D. No.	Action	Date

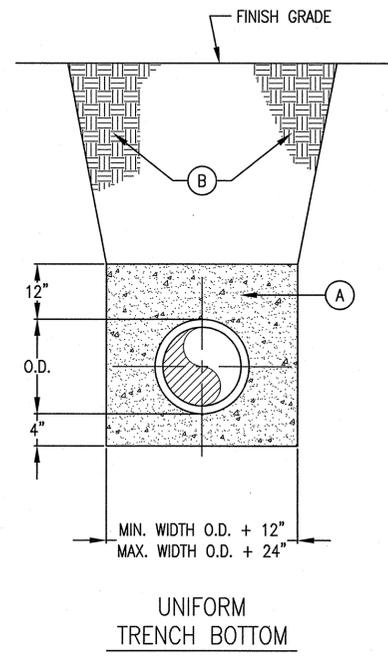
Designed by: M. CLARK	Date: 11-30-11	Rev.
Drawn by: M. CLARK	Soil No.	
Checked by: S. GRAMS	Contr. No.	
Reviewed by:	File name: 8817109-001-000-01	
Submitted by:		
Chief, Arch. Branch		

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

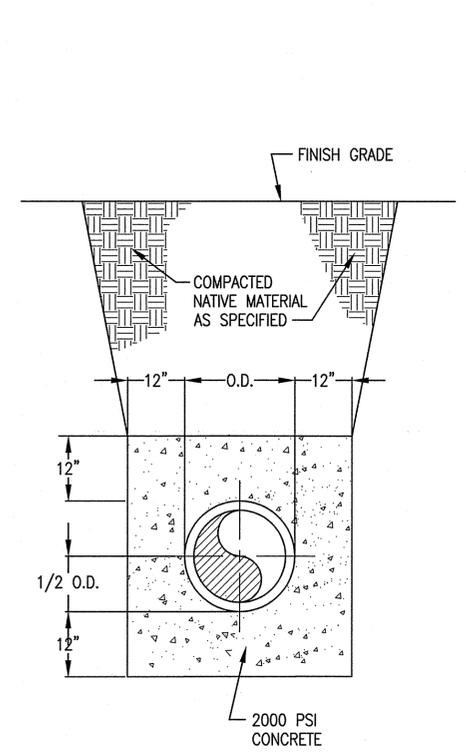
HULL-ZOLLARS
1717 MCKINNEY AVE.
SUITE 1400
Dallas, Texas 75202

JLENS - TADSS FACILITY
FORT BLISS, TEXAS

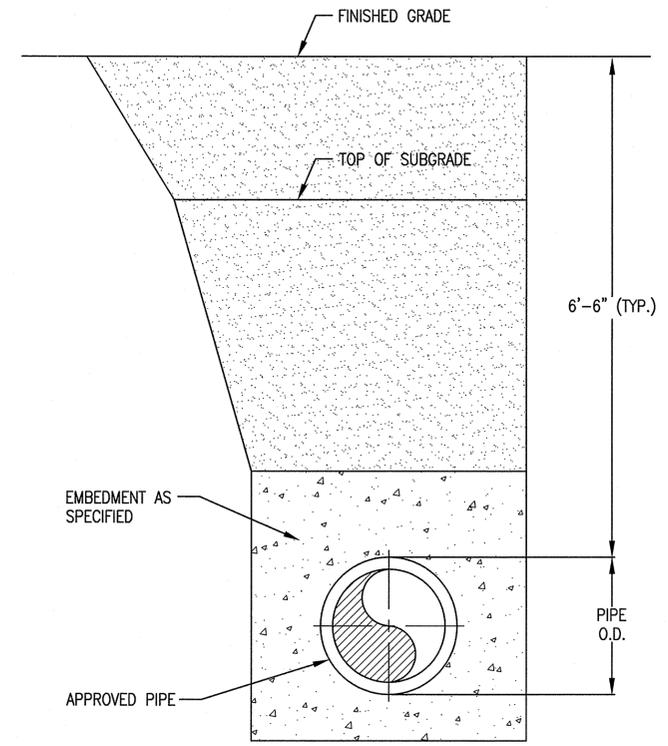
CIVIL DETAILS
DESIGN PACKAGE 120



UNIFORM TRENCH BOTTOM



REF 2 CONCRETE ENCASEMENT
NTS



REF 3 STANDARD COVER FOR WATER MAINS
NTS

- GENERAL NOTES
- REFER TO TRENCHING DETAIL 4/SHEET C-904 FOR PAVEMENT REPLACEMENT AND BACKFILL REQUIREMENTS.
 - TRENCH SAFETY SYSTEMS SHALL BE AS REQUIRED BY OSHA EXCAVATION AND TRENCH SAFETY REQUIREMENTS.
 - AT UTILITY CROSSINGS, CONTRACTOR TO COORDINATE WITH OTHER UTILITY CONTRACTORS FOR ADEQUATE CLEARANCES.

CONSTRUCTION KEY NOTES

IN CONDITIONS WHERE STANDARD 6'-6" COVER CAN NOT BE ACHIEVED, USE THE MINIMUM COVER DIMENSIONS TABLE BELOW.

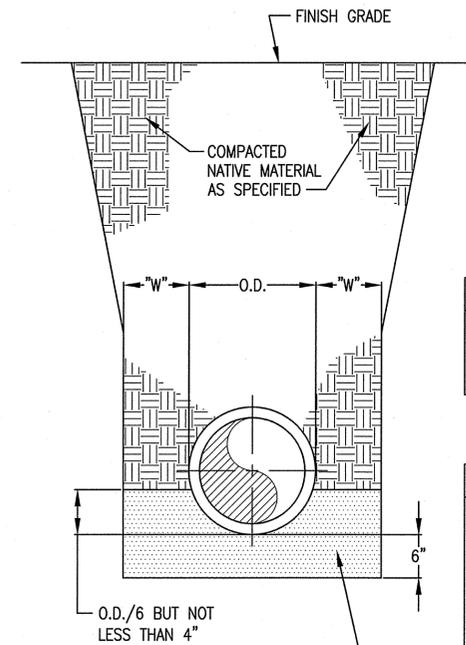
MINIMUM COVER DIMENSIONS	
PIPE SIZE	COVER DIMENSION
4" OR LESS	4'-0"
6" TO 16"	5'-0"
GREATER THAN 16"	6'-0"

- CONSTRUCTION KEY NOTES:
- EMBEDMENT BACKFILL - USE CLASS II COARSE GRAVELS PER ASTM D-2487 W/<12% FINES & MAX SIZE 1-1/2". NATIVE MATERIAL OR IMPORTED SELECT MATERIAL, MEETING OR EXCEEDING CLASS II REQUIREMENTS, MAY BE USED. CLASS I MATERIAL (MAXIMUM 1-1/2" SIZE) IS ACCEPTABLE AT THE DISCRETION OF THE CONTRACTOR.
 - FINAL BACKFILL - COMPACTED NATIVE MATERIAL TO 95%, MAXIMUM 3" SIZE.
 - METALLIC TAPE AS SPECIFIED SHALL BE PLACED APPROXIMATELY 9"-18" BELOW FINISHED GRADE.
 - CONCRETE THRUST BLOCKS AND SUPPORTS SHALL BE INSTALLED IN ACCORDANCE WITH THRUST BLOCKING DETAIL 1/C-903.

- GENERAL NOTES:
- STANDARD COVER SHALL BE AS INDICATED IN DETAIL 3/C-902.
 - UNIFORM TRENCH BOTTOM - PIPE SHALL GENERALLY BE LAID ON UNIFORM, EVENLY GRADED TRENCH BOTTOM. TRENCH BOTTOM SHALL BE SHAPED AT EVERY BELL TO PROVIDE UNIFORM BEARING OF PIPE BARREL.
 - NON-UNIFORM TRENCH BOTTOM - WHEN UNIFORM TRENCH BOTTOM IS UNATTAINABLE (ie ROCKY OR UNEVENLY GRADED) A 4" SAND BEDDING SHALL BE REQUIRED.
 - STANDARD COMPACTION REQUIREMENTS:

ZONE	UNPAVED	PAVED	ASTM*	REMARKS
EMBEDMENT	95%	95%	D-1557	
FINAL BACKFILL	95%	95%	D-1557	
SUBGRADE	N/A	D-1557	D-1557	COHESIVE SOIL
	N/A	D-1557	D-1557	NON-COHESIVE SOIL
BASE COURSE	N/A	D-1557	D-1557	8" THICKNESS

* ASTM D-1557 MODIFIED PROCTOR



NATIVE MATERIAL W/ LESS THAN 12% PASSING THE No. 200 SIEVE

CLASS B

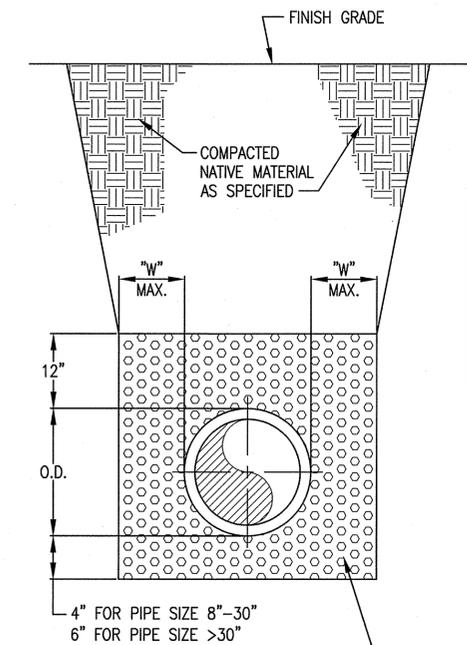
REF 4 EMBEDMENT CLASS B FOR RIGID PIPE
NTS

- GENERAL NOTES
- TRENCH SAFETY SYSTEMS SHALL BE AS REQUIRED BY OSHA EXCAVATION AND TRENCH SAFETY REQUIREMENTS.

CONSTRUCTION KEY NOTES

A. TRENCH DIMENSION "W" AS FOLLOWS:

PIPE DIAMETER	"W" AS FOLLOWS
LESS THAN 18"	16"
18" - 24"	19"
27" - 39"	22"
42" & LARGER	1/2 PIPE O.D.



CLASS I CRUSHED ROCK AS SPECIFIED COMPACTION SEE NOTE B

CLASS E1

REF 5 EMBEDMENT CLASS E1 FOR RIGID PIPE AND FLEXIBLE PIPE
NTS

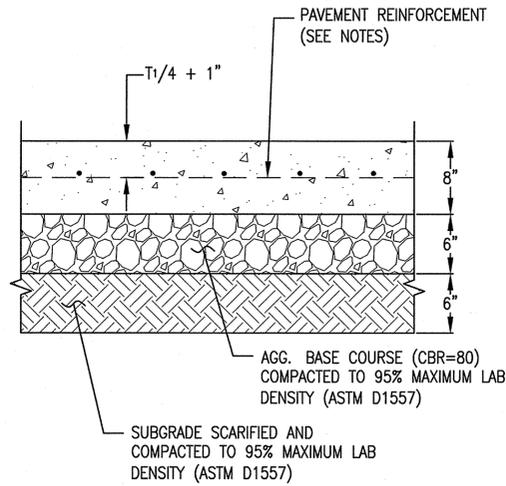
- CONSTRUCTION KEY NOTES
- USE CLASS I CRUSHED ROCK MAXIMUM 1 1/2 INCH SIZE PER ASTM D-2321.
 - NO COMPACTION REQUIRED. USE MINIMAL TAMPING, RODDING OR HAUNCH SLICING CAREFULLY IN THE EMBEDMENT ZONE.
 - TRENCH DIMENSION "W" AS FOLLOWS FOR FLEXIBLE SEWER PIPE:

PIPE DIAMETER	"W" AS FOLLOWS
LESS THAN 24"	9"
24" THRU 48"	12"
GREATER THAN 48"	O.D./4
 - TRENCH DIMENSION "W" AS FOLLOWS FOR RIGID PIPE:

PIPE DIAMETER	"W" AS FOLLOWS
LESS THAN 18"	16"
18" - 24"	19"
27" - 39"	22"
42" & LARGER	1/2 PIPE O.D.

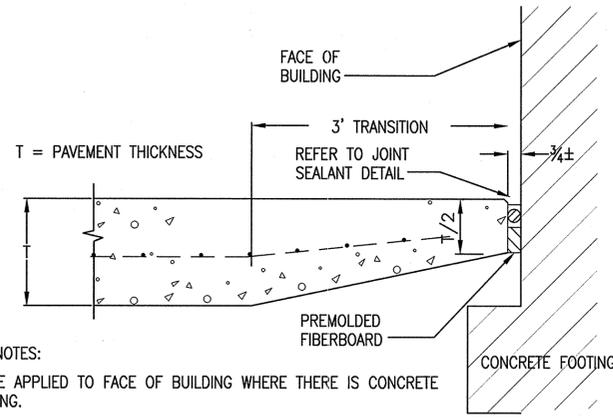
NOTES:

1. ALL REINFORCEMENT SHALL BE #4 BARS ON 16" CENTERS BOTH WAYS, AS PER THE PROJECT GEOTECHNICAL REPORT.
2. HEAVY DUTY PAVEMENT SHALL CONFORM TO SECTION 03 30 00.010 "CAST-IN-PLACE CONCRETE".
3. MIN. COVER ON ALL STEEL REINFORCEMENT SHALL BE 2".
4. SEE JOINTING PLANS FOR JOINT TYPE AND SPACING.
5. THE MOISTURE CONTENT SHALL BE MAINTAINED WITHIN THE LIMITS OF 2 PERCENT BELOW OPTIMUM TO 1 PERCENT ABOVE OPTIMUM DURING COMPACTION OF THE RAW SUBGRADE.



HEAVY DUTY REINFORCED CONCRETE PAVEMENT SECTION

REF 1 NTS

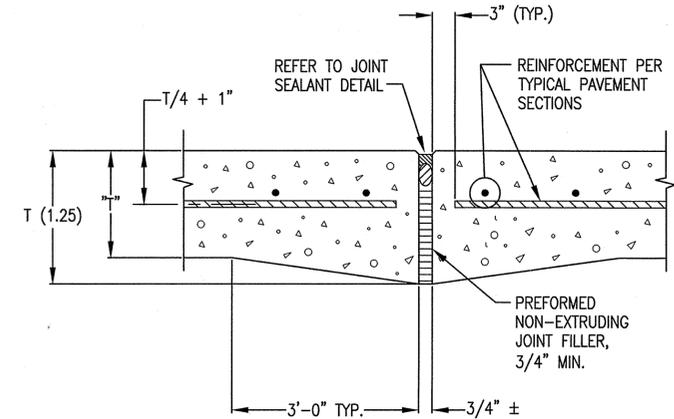


DETAIL NOTES:

1. TO BE APPLIED TO FACE OF BUILDING WHERE THERE IS CONCRETE FOOTING.
2. PROVIDE THICKENED EDGE AT VEHICLE ENTRY WAYS INTO BUILDINGS. THICKENED EDGE SHALL BE 1.25 TIMES THE THICKNESS OF THE PAVEMENT AND SHALL TRANSITION TO THE NORMAL SLAB THICKNESS OVER A DISTANCE OF 9 FEET

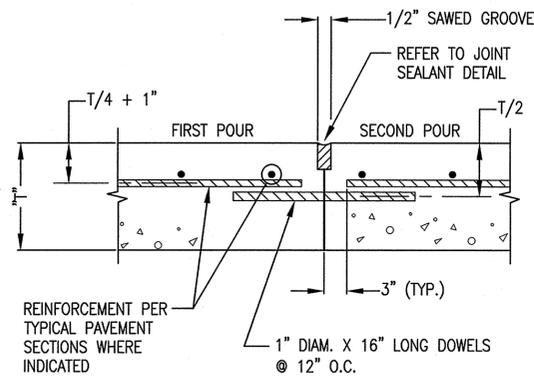
CONCRETE PAVEMENT TERMINAL DETAIL

REF 2 NTS



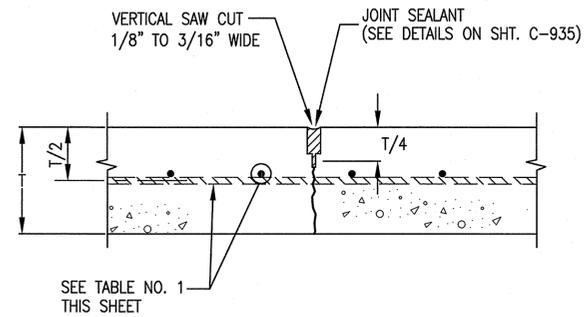
THICKENED EDGE AND EXPANSION JOINT

REF 3 NTS



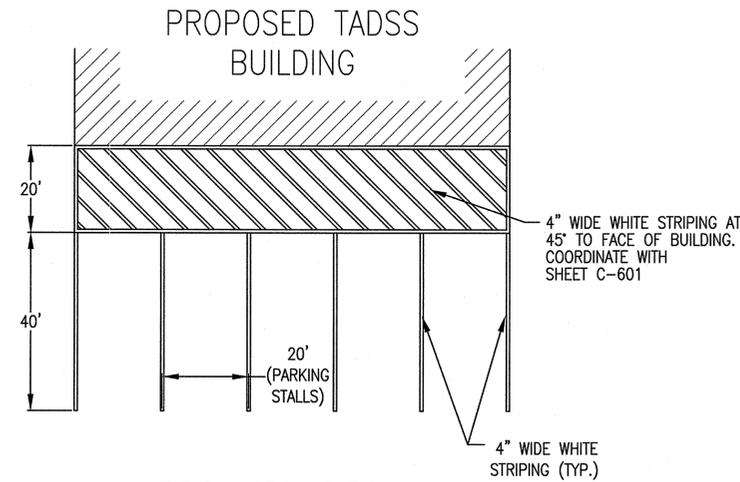
LONGITUDINAL OR TRANSVERSE DOWELED CONTRACTION JOINT

REF 4 NTS



LONGITUDINAL OR TRANSVERSE SAWED CONTRACTION JOINT

REF 5 NTS

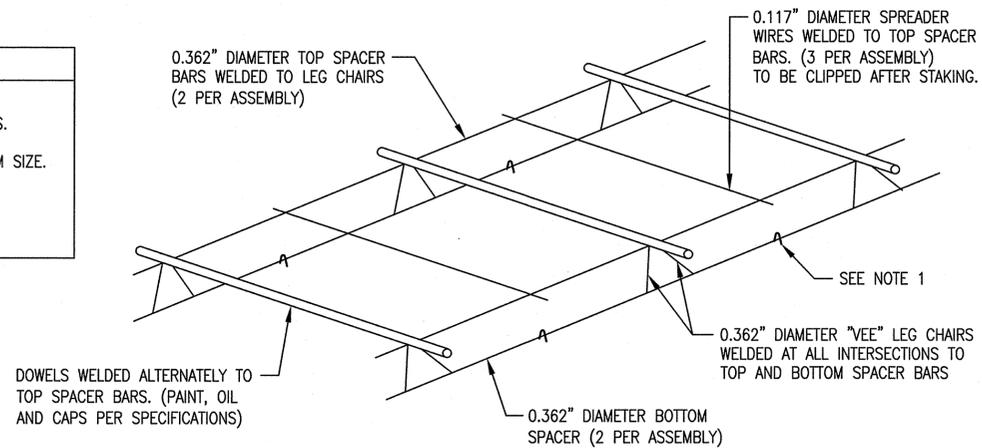


TYPICAL ORGANIZATIONAL & "NO PARKING" STRIPE DETAIL

REF 6 NTS

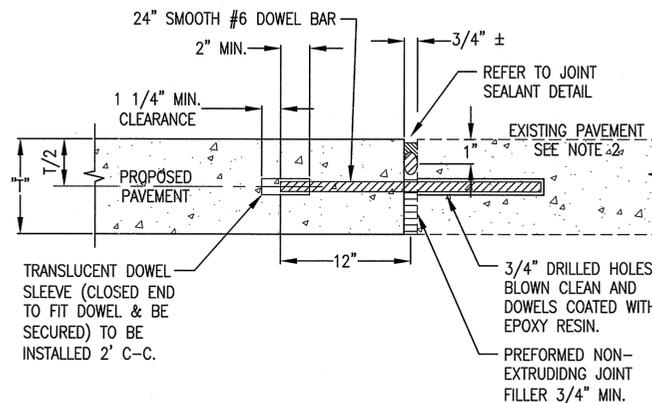
NOTES	
1.	ALL PERMANENT PAVEMENT MARKINGS TO BE THERMOPLASTIC MATERIAL UNLESS NOTED OTHERWISE.
2.	REFERENCE SHEET C-601 FOR GROUNDING ROD LOCATION AND REQUIREMENTS.

GENERAL NOTES	
1.	BASKET SHALL BE FIRMLY ANCHORED TO GRADE WITH 0.117" DIA. HAIRPINS.
2.	ALL WIRE SIZES SHOWN ARE MINIMUM SIZE.
3.	DOWELS SHALL BE HELD FIRMLY IN THE ASSEMBLY



TYPICAL DOWEL AND TIE-BAR BASKET

REF 7 NTS

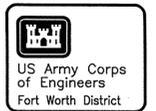


NOTE:

1. DOWEL BARS SHALL BE DRILLED INTO PAVEMENT HORIZONTALLY BY USE OF A MECHANICAL RIG. DRILLING BY HAND IS NOT ACCEPTABLE. DOWEL TO BE CENTERED ON JOINT.
2. COORDINATE INSTALLATION OF DOWEL WITH ADJACENT PAVING TO BE INSTALLED BY TEMF CONTRACTOR

DOWELED EXPANSION JOINT

REF 8 NTS



Huitt-Zollars, Inc. Firm Registration No. F-761

Mark	Description	D.D. No.	Action	Date

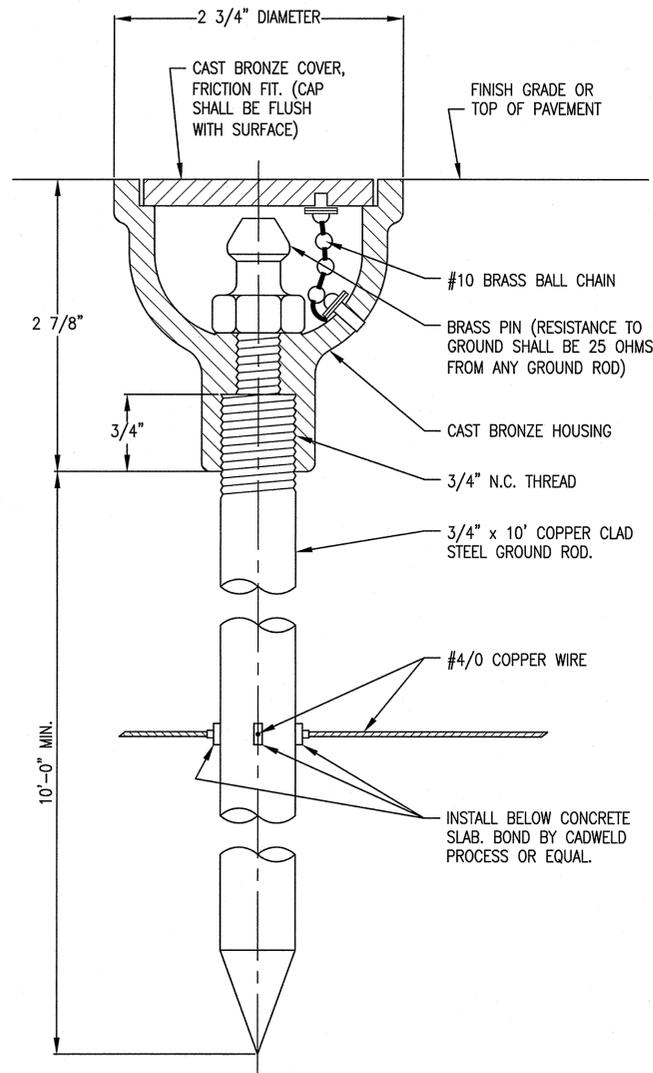
Designed by: M. CLARK	Date: 11-30-11	Rev.
Dwn by: M. CLARK	Sr No.	
Reviewed by: S. GRAVES	Contr. No.	
Submitted by: Huitt-Zollars	File name: 0301-001-000-01	Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS
 HUITT-ZOLLARS 1717 MCKINNEY AVE. SUITE 1400 Dallas, Texas 75202

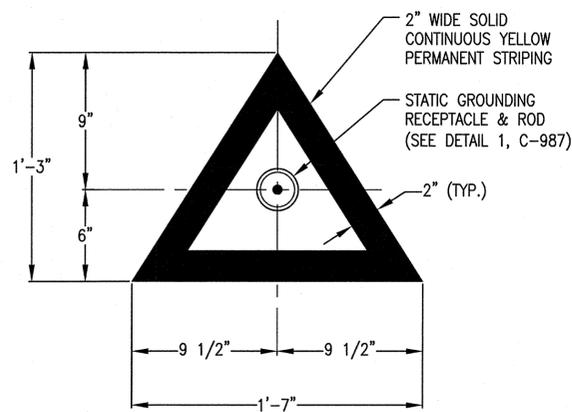
JLENS - TADSS FACILITY FORT BLISS, TEXAS
 CIVIL DETAILS PAVING DETAILS DESIGN PACKAGE 120

Sheet reference number:
C-933
 Sheet 15 of 17

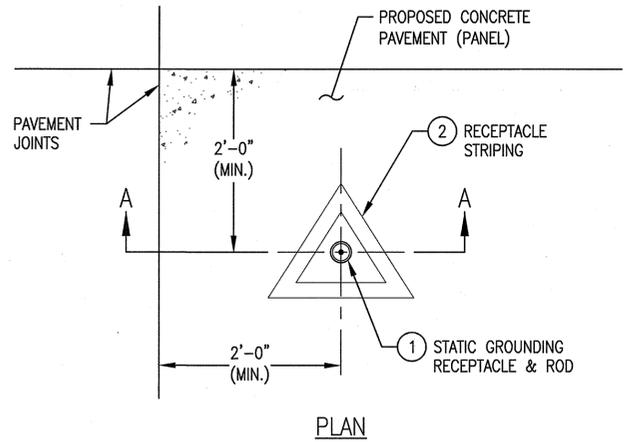
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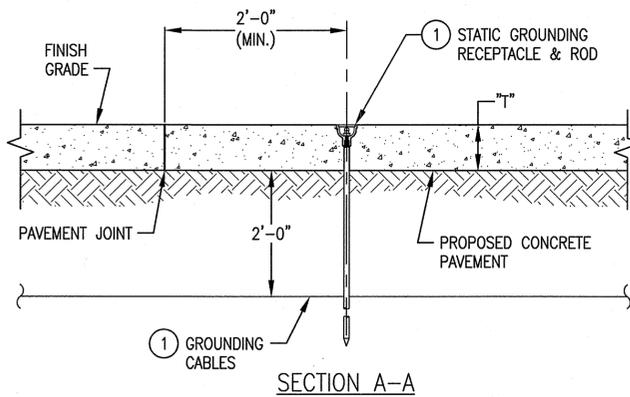
REF 1 STATIC GROUNDING RECEPTACLE
NTS



REF 2 STATIC GROUNDING RECEPTACLE PAVEMENT MARKING DETAIL
NTS



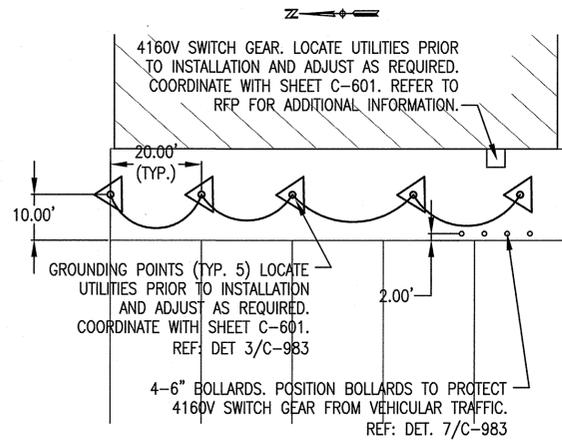
PLAN



SECTION A-A

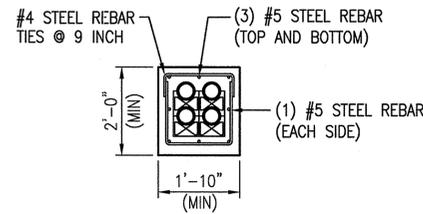
NOTES	
1.	SEE DETAIL 1, C-987 FOR STATIC GROUNDING RECEPTACLE AND ROD INFORMATION.
2.	SEE DETAIL 2, C-987 FOR RECEPTACLE STRIPING INFORMATION.
3.	"T" = PAVEMENT THICKNESS. PAVEMENT THICKNESS VARIES, SEE PLANS FOR ACTUAL DEPTH OF CONCRETE PAVEMENT.

REF 3 STATIC GROUNDING RECEPTACLE IN PROPOSED CONCRETE PAVEMENT
NTS



NOTE: FIELD LOCATE ALL UTILITIES PRIOR TO INSTALLATION. ADJUST LOCATION OF GROUND RODS AND BOLLARDS AS REQUIRED.

REF 5 4160V PEDESTALS WITH BOLLARDS
NTS

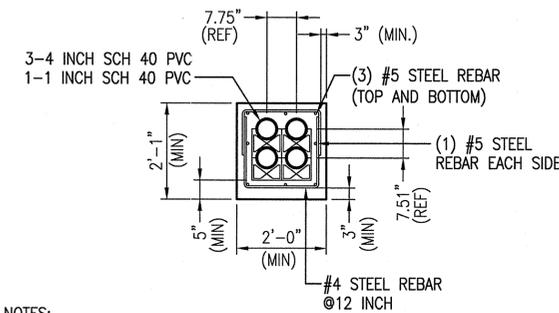


DUCT BANK SECTION

COMMUNICATIONS DUCT BANK NOTES:

- SUPPORTING DOCUMENTATION FOR DESIGN AND CONSTRUCTION OF MANHOLES, CABLE VAULTS AND COMMUNICATIONS DUCT BANKS IS FOUND IN THE UNITED STATES ARMY INFORMATION SYSTEMS ENGINEERING COMMAND (USAISEC) OUTSIDE PLANT DESIGN AND PERFORMANCE REQUIREMENTS MANUAL (OSDPDR) DATED OCTOBER 2008 (OR MOST RECENT VERSION). SEE TABLE 1 FOR A COMPLETE LISTING OF DOCUMENTATION, AND THE TECHNICAL CRITERIA FOR INSTALLATION INFORMATION INFRASTRUCTURE ARCHITECTURE MANUAL THE (ISA) DATED FEBRUARY 2010 (OR MOST RECENT VERSION).
- OBTAIN THE SIGNATURE OF THE US GOVERNMENT QC/QA REPRESENTATIVE SIGNIFYING THE ACCEPTABILITY OF THE DUCT PLACEMENT PRIOR TO POURING ANY CONCRETE FOR THE DUCT BANK.
- INSTALL A PERMANENT TRACER WIRE (POLYETHYLENE INSULATED), CENTRALLY LOCATED IN TOP OF CONDUIT FORMATION, OF EACH COMMUNICATIONS DUCT BANK AND CORRESPONDING STUB OUTS. USE COMPRESSION TYPE CONNECTORS FOR ALL SPLICES. USE THE WIRE FOR CONTINUITY AFTER INSTALLATION AND PROVIDE THE TEST RESULTS WITH THE AS BUILT DOCUMENTS. CONNECT TRACER WIRE TO EXIST. TRACE WIRES EXISTING DUCTBANKS.
- USE THE APPROPRIATE CONNECTORS SPECIFICALLY DESIGNED FOR JOINTS BETWEEN NON-IDENTICAL DUCT BANK COMPONENTS.

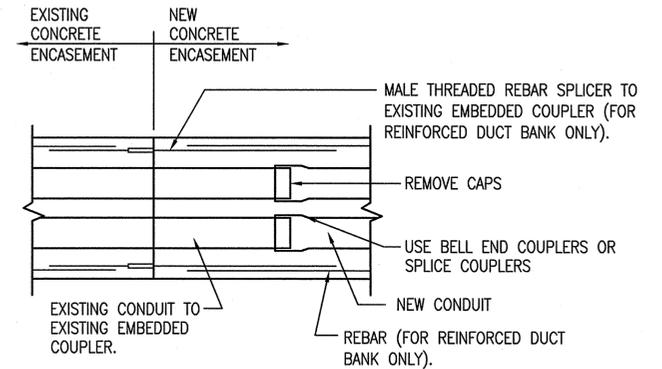
REF 4 COMMUNICAITON REINFORCED DUCT BANK SECTION
NTS



NOTES:

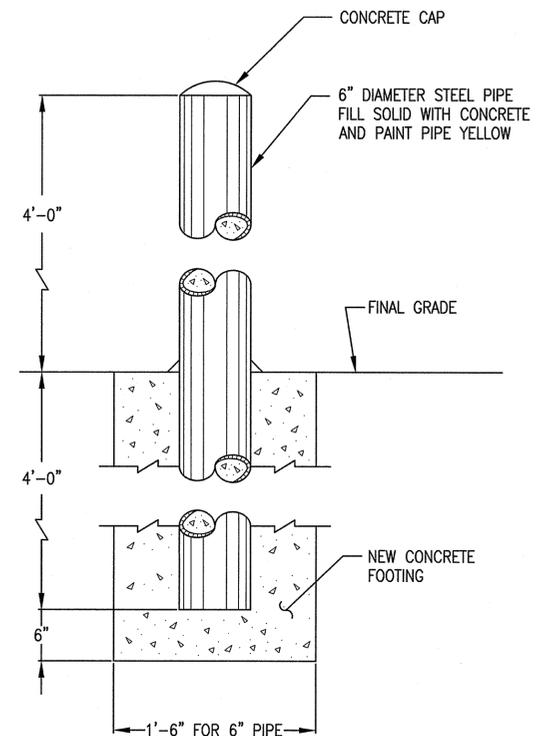
- REINFORCE DUCT BANKS WITH STEEL BAR PER THE DIMENSIONS SHOWN ON THE DUCT BANK DETAIL DRAWINGS. TIE OR TACK WELD REINFORCING BARS WHERE THEY CROSS.
- INSTALL DUCT BANKS BELOW GRADE AND FOLLOW THE ROUTE AS SHOWN ON THE DRAWINGS. INSTALL DUCT BANK A MINIMUM OF 24 INCHES BELOW PAVEMENT OR FINISHED GRADE. DUCT BANK SHALL VERTICALLY CLEAR OTHER UTILITIES BY 6 INCHES.
- MARK TOP OF THE DUCT BANKS WITH RED DYE.
- FOR DRAINAGE REQUIREMENT, SLOPE DUCT BANKS A MINIMUM OF 4 INCHES PER 100 FEET TOWARD THE NEAREST MANHOLE, UNLESS OTHERWISE NOTED.
- CONTRACTOR MAY ADJUST TO MAKE CONNECTION TO EXISTING DUCT BANK TO BE INSTALLED BY THE TEMF CONTRACTOR.

REF 6 SECONDARY ELECTRIC REINFORCED DUCT BANK SECTION
NTS

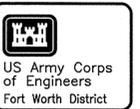


TYPICAL DUCT BANK CONNECTION DETAIL

- RUN DUCT SHALL AS STRAIGHT AS POSSIBLE BETWEEN MANHOLES TO MINIMIZE SIDE WALL PRESSURE DURING CABLE INSTALLATION. DO NOT MAKE ANY UNNECESSARY DIRECTION CHANGES. SLOPE DUCT BANKS 4 INCHES PER 100 FEET MINIMUM TOWARD EACH MANHOLE.
- PROVIDE A PULL STRING RATED AT LEAST 200 LBS TENSILE STRENGTH AFTER DUCTS HAVE UNDERGONE CLEANING. PROVIDE A MECHANICALLY-EXPANDABLE, REUSABLE RUBBER PLUG FOR EACH VACANT DUCT.
- REINFORCE DUCT BANKS WITH STEEL BAR PER THE DIMENSIONS SHOWN ON THE DUCT BANK DETAIL DRAWINGS. TIE OR TACK WELD REINFORCING BARS WHERE THEY CROSS.
- THE TERMS MANHOLE AND MAINTENANCE HOLE ARE INTERCHANGEABLE.
- REINFORCE ALL NEW DUCT BANKS WITHIN FIVE FEET OF MANHOLES EVEN IF THE SECTION CUT INDICATES NON-REINFORCED TYPE DUCTBANK. MAINTAIN THE SAME RACEWAY SIZE, QUANTITY AND CONFIGURATION AS THE SECTION CUT INDICATES.
- CONTRACTOR MAY ADJUST TO MAKE CONNECTION TO EXISTING DUCT BANK TO BE INSTALLED BY THE TEMF CONTRACTOR.



REF 7 PIPE BOLLARD DETAIL
NTS



Hult-Zollars, Inc.
Firm Registration No. F-761

Date	Rev.	Description
11-30-11	1	Initial Issue

Designed by	Checked by	Reviewed by	Submitted by
M. CLARK	M. CLARK	S. GRAVES	H. ZOLLARS

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS
HULT-ZOLLARS
1717 MCKINNEY AVE.
SUITE 1400
DALLAS, TEXAS 75202

JLENS - TADSS FACILITY
FORT BLISS, TEXAS
CIVIL DETAILS
DESIGN PACKAGE 120

Sheet reference number:
C-983
Sheet 17 of 17

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT

SPECIFICATION NO. :

CONTRACT NO. :

JLENS TRAINING AIDS DEVICES SIMULATORS & SIMULATION (TADSS) FACILITY
PN 77489

LDE DESIGN PACKAGE 120

AT

FORT BLISS, TX

DESIGN BY:

HUITT-ZOLLARS

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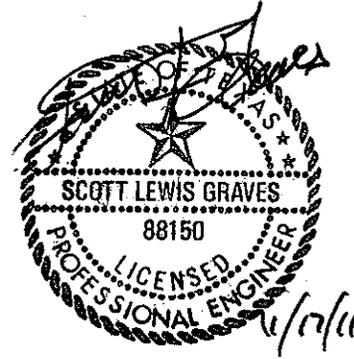
FINAL SUBMITTAL 17 NOVEMBER 2011

SPECIFICATION SUBMITTED BY: _____ DATE: _____

SPECIFICATION APPROVED BY: _____ DATE: _____

JLENS AIDS DEVICES SIMULATORS & SIMULATION (TADSS) FACILITY
PN 77489
LDE DESIGN PACKAGE 120

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SECTION 01 33 00

SUBMITTAL PROCEDURES

05/11

PART 1 GENERAL

1.1 SUMMARY

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 are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals 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.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to start of construction (work) or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction Progress Schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices

Health and safety plan

Work plan

Quality Control(QC) 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, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated 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 which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

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 logs and 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 manufacturer, 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-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

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

Special requirements necessary to properly close out a construction

contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

Interim "DD Form 1354" with cost breakout for all assets 30 days prior to facility turnover.

1.2.2 Approving Authority

Office or designated person authorized to approve submittal.

1.2.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, except those SD-01 Pre-Construction Submittals noted above, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

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. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.4.1 Government Approved G

Government approval is required for extensions of design, critical materials, deviations, 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."

1.4.2 Information Only

Submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.5 PREPARATION

1.5.1 Transmittal Form

Use the attached sample transmittal form (ENG Form 4025) for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the QCS software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract

drawings pertinent to the data submitted for each item.

1.6 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.

1.7 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.7.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.7.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. 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.

1.7.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.7.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.8 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.00 10 QUALITY CONTROL SYSTEM.

The Government will provide the initial submittal register in electronic format

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

1.8.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.8.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

1.8.4 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.9 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 14 calendar days will be allowed and shown on the register for review and approval of submittals for refrigeration and HVAC control systems.

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."
- c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.
- d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.10 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

- a. Note date on which submittal was received.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date approved submittals. 5 copies of the approved submittal will be retained by the Contracting Officer and 2 copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.11 DISAPPROVED OR REJECTED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes," is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.12 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory.

Approval or acceptance 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 dimensions, the design of adequate connections and details, and the satisfactory construction of all work.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.13 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract

requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.14 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.15 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

<p>CONTRACTOR</p> <p>(Firm Name)</p> <p>_____ Approved</p> <p>_____ Approved with corrections as noted on submittal data and/or attached sheets(s)</p> <p>SIGNATURE: _____</p> <p>TITLE: _____</p> <p>DATE: _____</p>

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
JLENS TRAINING AIDS DEVICES SIMULATORS & SIMULATION FACILITY

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				REMARKS		
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE		DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 33 00	SD-01 Preconstruction Submittals														
			Submittal Register	1.8	G												
		02 41 00.01	SD-01 Preconstruction Submittals														
			Existing Conditions	1.9	G												
			SD-07 Certificates														
			Demolition Plan	1.2.1	G												
		03 15 00.00 10	SD-03 Product Data														
			Preformed Expansion Joint Filler	2.2													
			Sealant	2.3													
			Waterstops	2.2													
			SD-04 Samples														
			Field-Molded Type	2.3.2													
			SD-07 Certificates														
			Preformed Expansion Joint Filler	2.2													
			Sealant	2.3													
			Waterstops	2.2													
		03 20 00.00 10	SD-02 Shop Drawings														
			Reinforcement	3.1	G												
			SD-03 Product Data														
			Welding	1.3.1													
			SD-07 Certificates														
			Reinforcing Steel	2.2													
		03 30 00.00 10	SD-03 Product Data														
			Recycled Content Products	Part 2													
			Portland Cement	1.2													
			Ready-Mixed Concrete	3.2.1													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
JLENS TRAINING AIDS DEVICES SIMULATORS & SIMULATION FACILITY

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY					REMARKS	
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		MAILED TO CONTR/ DATE RCD FRM APPR AUTH
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03 30 00.00 10	Vapor Barrier	3.4.4.1													
			Latex Bonding Agent	2.6													
			Chemical Admixtures	2.3													
			Epoxy Resin	2.7													
			SD-06 Test Reports														
			Testing and Inspection for CQC	3.10	G												
			SD-07 Certificates														
			Qualifications	1.4													
		03 40 00.00 10	SD-01 Preconstruction Submittals														
			Quality Control Procedures	1.5.2.2													
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			Standard Precast Units	1.4.1	G												
			Custom-Made Precast Units	1.4.2	G												
			SD-03 Product Data														
			Standard Precast Units	1.4.1													
			Proprietary Precast Units	1.4.3													
			Embedded Items	3.1.3													
			Accessories	2.1.9													
			SD-05 Design Data														
			Design Calculations	1.4.2													
			Concrete Mix Proportions	1.4.5.1													
			SD-06 Test Reports														
			Test Reports	1.5.2.2													
			SD-07 Certificates														
			Quality Control Procedures	1.5.2.2													
		31 00 00	SD-01 Preconstruction Submittals														

SUBMITTAL REGISTER

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE		DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		31 00 00	Shoring	3.4	G												
			SD-03 Product Data														
			Utilization of Excavated Materials	3.8	G												
			SD-06 Test Reports														
			Testing	3.15													
			SD-07 Certificates														
			Testing	3.15													
		31 05 22	SD-04 Samples														
			Geotextile	2.1.1													
			SD-07 Certificates														
			Geotextile	2.1.1													
		32 01 19	SD-03 Product Data														
			Equipment	1.2													
			SD-04 Samples														
			Materials	1.4.2	G												
		32 11 16	SD-03 Product Data														
			Equipment	1.3													
			SD-06 Test Reports														
			Sampling and Testing	1.5													
			Field Density Tests	1.5.2.4													
		32 16 13	SD-03 Product Data														
			Concrete	2.1													
			SD-06 Test Reports														
			Field Quality Control	3.8													
		32 17 24.00 10	SD-03 Product Data														
			Equipment	1.2	G												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
JLENS TRAINING AIDS DEVICES SIMULATORS & SIMULATION FACILITY

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT OR CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS	
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE			DATE OF ACTION
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		32 17 24.00 10	Composition Requirements	2.2.1													
			Qualifications	1.4.1													
			SD-06 Test Reports														
			Sampling and Testing	2.5													
		33 40 00	SD-03 Product Data														
			Placing Pipe	3.3													
			SD-04 Samples														
			Pipe for Culverts and Storm Drains	2.1													
			SD-07 Certificates														
			Frame and Cover for Gratings	2.2.4													
		33 51 15	SD-02 Shop Drawings														
			Pipe, Fittings, and Associated Materials	2.1													
			SD-03 Product Data														
			Materials and Equipment	2.1	G												
			Spare Parts	1.6	G												
			SD-05 Design Data														
			Connections to Existing Lines	3.8	G												
			Jointing of Polyethylene Piping	1.4.1.1	G												
			SD-06 Test Reports														
			Pressure and Leak Tests	3.9.2	G												
			SD-10 Operation and Maintenance Data														
			Gas Distribution System	3.5													
			SD-11 Closeout Submittals														

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

08/10

PART 1 GENERAL

See Section 01 42 00 in RFP for Requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01 45 00.00 10

QUALITY CONTROL
02/10

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 3740 (2008) 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 (2009) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all associated costs will be included in the applicable Bid Schedule unit or lump-sum prices.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

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

3.2 QUALITY CONTROL PLAN

Submit no later than 14 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 Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

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

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- c. 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. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agentssubcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
- e. 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. (Laboratory facilities approved by the Contracting Officer must be used.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- g. Procedures for tracking construction design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

- h. Reporting procedures, including proposed reporting formats.
- i. 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 features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during 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.

3.2.3 Notification of Changes

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

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, Postaward Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 14 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations 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. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There may be occasions when subsequent conferences will be called by either party 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 and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager must receive direction and authority from the CQC System Manager and serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff must 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 will 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 complete and furnish 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 is responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must be a construction person with a minimum of 15 years in related work. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager must have completed the course entitled "Construction Quality Management For Contractors"..

3.4.4 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying 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. At least three phases of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed 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 includes:

- a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and

standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

- b. Review of the contract drawings.
- c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. 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.
- g. Review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government must be notified at least 72 hours in advance of beginning the preparatory control phase. 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 attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

- a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.

- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government must be notified at least 72 hours in advance of beginning the initial phase. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work onsite, or 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. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all 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. 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. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. 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 must 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 Contractor will be assessed a charge of \$250.00 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 Testing

Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government must be delivered to the Corps of Engineers Division Laboratory, f.o.b., at the following address:

For delivery by mail: TBD

For other deliveries: TBD

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC Manager 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. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph

DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

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. 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. These inspections and any deficiency corrections required by this paragraph must be accomplished 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 must be in attendance at 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 be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer 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

Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. 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.
- d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- g. Offsite surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and 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, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will 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 will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

SECTION 01 56 20

DUST CONTROL FOR FORT BLISS
6/2003

PART 1 GENERAL

See Section 01 56 20 in RFP for requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL
04/08

PART 1 GENERAL

See Section 01 57 23 in RFP for requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 62 35

RECYCLED / RECOVERED MATERIALS

07/06

PART 1 GENERAL

See Section 01 62 35 in RFP for requirements.

-- End of Section --

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
01/07

PART 1 GENERAL

See Section 01 74 19 in RFP for requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS

05/10

PART 1 GENERAL

See Section 01 78 00 in RFP requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

07/06

PART 1 GENERAL

See Section 01 78 23 in RFP for requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 02 41 00.01

SITE DEMOLITION
05/10

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 145 (1991; R 2008) Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

AASHTO T 180 (2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6 (2006) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2008; Change 1-2010; Change 3-2010; Errata 1-2010) Safety and Health Requirements Manual

1.2 PROJECT DESCRIPTION

1.2.1 Demolition Plan

Prepare a Demolition Plan and submit proposed demolition, and removal procedures for approval before work is started. Include in the plan procedures for coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Provide procedures for safe conduct of the demolition work in accordance with EM 385-1-1. Plan shall be approved by Contracting Officer prior to work beginning.

1.2.2 General Requirements

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations on site. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas

specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. Refer to Section 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT for documentation of salvaged or reused material.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items at no additional cost to the Government. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

1.3.2 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a 6 foot high fence. Erect and secure fence along the drip line of the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.3.3 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition operations. Prior to start of work, utilities designated for removal will be shut off by the Government and disconnected and sealed by the Contractor.

1.3.4 Facilities

Where removal of existing utilities and pavement is indicated, provide approved barricades, temporary covering of exposed areas, and temporary service connections for all utilities affected by demolition work.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Conditions; G

SD-07 Certificates

Demolition Plan; G

1.6 QUALITY ASSURANCE

Furnish timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with applicable laws and requirements. Notify the local air pollution control district/agency and the Contracting Officer in writing 10 working days prior to the commencement of work. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6. Use of explosives will not be permitted.

1.6.1 Dust and Debris Control

Prevent the spread of dust and debris adjacent streets and adjacent sites and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of dust and debris.

1.7 PROTECTION

1.7.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the Contracting Officer prior to beginning such work.

1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items at no additional cost to the Government.

1.9 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting utility locations (above or below ground), the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with section for excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition or deconstruction of structures.

b. Fill material shall conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material shall be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

c. Proposed fill material must be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	AASHTO M 145
Moisture-density relations	AASHTO T 180, Method B or D

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures so designated for reuse prior to beginning work. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be reused onsite whenever possible.

3.1.1 Utilities and Related Equipment

3.1.1.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.1.2 Disconnecting Existing Utilities

Remove existing utilities , as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment as indicated, and deliver to a location in accordance with instructions of the Contracting Officer.

3.1.2 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole

units. Cut chain link fabric to 30 foot lengths and store in rolls off the ground.

3.1.3 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated in plans. Provide neat full depth sawcuts at limits of pavement removal as indicated. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the Contracting Officer. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition work until all demolition in the area has been completed and debris removed. Fill holes in accordance with Section 2.1 Fill Material.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.4 CLEANUP

Remove debris and rubbish from area of work. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations. Storage of removed materials on the project site is prohibited.

3.5.2 Burning on Government Property

Burning of materials removed during demolition work will not be permitted on Government property .

3.5.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition work to designated spoil areas on Government property.

3.5.4 Removal from Government Property

Transport waste materials removed from demolished work, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

-- End of Section --

SECTION 03 15 00.00 10

CONCRETE ACCESSORIES

08/10

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 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM D 1751	(2004; R 2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D 2835	(1989; R 2007) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D 5249	(1995; R 2006) Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Preformed Expansion Joint Filler
Sealant
Waterstops

SD-04 Samples

Field-Molded Type

One gallon of field-molded sealant and one quart of primer (when primer is recommended by the sealant manufacturer) identified to indicate manufacturer, type of material, quantity,

and shipment or lot represented.

SD-07 Certificates

Preformed Expansion Joint Filler
Sealant
Waterstops

1.3 DELIVERY, STORAGE, AND HANDLING

Protect material delivered and placed in storage off the ground from moisture, dirt, and other contaminants. Deliver sealants in the manufacturer's original unopened containers. Remove sealants from the site whose shelf life has expired.

PART 2 PRODUCTS

2.1 CONTRACTION JOINT STRIPS

Contraction joint strips shall be 1/8 inch thick , rigid polyvinylchloride (PVC) or high impact polystyrene (HIPS) insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

2.2 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752, Type I, or resin impregnated fiberboard conforming to the physical requirements of ASTM D 1752. Submit certified manufacturer's test reports for premolded expansion joint filler strips, compression seals and lubricant, and metallic waterstops to verify compliance with applicable specification. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

2.3 SEALANT

Joint sealant shall conform to the following:

2.3.1 Lubricant for Preformed Compression Seals

ASTM D 2835.

2.3.2 Field-Molded Type

ASTM C 920, Type M, Grade P or NS, Class 25, Use NT for horizontal joints. Type M, Grade NS, Class 25, Use NT for vertical joints. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, non-shrink, nonreactive with sealant, and non-absorptive material type such as extruded butyl or polychloroprene rubber.

PART 3 EXECUTION

3.1 INSTALLATION

Joint locations and details, including materials and methods of installation of joint fillers, shall be as specified and indicated. In no case shall any fixed metal be continuous through an expansion or

contraction joint.

3.1.1 Contraction Joints

Contraction joints may be constructed by inserting rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting the concrete with a saw after concrete has set. Make joints 1/8 inch to 3/16 inch wide and extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

3.1.1.1 Joint Strips

Provide strips of the required dimensions and as long as practicable. After the first floating, groove the concrete with a tool at the joint locations. Insert the strips in the groove and depress them until the top edge of the vertical surface is flush with the surface of the slab. Float and finish the slab as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, saw out the top portion of the strip after the curing period to form a recess for sealer. Discard the removable section of PVC or HIPS strips and leave the insert in place. Maintain true alignment of the strips during insertion.

3.1.1.2 Sawed Joints

Saw joints early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent raveling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. Use concrete sawing machines that are adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Cut joints to true alignment and in sequence of concrete placement. Remove sludge and cutting debris. Form reservoir for joint sealant.

3.1.2 Expansion Joints

Use preformed expansion joint filler in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. Extend the filler to the full slab depth, unless otherwise indicated. Neatly finish the edges of the joint with an edging tool of 1/8 inch radius. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. Remove the wood strip after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. Thoroughly clean the groove of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust. If blowing out the groove use oil-free compressed air.

3.1.3 Joint Sealant

Fill sawed contraction joints and expansion joints in slabs with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Apply joint sealant as recommended by the manufacturer of the sealant.

3.1.3.1 Joints With Preformed Compression Seals

Install compression seals with equipment capable of installing joint seals to the prescribed depth without cutting, nicking, twisting, or otherwise distorting or damaging the seal or concrete and with no more than 5 percent stretching of the seal. Cover the sides of the joint and, if necessary, the sides of the compression seal with a coating of lubricant. Coat butt joints with liberal applications of lubricant.

3.1.3.2 Joints With Field-Molded Sealant

Do not seal joints when the sealant material, ambient air, or concrete temperature is less than 40 degrees F. Coat joints requiring a bond breaker with curing compound or with bituminous paint. Install bond breaker and back-up material where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's recommendations.

3.2 CONSTRUCTION JOINTS

Construction joints are specified in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE, except treat construction joints coinciding with expansion and contraction joints as expansion or contraction joints as applicable.

-- End of Section --

SECTION 03 20 00.00 10

CONCRETE REINFORCING
08/10

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 318 (2008; Errata 2008; Errata 2009; Errata 2009; Errata 2009; Errata 2009; Errata 2009) Building Code Requirements for Structural Concrete and Commentary

ACI SP-66 (2004) ACI Detailing Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M (2005) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 615/A 615M (2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A 675/A 675M (2003; R 2009) Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties

ASTM A 706/A 706M (2009b) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A 996/A 996M (2009b) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP (2001; 27Ed) Manual of Standard Practice

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00

SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement; G

SD-03 Product Data

Welding

SD-07 Certificates

Reinforcing Steel

1.3 QUALITY ASSURANCE

1.3.1 Welding Qualifications

Welders shall be qualified in accordance with AWS D1.4/D1.4M. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4/D1.4M. Submit a list of qualified welders names.

1.4 DELIVERY, STORAGE, AND HANDLING

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A 675/A 675M, Grade as indicated.

2.2 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M ASTM A 996/A 996M including Supplementary Requirements or ASTM A 706/A 706M, grades and sizes as indicated.

Submit certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

2.3 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.4 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 10MSP and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the

same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement steel and accessories shall be fabricated and placed as specified and shown on approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown shall be in accordance with ACI SP-66 and ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms. Submit detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4/D1.4M. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.1.3 Placing Tolerances

3.1.3.1 Spacing

The spacing between adjacent bars and the distance between layers of bars may not vary from the indicated position by more than one bar diameter nor

more than 1 inch.

3.1.3.2 Concrete Cover

The minimum concrete cover of main reinforcement steel bars shall be as shown. The allowable variation for minimum cover shall be as follows:

MINIMUM COVER (inch)	VARIATION (inch)
6	plus 1/2
4	plus 3/8
3	plus 3/8
2	plus 1/4
1-1/2	plus 1/4
1	plus 1/8
3/4	plus 1/8

3.2 DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

-- End of Section --

SECTION 03 30 00.00 10

CAST-IN-PLACE CONCRETE

11/10

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 117	(2010) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 214R	(2002; Errata 2010) Evaluation of Strength Test Results of Concrete
ACI 305.1	(2006) Specification for Hot Weather Concreting
ACI 305R	(2010) Specification for Hot Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM C 1017/C 1017M	(2007) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059/C 1059M	(1999; R 2008) Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 1077	(2010c) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(2010) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 150	(2009) Standard Specification for Portland Cement
ASTM C 150/C 150M	(2009) Standard Specification for Portland Cement
ASTM C 173/C 173M	(2010b) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2010) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 39/C 39M	(2010) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 494/C 494M	(2010a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 595/C 595M	(2010) Standard Specification for Blended Hydraulic Cements
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 881/C 881M	(2010) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 94/C 94M	(2010a) Standard Specification for Ready-Mixed Concrete
ASTM C 940	(2010a) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM C172/C172M	(2010) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231/C231M	(2010) Standard Test Method for Air

Content of Freshly Mixed Concrete by the Pressure Method

ASTM C78/C78M (2010) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

ASTM D 75/D 75M (2009) Standard Practice for Sampling Aggregates

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA QC 3 (2003) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

NRMCA TMMB 100 (2001; R 2007) Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104 (1980) Method of Calculation of the Fineness Modulus of Aggregate

COE CRD-C 400 (1963) Requirements for Water for Use in Mixing or Curing Concrete

COE CRD-C 521 (1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

COE CRD-C 94 (1995) Corps of Engineers Specification for Surface Retarders

1.2 SYSTEM DESCRIPTION

Provide concrete composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.2.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117. Take level and grade tolerance measurements of slabs as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.2.2 Strength Requirements

Specified compressive strength (f'c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
4000 psi at 28 days	All Project Concrete

Concrete slabs on-grade shall have a 28-day flexural strength of 4000 psi. Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C 39/C 39M.

- a. Evaluation of Concrete Compressive Strength. Fabricate compressive strength specimens (6 by 12 inch cylinders), laboratory cure them in accordance with ASTM C 31/C 31M and test them in accordance with ASTM C 39/C 39M. 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. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. 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.

1.2.3 Water-Cement Ratio

Maximum water-cement ratio (w/c) for normal weight concrete shall be as follows:

WATER-CEMENT RATIO, BY WEIGHT	STRUCTURE OR PORTION OF STRUCTURE
0.40	All Project Concrete

These w/c's may cause higher strengths than that required above for compressive or flexural strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations of ACI 211.1 for the term P which is used to denote the weight of pozzolan.

1.2.4 Air Entrainment

Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Concrete with specified strength over 5000 psi may have 1.0 percent less air than specified above. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C231/C231M.

1.2.5 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143/C 143M.

Structural Element	Slump	
	Minimum	Maximum
Foundation walls, substructure walls, footings, slabs	1 in.	3 in.
Any structural concrete approved for placement by pumping:		
At pump	2 in.	6 in.
At discharge of line	1 in.	4 in.

1.2.6 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.2.7 Size of Coarse Aggregate

Use the largest feasible nominal maximum size aggregate (NMSA), specified in PART 2 paragraph AGGREGATES, in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

- Recycled Content Products; (LEED)
- Portland Cement
- Ready-Mixed Concrete
- Vapor Barrier
- Latex Bonding Agent

- Chemical Admixtures
- Epoxy Resin

SD-06 Test Reports

- Testing and Inspection for CQC; G

Certified copies of laboratory test reports, including mill tests

and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

SD-07 Certificates

Qualifications

Written documentation for Contractor Quality Control personnel.

1.4 QUALITY ASSURANCE

Submit qualifications for Contractor Quality Control personnel assigned to concrete construction as American Concrete Institute (ACI) Certified Workmen in one of the following grades or show written evidence of having completed similar qualification programs:

Concrete Field Testing Technician	Grade I
Concrete Laboratory Testing Technician	Grade I or II
Concrete Construction Inspector	Level II
Concrete Transportation Construction Inspector or Reinforced Concrete Special Inspector	Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Code Council (ICC), and Southern Building Code Congress International (SBCCI)
Foreman or Lead Journeyman of the flatwork finishing crew	Similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation

1.4.1 Pre-installation Meeting

A pre-installation meeting with the Contracting Officer will be required at least 10 days prior to start of construction. The Contractor is responsible for calling the meeting; the Project Superintendent and active installation personnel shall be present.

1.4.2 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.4.3 Technical Service for Specialized Concrete

Obtain the services of a factory trained technical representative to oversee proportioning, batching, mixing, placing, consolidating, and finishing of specialized structural concrete. The technical representative

shall be on the job full time until the Contracting Officer is satisfied that field controls indicate concrete of specified quality is furnished and that the Contractor's crews are capable of continued satisfactory work. The technical representative shall be available for consultation with, and advice to, Government forces.

1.4.4 Government Assurance Inspection and Testing

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any CQC responsibilities.

1.4.4.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. Provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75/D 75M. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.4.4.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C172/C172M and tested in accordance with these specifications, as considered necessary.

1.4.4.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.4.4.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

1.5 DELIVERY, STORAGE, AND HANDLING

Store cement and other cementitious materials in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Store reinforcing bars and accessories above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are

opened.

PART 2 PRODUCTS

In accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS submit documentation indicating: distance between manufacturing facility and the project site, distance of raw material origin from the project site, percentage of post-industrial and post-consumer recycled content per unit of product and relative dollar value of recycled content products to total dollar value of products included in project. Submittals shall be as specified in the subject Section.

2.1 CEMENTITIOUS MATERIALS

Cement and pozzolan will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports showing that the material in each shipment meets the requirements of the specification under which it is furnished. Mill test reports shall be no more than 1 month old, prior to use in the work. No cementitious material shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious material may be subjected to check testing by the Government from samples obtained at the mill, at transfer points, or at the project site. If tests prove that a cementitious material that has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cementitious material that has not been used within 6 months after testing shall be retested at the Contractor's expense and shall be rejected if test results are not satisfactory.

2.1.1 Portland Cement

ASTM C 150, Type I or II or V or ASTM C 595/C 595M, Type IS, IP, or P with maximum alkali content of 0.60%. Cement certificate shall include test results in accordance with ASTM C 150, including equivalent alkalies indicated in the Supplementary Optional Chemical Requirements

2.1.2 High-Early-Strength Portland Cement

ASTM C 150/C 150M, Type III with tricalcium aluminate limited to 5 percent, low alkali. Use Type III cement only in isolated instances and only when approved in writing.

2.1.3 Pozzolan (Fly Ash)

ASTM C 618, Type F, except that the maximum allowable loss on ignition shall be 6%, maximum available alkalies content shall be 1.5%, and maximum calcium oxide (CaO) content 8%. Fly ash certificates shall include test results in accordance with ASTM C 618, including available alkalies indicated in the Supplementary Optional Chemical Requirements. Comply with EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS.

2.2 AGGREGATES

2.2.1 Alkali Reactivity Test

Aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with ASTM C 1260. The types of aggregates shall be evaluated in a combination which matches the contractors' proposed mix design (including Class F fly ash), utilizing

the modified version of ASTM C 1260. Test results of the combination shall have a measured expansion of less than 0.08 percent at 16 days. Should the test data indicate an expansion of greater than 0.08%, the aggregate(s) shall be rejected and the contractor shall submit new aggregate sources for retesting or may submit additional test results incorporating Lithium Nitrate for consideration.

ASTM C 1260 shall be modified as follows to include one of the following options:

- a. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and fly ash.
- b. Utilize the contractor's proposed low alkali Portland cement and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and GGBF.
- c. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement, fly ash and GGBF.

2.2.2 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33/C 33M.

2.2.3 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33/C 33M.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494/C 494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494/C 494M, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

2.3.4 Surface Retarder

COE CRD-C 94. Submit sample of surface retarder material with manufacturer's instructions for application in conjunction with air-water

cutting.

2.3.5 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017/C 1017M, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 WATER

Water for mixing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.5 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107/C 1107M, and shall be a commercial formulation suitable for the proposed application.

2.6 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059/C 1059M.

2.7 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881/C 881M, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures. Submit manufacturer's product data, indicating VOC content. Manufacturer's catalog data for the items above, including printed instructions.

2.8 JOINT MATERIALS

2.8.1 Joint Fillers, Sealers, and Waterstops

Materials for expansion joint fillers and waterstops shall be in accordance with Section 03 15 00.00 10 CONCRETE ACCESSORIES. Materials for and sealing of joints shall conform to the requirements of Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

2.8.2 Contraction Joints in Slabs

Materials for contraction joint inserts shall be in accordance with Section 03 15 00.00 10 CONCRETE ACCESSORIES.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, perform the following: Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03 20 00.00 10 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material.

Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.1.2 Preparation of Rock

Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as specified below for Previously Placed Concrete. Keep rock surfaces continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Place concrete before the mortar stiffens.

3.1.2 Previously Placed Concrete

3.1.2.1 Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Remove laitance and loose particles. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

3.2 CONCRETE PRODUCTION

3.2.1 General Requirements

Concrete shall either be batched and mixed onsite or shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94/C 94M, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall conform to the following subparagraphs.

3.2.2 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94/C 94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Water shall not be added at the placing site unless specifically approved; and in no case shall it exceed the specified w/c. Any such water shall be injected at the base of the mixer, not at the discharge end.

3.3 CONVEYING CONCRETE ONSITE

Convey concrete from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.3.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.3.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. Equip the transfer hopper with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.3.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Use nonagitating equipment only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.3.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. Use a discharge deflector when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.3.5 Belt Conveyors

Design and operate belt conveyors to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and provided with positive means, such as discharge baffle or hopper , for preventing segregation of the concrete at the transfer points and the point of placing. Construct belt conveyors such that the idler spacing does not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.3.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.4 PLACING CONCRETE

Discharge mixed concrete within 1.5 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, reduce the time to 45 minutes. Place concrete within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Provide adequate scaffolding, ramps and walkways so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities prevent proper consolidation, finishing and curing. Provide sufficient placing capacity so that concrete can be kept free of cold joints.

3.4.1 Depositing Concrete

Deposit concrete as close as possible to its final position in the forms, and with no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single lift. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Place concrete for

beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for adjoining slabs.

3.4.2 Consolidation

Immediately after placing, consolidate each layer of concrete by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; keep a spare vibrator at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Insert vibrators vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation or flotation of coarse aggregate shall be prevented. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.4.3 Cold Weather Requirements

Use special protection measures, approved by the Contracting Officer, if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. 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, an accelerating 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.

3.4.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.4.4.1 Additional Hot Weather Requirements

Concrete shall be placed in accordance with ACI 305R. During periods of warm weather, the following precautions shall be taken to prevent the formation of plastic-shrinkage cracks resulting from excessive loss of moisture from the concrete:

- a. The metal forms and/or underlying base or subgrade materials that will not be covered by vapor barrier or similar material shall be cooled by sprinkling or fogging with water immediately before the placement of concrete.
- b. All concrete shall be delivered to the forms at a temperature below 85 degrees F, except that concrete with retarding admistures may have temperatures of 85 degrees F to 90 degrees as deposited in the forms.
- c. Placement may be allowed only at night or in early morning hours if necessary to maintain the concrete temperature and keep forms cool.
- d. The concrete shall be placed and finished as rapidly as practicable and curing will start immediately after final finishing has been completed on any section of a floor or placement.
- e. The finished surface of the concrete shall be kept damp by applying a water for or mist with approved spraying equipment until nats can be applied as required by the moist curing method.
- f. Curing for the first 24 hours after placement shall be by the moist curing method. After this initial curing period any of the specified methods may be used for the remaining period of curing.

3.4.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Take particular care if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Conform with the requirement of ACI 305.1. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.5 JOINTS

Locate and construct joints as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable inserts, or by sawing to widen the top portion of sawed joints. Joints to be sealed shall be cleaned and sealed as indicated and in accordance with Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.5.1 Construction Joints

For concrete other than slabs on grade, locate construction joints so that the unit of operation does not exceed distance indicated in the plans. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Locate construction joints as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer. Unless otherwise indicated and except for slabs on grade, extend reinforcing steel through construction joints. Construction joints in slabs on grade shall be as shown. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete above.

3.5.2 Contraction Joints in Slabs on Grade

Contraction joints shall be located and detailed as shown on the drawings. Produce contraction joints by forming a weakened plane in the concrete slab by sawing a continuous slot with a concrete saw. The joint shall be as indicated in the drawings. For saw-cut joints, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent raveling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. Form reservoir for joint sealant as previously specified.

3.5.3 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03 15 00.00 10 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS and Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.5.4 Waterstops

Install waterstops in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03 15 00.00 10 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

3.5.5 Dowels and Tie Bars

Install dowels and tie bars at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03 20 00.00 10 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.6 FINISHING FORMED SURFACES

Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, maintain uniform color of the concrete by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class A or B finish. Except for major defects, as defined hereinafter, repair surface defects as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair below. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects below. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.7 REPAIRS

3.7.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects, whose depth is at least as great as their surface diameter but not over 4 inches, shall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the No. 16 mesh sieve, and minimum amount of water. Use only sufficient water to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer

and hardwood block. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

3.7.2 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep. Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Repair major defects as specified below.

3.7.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Use approved equipment and procedures which will not cause cracking or microcracking of the sound concrete. If reinforcement is encountered, remove concrete so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inches shall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Keep surfaces continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, as an option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, test each repair area for drumminess by firm tapping with a hammer and inspecting for cracks, both in the presence of the Contracting Officer, immediately before completion of the contract, and replacing any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Keep burlap continually wet.

3.7.2.2 Repair of Deep and Large Defects

Deep and large defects will be those that are more than 6 inches deep and also have an average diameter at the surface more than 18 inches or that are otherwise so identified by the Project Office. Such defects shall be repaired as specified herein or directed, except that defects which affect the strength of the structure shall not be repaired and that portion of the structure shall be completely removed and replaced. Repair deep and large defects by procedures approved in advance including forming and placing special concrete using applied pressure during hardening. Preparation of

the repair area shall be as specified for surface application of mortar. In addition, the top edge (surface) of the repair area shall be sloped at approximately 20 degrees from the horizontal, upward toward the side from which concrete will be placed. The special concrete shall be a concrete mixture with low water content and low slump, and shall be allowed to age 30 to 60 minutes before use. Concrete containing a specified expanding admixture may be used in lieu of the above mixture; design the paste portion of such concrete mixture to have an expansion between 2.0 and 4.0 percent when tested in accordance with ASTM C 940. Provide a full width "chimney" at the top of the form on the placing side to ensure filling to the top of the opening. Use a pressure cap on the concrete in the chimney with simultaneous tightening and revibrating the form during hardening to ensure a tight fit for the repair. Remove the form after 24 hours and immediately the chimney shall be carefully chipped away to avoid breaking concrete out of the repair; the surface of the repair concrete shall be dressed as required.

3.8 EXTERIOR SLAB AND RELATED ITEMS

3.8.1 Pavements

Construct pavements where shown on the drawings. After forms are set and underlying material prepared as specified, place the concrete uniformly throughout the area and thoroughly vibrated. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. The entire surface shall be tamped with the strike off, or consolidated with a vibrating screed, and this operation continued until the required compaction and reduction of internal and surface voids are accomplished. Take care to prevent bringing excess paste to the surface. Immediately following the final consolidation of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces. After finishing is completed but while the concrete is still plastic, eliminate minor irregularities and score marks in the pavement surface by means of long-handled cutting straightedges. Straightedges shall be 12 feet in length and shall be operated from the sides of the pavement and from bridges. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than one-half the width of the pavement. The surface shall then be tested for trueness with a 12 foot straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. The straightedge shall be advanced along the pavement in successive stages of not more than one-half the length of the straightedge. Depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. Continue the straightedge testing and finishing until the entire surface of the concrete is true. Before the surface sheen has disappeared and well before the concrete becomes nonplastic, the surface of the pavement shall be given a nonslip sandy surface texture by use of a burlap drag. A strip of clean, wet burlap from 3 to 5 feet wide and 2 feet longer than the pavement width shall be carefully pulled across the surface. Round edges and joints with an edger having a radius of 1/8 inch. Curing shall be as specified.

3.8.2 Sidewalks

Concrete shall be 4 inches minimum thickness. Provide contraction joints at 5 feet spaces unless otherwise indicated. Contraction joints shall be cut 1 inch deep with a jointing tool after the surface has been finished. Provide transverse expansion joints 1/2 inch thick at changes in direction and where sidewalk abuts curbs, steps, rigid pavement, or other similar structures. Sidewalks shall be given a lightly broomed finish. A transverse slope of 1/4 inch per foot shall be provided, unless otherwise indicated. Variations in cross section shall be limited to 1/4 inch in 5 feet.

3.8.3 Curbs and Gutters

Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed for this work. Curbs will be poured integral with the adjacent concrete pavement. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (1/2 inch wide) shall be provided at 600 feet maximum spacing unless otherwise indicated. Finish exposed surfaces using a stiff bristled brush.

3.9 CURING AND PROTECTION

3.9.1 General

Concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
All other concrete	7 days

Immediately after placement, protect concrete from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Maintain air and forms in contact with concrete at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds in PART 2, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.9.2 Moist Curing

Maintain concrete, to be moist-cured, continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved.

When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. Provide an approved work system to ensure that moist curing is continuous 24 hours per day.

3.9.3 Membrane Forming Curing Compounds

Concrete in the following areas may be cured with a pigmented curing compound in lieu of moist curing. Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete, including surfaces to which a smooth finish is to be applied or other concrete to be bonded. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements, may be used for surfaces which are to be painted or are to receive bituminous roofing or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing or flooring specified. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Apply curing compound to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 psi, at a uniform coverage of not more than 400 square feet/gallon for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Shade surfaces, on which clear compound is used, from direct rays of the sun for the first 3 days. Keep surfaces coated with curing compound free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

3.9.4 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 32 degrees F maintain the temperature of the concrete above 40 degrees F for the first seven days after placing. During the period of protection removal, control the air temperature adjacent to the concrete surfaces so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. Perform the installation of the thermometers as directed.

3.10 TESTING AND INSPECTION FOR CQC

Perform the inspection and tests described below and, based upon the results of these inspections and tests, take the action required. Submit certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

- a. When, in the opinion of the Contracting Officer, the concreting operation is out of control, cease concrete placement and correct the operation.
- b. The laboratory performing the tests shall be onsite and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site.
- c. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per 60 thereafter for conformance with ASTM C 1077.

3.10.1 Grading and Corrective Action

3.10.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.10.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.10.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, perform all tests for aggregate quality required by ASTM C 33/C 33M. In addition, after the start of concrete placement, perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.10.3 Scales, Batching and Recording

Check the accuracy of the scales by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.10.4 Batch-Plant Control

Continuously control the measurement of concrete materials, including cementitious materials, each size of aggregate, water, and admixtures. Adjust the aggregate weights and amount of added water as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. Prepare a report indicating 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 weights per cubic yard amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

3.10.5 Concrete Mixture

- a. Air Content Testing. Perform air content tests when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Perform additional tests when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C231/C231M for normal weight concrete and ASTM C 173/C 173M for lightweight concrete. Plot test results on control charts which shall at all times be readily available to the Government and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, perform a second test immediately. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an

"average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment in PART 1. Set an upper warning limit and a lower warning limit line 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.

- b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.
- c. Slump Testing. In addition to slump tests which are made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143/C 143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Plot test results on control charts which shall at all times be readily available to the Government and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, immediately perform a second test. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Set limits on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Take samples for slump at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, take correlation samples at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.

- d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, make an adjustment immediately in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, halt the concreting operation immediately, and take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.
- e. Temperature. Measure the temperature of the concrete when compressive strength specimens are fabricated in accordance with ASTM C 1064/C 1064M. Report the temperature along with the compressive strength data.
- f. Strength Specimens. Perform at least one set of test specimens, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Perform additional sets of test specimens, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. Develop a truly random (not haphazard) sampling plan for approval by the Contracting Officer prior to the start of construction. The plan shall ensure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. A set of test specimens for concrete with a 90-day strength in accordance with the same paragraph shall consist of six specimens, two tested at 7 days, two at 28 days, and two at 90 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M for test cylinders and ASTM C 78/C 78M for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214R.

3.10.6 Inspection Before Placing

Inspect foundations, construction joints, forms, and embedded items in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. Report the results of each inspection in writing.

3.10.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient

temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.10.8 Vibrators

Determine the frequency and amplitude of each vibrator in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Perform additional tests as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. Determine the amplitude with the head vibrating in air. Take two measurements, one near the tip and another near the upper end of the vibrator head, and these results averaged. Report the make, model, type, and size of the vibrator and frequency and amplitude results in writing. Any vibrator not meeting the requirements of paragraph Consolidation above, shall be immediately removed from service and repaired or replaced.

3.10.9 Curing Inspection

- a. Moist Curing Inspections. At least once each shift, and not less than twice per 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.
- b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.
- c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, compute the rate of coverage in square feet/gallon, and note whether or not coverage is uniform.
- d. Membrane Curing Corrective Action. 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.
- e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.
- f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period

for those areas shall be extended by 1 day.

3.10.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.10.11 Mixer Uniformity

- a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M.
- b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M. Select the truck mixers randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.
- c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.10.12 Reports

Report all results of tests or inspections conducted, informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such 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 contractor quality control records.

-- End of Section --

SECTION 03 40 00.00 10

PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION
08/06

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 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 211.2	(1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 305R	(2010) Specification for Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 318/318R	(2005) Building Code Requirements for Structural Concrete and Commentary

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

ACPA 01-102	(2000) Concrete Pipe Handbook
ACPA 01-110	(1984) Design Manual for Sulfide and Corrosion Prediction and Control
ACPA QPC	(2005; Ver 3.0) QCast Plant Certification Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2008; Errata 2009) Structural Welding Code - Steel
AWS D1.4/D1.4M	(2005) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 185/A 185M	(2007) Standard Specification for Steel

	Welded Wire Reinforcement, Plain, for Concrete
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 496/A 496M	(2007) Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497/A 497M	(2006; R 2006) Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A 615/A 615M	(2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706/A 706M	(2009b) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 82/A 82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1240	(2005) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C 1244	(2005a; E 2006) Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
ASTM C 138/C 138M	(2007) Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143/C 143M	(2010) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 1478	(2007) Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
ASTM C 150	(2009) Standard Specification for Portland Cement
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 173/C 173M	(2010b) Standard Test Method for Air Content of Freshly Mixed Concrete by the

	Volumetric Method
ASTM C 192/C 192M	(2007) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2010) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Standard Specification for Concrete Aggregates
ASTM C 330	(2005) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C 39/C 39M	(2010) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 443	(2010) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 494/C 494M	(2010a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 595	(2008a) Standard Specification for Blended Hydraulic Cements
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 877	(2008) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
ASTM C 891	(1990; R 2003) Installation of Underground Precast Concrete Utility Structures
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM C 923	(2002) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals

ASTM C 990 (2006) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants

CSA AMERICA, INC. (CSA/AM)

CAN/CSA A23.4 (2005) Precast Concrete - Materials and Construction

NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA)

NPCA QC Manual (2005; R 2006) Quality Control Manual for Precast Plants

1.2 SUBMITTALS

All submittals are the responsibility of the precast concrete producer. Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Procedures

Quality control procedures established by the precast manufacturer in accordance with NPCA QC Manual and/or ACPA QPC.

SD-02 Shop Drawings

Standard Precast Units; G

Drawings for standard precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. These drawings shall demonstrate that the applicable industry design standards have been met. Include installation and construction information on shop drawings. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

Custom-Made Precast Units; G

Drawings for custom-made precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. Show on these drawings complete design, installation, and construction information in such detail as to enable the Contracting Officer to determine the adequacy of the proposed units for the intended purpose. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

SD-03 Product Data

Standard Precast Units

Cut sheets, for standard precast concrete units, showing conformance to project drawings and requirements, and to applicable industry design standards listed in this specification.

Proprietary Precast Units

Standard plans or informative literature, for proprietary precast concrete units. Make available supporting calculations and design details upon request. Provide sufficient information as to demonstrate that such products will perform the intended task.

Embedded Items

Product data sheets and proper installation instruction for anchors, lifting inserts and other devices. Clearly indicate the products dimensions and safe working load.

Accessories

Proper installation instructions and relevant product data for items including, but not limited to, sealants, gaskets, connectors, steps, cable racks and other items installed before or after delivery.

SD-05 Design Data

Design Calculations Concrete Mix Proportions

Precast concrete unit design calculations, and concrete mix proportions.

SD-06 Test Reports

Test Reports

a. Copies of material certifications and/or laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolans, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

b. Copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze thaw durability, abrasion and absorption. Clearly detail in the specifications special tests for precast concrete or cast-in items.

c. Copies of in-plant QA/QC inspection reports, upon the request of the Contracting Officer.

SD-07 Certificates

Quality Control Procedures

Quality control procedures established in accordance with

NPCA QC Manual and/or ACPA QPC.

1.3 GENERAL REQUIREMENTS

Furnish precast concrete units designed and fabricated by an experienced and acceptable precast concrete manufacturer who has been, for at least 3 years, regularly and continuously engaged in the manufacture of precast concrete work similar to that indicated on the drawings. Coordinate precast work with the work of other trades.

1.4 DESIGN

1.4.1 Standard Precast Units

Design standard precast concrete units to withstand indicated design load conditions in accordance with applicable industry design standards ACI 318/318R, ASTM, ACPA 01-102, Chapter 7-Design for Sulfide Control. Design must also consider stresses induced during handling, shipping and installation as to avoid product cracking or other handling damage. Indicate design loads for precast concrete units on the shop drawings.

1.4.2 Custom-Made Precast Units

Submit design calculations and drawings of custom-made precast units, prepared and sealed by a registered professional engineer, for approval prior to fabrication. Include in the calculations the analysis of units for lifting stresses and the sizing of lifting devices.

1.4.3 Proprietary Precast Units

Products manufactured under franchise arrangements must conform to all the requirements specified by the franchiser. Items not included in the franchise specification, but included in this specification, must conform to the requirements in this specification.

1.4.4 Joints and Sealants

Provide joints and sealants between adjacent units of the type and configuration indicated on shop drawings meeting specified design and performance requirements.

1.4.5 Concrete Mix Design

1.4.5.1 Concrete Mix Proportions

Base selection of proportions for concrete on the methodology presented in ACI 211.1 for normal weight concrete and ACI 211.2 for lightweight concrete. Develop the concrete proportions using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Do not use calcium chloride in precast concrete containing reinforcing steel or other embedded metal items. At a minimum of thirty days prior to precast concrete unit manufacturing, the precast concrete producer will submit a mix design for each strength and type of concrete that will be used. Furnish a complete list of materials, including quantity, type, brand and applicable data sheets for all mix design constituents as well as applicable reference specifications. The use of self-consolidating concrete is permitted, provided that mix design proportions and

constituents meet the requirements of this specification.

1.4.5.2 Concrete Strength

Provide precast concrete units with a 28-day compressive strength (f'c) of 4000 psi.

1.4.5.3 Water-to-Cement Ratio

Furnish concrete, that will be exposed to freezing and thawing, containing entrained air and with water-cement ratios of 0.45 or less. Furnish concrete which will not be exposed to freezing, but which is required to be watertight, with a water-cement ratio of 0.48 or less if the concrete is exposed to fresh water, or 0.45 or less if exposed to brackish water or sea water. Furnish reinforced concrete exposed to deicer salts, brackish water or seawater with a water-cement ratio of 0.40 or less for corrosion protection.

1.4.5.4 Air Content

The air content of concrete that will be exposed to freezing conditions must be within the limits given below.

NOMINAL MAXIMUM AGGREGATE SIZE	AIR CONTENT %	
	SEVERE EXPOSURE	MODERATE EXPOSURE
10 mm (3/8 inch)	6.0 to 9.0	4.5 to 7.5
13 mm (1/2 inch)	5.5 to 8.5	4.0 to 7.0
19 mm (3/4 inch)	4.5 to 7.5	3.5 to 6.5
25 mm (1.0 inch)	4.5 to 7.5	3.0 to 6.0
38 mm (1.5 inch)	4.5 to 7.0	3.0 to 6.0

Note: For specified compressive strengths greater than 5000 psi, air content may be reduced 1%

1.4.5.5 Corrosion Control for Sanitary Sewer Systems

Follow design recommendations outlined in Chapter 7 of ACPA 01-102 or the ACPA 01-110 when hydrogen sulfide is indicated as a potential problem.

1.5 QUALITY ASSURANCE

Demonstrate adherence to the standards set forth in NPCA QC Manual and/or ACPA QPC. Meet requirements written in the subparagraphs below.

1.5.1 NPCA and ACPA Plant Certification

The precast concrete producer shall be certified by the National Precast Concrete Association's and/or the American Concrete Pipe Association's Plant Certification Program prior to and during production of the products for this project.

1.5.2 Qualifications, Quality Control and Inspection

1.5.2.1 Qualifications

Select a precast concrete producer that has been in the business of producing precast concrete units similar to those specified for a minimum of 3 years. The precast concrete producer must maintain a permanent

quality control department or retain an independent testing agency on a continuing basis.

1.5.2.2 Quality Control Procedures

Show that the following QC tests are performed as required and in accordance with the ASTM standards indicated.

- a. Slump: Perform a slump test for each 150 cu yd of concrete produced, or once a day, whichever comes first. Perform slump tests in accordance with ASTM C 143/C 143M.
- b. Temperature: Measure the temperature of fresh concrete when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C 1064/C 1064M.
- c. Compressive Strength: Make at least four compressive strength specimens for each 150 cubic yards of concrete of each mix in accordance with the following Standards: ASTM C 31/C 31M, ASTM C 192/C 192M, ASTM C 39/C 39M.
- d. Air Content: Perform tests for air content on air-entrained, wet-cast concrete for each 150 cu yd of concrete, but not less often than once each day when air-entrained concrete is used. Determine the air content in accordance with either ASTM C 231 or ASTM C 173/C 173M for normal weight aggregates and ASTM C 173/C 173M for lightweight aggregates.
- e. Unit Weight: Perform tests for unit weight a minimum of once per week to verify the yield of batch mixes. Perform unit weight tests for each 100 cu yd of lightweight concrete in accordance with ASTM C 138/C 138M.

Submit test reports as specified in the Submittals paragraph and documentation to demonstrate compliance with the above subparagraphs.

1.5.2.3 Inspection

The Contracting Officer may place an inspector in the plant when the units covered by this specification are being manufactured. The burden of payment for plant inspection will be clearly detailed in the specification. The precast concrete producer shall give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the Government's right to enforce contractual provisions after units are transported or erected.

1.6 HANDLING, STORAGE AND DELIVERY

1.6.1 Handling

Handle, transport, and store products in a manner to minimize damage. Lifting devices or hoists shall be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on shop drawings.

1.6.2 Storage

Store units off the ground or in a manner that will minimize potential

damage.

1.6.3 Delivery

Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the Contracting Officer for quality and final acceptance.

PART 2 PRODUCTS

2.1 MATERIALS

Except as otherwise specified in the following paragraphs, conform material to Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE and Section 03 20 00.00 10 CONCRETE REINFORCEMENT.

2.1.1 Cement

Furnish cement conforming to ASTM C 150, Type I, II, III or V. Sanitary Sewer applications shall utilize Type V only. Furnish blended cements that conform to ASTM C 595.

2.1.2 Silica Fume

Provide silica fume conforming to ASTM C 1240. Provide available alkalis conforming to the optimal limit given in Table 2 of ASTM C 1240. Silica fume may be furnished as a dry, densified material or as a slurry. When necessary, coordinate the services of a technical representative experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume.

2.1.3 Fly Ash and Pozzolans

Fly ash is if used as an admixture conforming to ASTM C 618, Class F with 4 percent maximum loss on ignition and 35 percent maximum cement replacement by weight.

2.1.4 Water

Furnish water potable or free of deleterious substances in amounts harmful to concrete or embedded metals.

2.1.5 Aggregates

2.1.5.1 Selection

Furnish aggregates conforming to ASTM C 33. Provide aggregates not containing any substance, which may be deleteriously reactive with the alkalis in the cement.

2.1.5.2 Aggregates for Lightweight Concrete

ASTM C 330

2.1.6 Admixtures

2.1.6.1 Air-Entraining

ASTM C 260

2.1.6.2 Accelerating, Retarding, Water Reducing Moderate to High

ASTM C 494/C 494M

2.1.6.3 Pigments

Non-fading and lime-resistant

2.1.7 Reinforcement

2.1.7.1 Reinforcing Bars

- a. Deformed Billet-steel: ASTM A 615/A 615M
- b. Deformed Low-alloy steel: ASTM A 706/A 706M

2.1.7.2 Reinforcing Wire

- a. Plain Wire: ASTM A 82/A 82M
- b. Deformed Wire: ASTM A 496/A 496M

2.1.7.3 Welded Wire Fabric

- a. Plain Wire: ASTM A 185/A 185M
- b. Deformed Wire: ASTM A 497/A 497M

2.1.8 Inserts and Embedded Metal

All items embedded in concrete shall be of the type required for the intended task, and meet the following standards.

- a. Structural Steel Plates, Angles, etc.: ASTM A 36/A 36M
- b. Hot-dipped Galvanized: ASTM A 153/A 153M
- c. Proprietary Items: In accordance with manufacturers published literature

2.1.9 Accessories

- a. Rubber Gaskets for Circular Concrete Sewer Pipe and Culvert Pipe: ASTM C 443.
- b. External Sealing Bands for Noncircular Sewer, Storm Drain and Culvert Pipe: ASTM C 877.
- c. Preformed Flexible Joint Sealants for Concrete Pipe, Manholes, and Manufactured Box Sections: ASTM C 990.
- d. Elastomeric Joint Sealants: ASTM C 920

2.1.10 Pipe Entry Connectors

Pipe entry connectors shall conform to ASTM C 923 or ASTM C 1478.

2.1.11 Grout

Nonshrink Grout shall conform to ASTM C 1107/C 1107M. Cementitious grout shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.

PART 3 EXECUTION

3.1 FABRICATION AND PLACEMENT

Perform fabrication in accordance with NPCA QC Manual and/or ACPA QPC unless specified otherwise.

3.1.1 Forms

Use forms, for manufacturing precast concrete products, of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Construct forms so that the forces and vibrations to which the forms will be subjected can cause no product damage. Clean forms of concrete build-up after each use. Apply form release agents according to the manufacturers recommendations and do not allow to build up on the form casting surfaces.

3.1.2 Reinforcement

Follow applicable ASTM Standard or ACI 318/318R for placement and splicing. Fabricate cages of reinforcement either by tying the bars, wires or welded wire fabric into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4/D1.4M. Position reinforcing as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 inch. Provide concrete cover not less than 1/2 inch. Take positive means to assure that the reinforcement does not move significantly during the casting operations.

3.1.3 Embedded Items

Position embedded items at locations specified in the design documents. Perform welding in accordance with AWS D1.1/D1.1M when necessary. Hold rigidly in place inserts, plates, weldments, lifting devices and other items to be imbedded in precast concrete products so that they do not move significantly during casting operations.

3.2 CONCRETE

3.2.1 Concrete Mixing

Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

3.2.2 Concrete Placing

Deposit concrete into forms as near to its final location as practical. Keep the free fall of the concrete to a minimum. Consolidate concrete in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Use vibrators to consolidate concrete with frequencies and amplitudes sufficient to produce well consolidated concrete.

3.2.2.1 Cold Weather Concreting

Perform cold weather concreting in accordance with ACI 306.1.

- a. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather.
- b. Free from frost all concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact.
- c. Do not use frozen materials or materials containing ice.
- d. In cold weather the temperature of concrete at the time of placing shall not be below 45 degrees F. Discard concrete that freezes before its compressive strength reaches 500 psi.

3.2.2.2 Hot Weather Concreting

Recommendations for hot weather concreting are given in detail in ACI 305R. During hot weather, give proper attention to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90 degrees F.

3.2.3 Concrete Curing

Commence curing immediately following the initial set and completion of surface finishing.

3.2.3.1 Curing by Moisture Retention

Prevent moisture evaporation from exposed surfaces until adequate strength for stripping is reached by one of the following methods:

- a. Cover with polyethylene sheets a minimum of 6 mils thick per ASTM C 171.
- b. Cover with burlap or other absorptive material and keep continually moist.
- c. Use of a membrane-curing compound applied at a rate not to exceed 200 square ft/gallon, or per manufacturers' recommendations according to ASTM C 309.

3.2.3.2 Curing with Heat and Moisture

Do not subject concrete to steam or hot air until after the concrete has attained its initial set. Apply steam, if used, within a suitable enclosure, which permits free circulation of the steam in accordance with CAN/CSA A23.4. If hot air is used for curing, take precautions to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 150 degrees F. These requirements do not apply to products cured with steam under pressure in an autoclave.

3.2.4 Surface Finish

Finish unformed surfaces of wet-cast precast concrete products as

specified. If no finishing procedure is specified, finish such surfaces using a strike-off to level the concrete with the top of the form.

3.2.5 Stripping Products from Forms

Do not remove products from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.

3.2.6 Patching and Repair

No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.

3.2.6.1 Repairing Minor Defects

Defects that will not impair the functional use or expected life of a precast concrete product may be repaired by any method that does not impair the product.

3.2.6.2 Repairing Honeycombed Areas

When honeycombed areas are to be repaired, remove all loose material and cut back the areas into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Use proprietary repair materials in accordance with the manufacturer's instructions. If a proprietary repair material is not used, saturate the area with water. Immediately prior to repair, the area should be damp, but free of excess water. Apply a cement-sand grout or an approved bonding agent to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

3.2.6.3 Repairing Major Defects

Evaluate, by qualified personnel, defects in precast concrete products which impair the functional use or the expected life of products to determine if repairs are feasible and, if so, to establish the repair procedure.

3.2.7 Shipping Products

Do not ship products until they are at least 5 days old, unless it can be shown that the concrete strength has reached at least 75% of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

3.3 INSTALLATION

3.3.1 General Requirements

- a. Install precast concrete products to the lines and grades shown in the contract documents or otherwise specified.
- b. Lift products by suitable lifting devices at points provided by the precast concrete producer.
- c. Install products per the precast concrete producer's instructions.

In the absence of such instructions, install underground utility structures in accordance with ASTM C 891. Install pipe and manhole sections in accordance with the procedures outlined by the American Concrete Pipe Association.

d. Field modifications to the product will relieve the precast producer of liability even if such modifications result in the failure of the product.

3.3.2 Water Tightness

Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, connectors and inserts should be used to ensure the integrity of the entire system.

3.4 FIELD QUALITY CONTROL

3.4.1 Site Tests

When water tightness testing is required for an underground product, use one of the following methods:

3.4.2 Vacuum Testing

Prior to backfill vacuum test system according to ASTM C 1244.

3.4.3 Water Testing

Perform water testing according to the contract documents and precast concrete producer's recommendations.

-- End of Section --

SECTION 31 00 00

EARTHWORK
08/08PART 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 T 180 (2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
- AASHTO T 224 (2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION (AWWA)

- AWWA C600 (2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

AMERICAN WELDING SOCIETY (AWS)

- AWS D1.1/D1.1M (2008; Errata 2009) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

- ASTM C 136 (2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D 1140 (2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
- ASTM D 1556 (2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
- ASTM D 1557 (2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
- ASTM D 1883 (2007) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
- ASTM D 2167 (2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
- ASTM D 2434 (1968; R 2006) Permeability of Granular

Soils (Constant Head)

ASTM D 2487	(2006) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2937	(2004) Density of Soil in Place by the Drive-Cylinder Method
ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6938	(2008a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials 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. Satisfactory materials for grading comprise stones less than 8 inches, except for fill material for pavements which comprise stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

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; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 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, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of 0. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, 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. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch

sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.

1.2.5 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.6 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 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.

1.2.7 Unstable Material

Unstable material are too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.2.8 Select Granular Material

1.2.8.1 General Requirements

Select granular material consist of materials classified as GW OR SW, by ASTM D 2487 where indicated. The liquid limit of such material must not exceed 25 percent when tested in accordance with ASTM D 4318. The plasticity index must not be greater than 6 percent when tested in accordance with ASTM D 4318, and not more than 35 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D 1140. Provide a minimum coefficient of permeability of 0.002 feet per minute when tested in accordance with ASTM D 2434.

1.2.8.2 California Bearing Ratio Values

Bearing Ratio: At 0.1 inch penetration, provide a bearing ratio of 10 percent at 95 percent ASTM D 1557 maximum density as determined in accordance with ASTM D 1883 for a laboratory soaking period of not less than 4 days.

1.2.9 Initial Backfill Material

Initial backfill consists of select granular material or satisfactory materials free from rocks 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, free

the initial backfill material of stones larger than 1/2 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.2.10 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 15 when tested in accordance with ASTM D 4318.

1.3 SYSTEM DESCRIPTION

1.3.1 Classification of Excavation

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.3.2 Blasting

Blasting will not be permitted.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring; G
Dust Control and Management Plan; G

SD-03 Product Data

Utilization of Excavated Materials; G

Procedure and location for disposal of unused satisfactory material. Proposed source of borrow material. Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

SD-06 Test Reports

Testing
Borrow Site Testing

Within 24 hours of conclusion of physical tests, 4 copies of test results, including calibration curves and results of calibration tests. Results of testing at the borrow site.

SD-07 Certificates

Testing

Qualifications of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities.

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Provide 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, 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. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems

2.1.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.1.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.2 DETECTION WIRE FOR NON-METALLIC PIPING

Insulate a single strand, solid copper detection wire with a minimum of 12 AWG.

2.3 MATERIAL FOR RIP-RAP

Provide Bedding material, Grout, Filter fabric and rock conforming to the requirements indicated.

2.3.1 Bedding Material

Provide bedding material consisting of sand, gravel, or crushed rock, well graded, with a maximum particle size of 2 inch. Compose material of tough, durable particles. Allow fines passing the No. 200 standard sieve with a plasticity index less than six.

2.3.2 Grout

Provide durable grout composed of cement, water, an air-entraining admixture, and sand mixed in proportions of one part portland cement to two parts of sand, sufficient water to produce a workable mixture, and an amount of admixture which will entrain sufficient air, as determined by the Contracting Officer. Mix grout in a concrete mixer. Allow a sufficient mixing time to produce a mixture having a consistency permitting gravity flow into the interstices of the rip-rap with limited spading and brooming.

2.3.3 Rock

Provide rock fragments sufficiently durable to ensure permanence in the structure and the environment in which it is to be used. Use rock fragments free from cracks, seams, and other defects that would increase the risk of deterioration from natural causes. Provide fragments sized so that no individual fragment exceeds a weight of 50 pounds and that no more than 10 percent of the mixture, by weight, consists of fragments weighing 2 pounds or less each. Provide rock with a minimum specific gravity of 2.50. Do not permit the inclusion of more than trace 1 percent quantities of dirt, sand, clay, and rock fines.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the grading limits from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.1.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material be deposited a maximum 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.1.2 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as

directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.1.3 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. 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 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.

3.1.4 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls more than 5 feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in. Shore vertical trench walls more than 5 feet high. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inch inside diameter, and do not exceed 36 inch plus pipe outside diameter for sizes larger than 24 inch inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.1.4.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 3 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.1.4.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench,

remove such material 6 inch below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.4.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it 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 Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.1.4.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Specify removal of unstable material. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.1.4.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, provide excavation 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.

3.1.5 Underground Utilities

The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. 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 two 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.

3.1.6 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement.

3.2 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Obtain borrow material from the borrow areas within the limits of the project site, selected by the Contractor or from approved private sources. Unless

otherwise provided in the contract, the Contractor is responsible for obtaining 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 from the owners. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. Consider necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon related operations to the borrow excavation.

3.3 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

Notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, excavate borrow pits and other excavation areas providing adequate drainage. Transport overburden and other spoil material to designated spoil areas or otherwise dispose of as directed. Provide neatly trimmed and drained borrow pits after the excavation is completed. Ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.4 SHORING

3.4.1 General Requirements

Submit a Shoring and Sheet piling 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 sheet piling of excavations. Finish shoring, including sheet piling, and install as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove shoring, bracing, and sheet piling as excavations are backfilled, in a manner to prevent caving.

3.5 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory and wasted materials as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials 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, remove and replace such material with satisfactory material from approved sources.

3.6 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.7 GROUND SURFACE PREPARATION

3.7.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 8 inch before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 8 inch, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inch and compact it as specified for the adjacent fill.

3.7.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to plus or minus 2 percent of optimum moisture.

3.8 UTILIZATION OF EXCAVATED MATERIALS

Dispose unsatisfactory materials removing from excavations into designated waste disposal or spoil areas. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Do not waste any satisfactory excavated material without specific written authorization. Dispose of satisfactory material, authorized to be wasted, in designated areas approved for surplus material storage or designated waste areas as directed. Clear and grub newly designated waste areas on Government-controlled land before disposal of waste material thereon. Stockpile and use coarse rock from excavations for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. Do not dispose excavated material 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.

3.9 BURIED TAPE AND DETECTION WIRE

3.9.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 24 inches above top of pipe. Location may be adjusted to avoid conflicts with other utilities.

3.9.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inch above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over it's entire length. Install wires at manholes between the top of the

corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal.

3.10 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed as specified in paragraph GROUND SURFACE PREPARATION. Provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.10.1 Trench Backfill

Backfill trenches to the grade shown. Backfill the trench to 2 feet above the top of pipe prior to performing the required pressure tests. Leave the joints and couplings uncovered during the pressure test. Do not backfill the trench until all specified tests are performed.

3.10.1.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with select granular material or initial backfill material.

3.10.1.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with select granular material placed in layers not exceeding 6 inch loose thickness.

3.10.1.3 Bedding and Initial Backfill

Place initial backfill material and compact it with approved tampers to a height of at least one foot above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to top of pipe to 95 percent of ASTM D 698 maximum density. Provide plastic piping with bedding to spring line of pipe. Provide materials as follows:

- a. Class I: Angular, 0.25 to 1.5 inch, graded stone.
- b. Class II: Coarse sands and gravels with maximum particle size of 1.5 inch, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.
- c. Clean, coarse-grained sand classified as SW or SP by ASTM D 2487 for bedding and backfill as indicated.
- d. Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as having a classification of GW in

accordance with ASTM D 2487 for bedding as indicated. Do not exceed maximum particle size of 1.5 inch.

3.10.1.4 Final Backfill

Fill the remainder of the trench, except for special materials for roadways with satisfactory material. Place backfill material and compact as follows:

- a. Roadways, : Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction.
- b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Deposit backfill in layers of a maximum of 12 inch loose thickness, and compact it to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Do not permit compaction by water flooding or jetting. Apply this requirement to all other areas not specifically designated above.

3.10.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 3 days, place backfill in such a manner that the structure is not be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.11 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.11.1 Gas Distribution

Excavate trenches to a depth that will provide a minimum 18 inch of cover in rock excavation and a minimum 36 inch of cover in other excavation.

3.11.2 Water Lines

Excavate trenches to a depth that provides a minimum cover from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. For fire protection yard mains or piping, provide minimum cover as indicated in plans.

3.11.3 Heat Distribution System

Free initial backfill material of stones larger than 1/4 inch in any dimension.

3.11.4 Electrical Distribution System

Provide a minimum cover of 24 inch from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated.

3.11.5 Pipeline Casing

Provide new smooth wall steel pipeline casing in locations indicated in the drawings. Installation shall be in a trench unless otherwise indicated in

the drawings. 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. If installation by dry boring and jacking method is indicated, it shall be as follows:

3.11.5.1 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.

3.11.5.2 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.

3.11.5.3 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 as indicated.

3.11.6 Rip-Rap Construction

Construct rip-rap on filter fabric in the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.11.6.1 Bedding Placement

Spread filter fabric on prepared subgrade as indicated.

3.11.6.2 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above.

3.12 FILLS OR EMBANKMENTS

3.12.1 Earth Fills or Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than 6 inch in depth. Spread each layer 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, plow, disk, or otherwise brake up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for

the upper portion of earth fills or embankments forming raw subgrade for pavements are identical with those requirements specified in paragraph RAW SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.13 RAW SUBGRADE PREPARATION

3.13.1 Proof Rolling

Finish proof rolling 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 with six passes of a 15 ton, pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes over all areas, and at speeds between 2-1/2 to 3-1/2 mph. When proof rolling, provide one-half of the passes made with the roller in a direction perpendicular to the other passes. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Perform proof rolling in the presence of the Contracting Officer. Undercut rutting or pumping of material to a depth of 12 inch and replace with fill and backfill material.

3.13.2 Construction

Shape raw subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inch below finished grade for the raw subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire raw subgrade to line, grade, and cross section and compact as specified. After rolling, do not show deviations for the surface of the raw subgrade for roadways greater than 1/2 inch when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area. Do not vary the elevation of the finish subgrade more than 0.05 foot from the established grade and cross section.

3.13.3 Compaction

Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas, compact each layer of the embankment to at least 90 percent of laboratory maximum density.

3.13.3.1 Raw Subgrade for Pavements

Compact raw subgrade for pavements to at least 95 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the raw subgrade, thoroughly blend, reshape, and compact the top 6 inch of raw subgrade.

3.14 FINISHING

Finish the surface of excavations, fills, embankments, and raw subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for

graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for raw subgrades specified in paragraph RAW SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.14.1 Raw Subgrade and Fills or Embankments

During construction, keep fills or embankments and excavations shaped and drained. Maintain ditches and drains along raw subgrade to drain effectively at all times. Do not disturb the finished raw subgrade by traffic or other operation. Protect and maintain the finished raw subgrade in a satisfactory condition until subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished raw subgrade. Do not lay subbase, base course, or pavement until the raw subgrade has been checked and approved, and in no case place subbase, base, surfacing, or pavement on a muddy, spongy, or frozen subgrade.

3.14.2 Grading Around Structures

Construct areas within 5 feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.15 TESTING

Perform testing by a validated commercial testing laboratory or the Contractor's validated testing facility. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected, validated and approved by the Contracting Officer. Determine field in-place density in accordance with ASTM D 1556 or ASTM D 2167 ASTM D 6938 Procedure A. When ASTM D 6938 is used, check the calibration curves and adjust using only the sand cone method as described in ASTM D 1556. ASTM D 6938 results in a wet unit weight of soil in determining the moisture content of the soil when using this method. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D 6938 Procedure A; check the calibration of both the density and moisture gauges at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. ASTM D 2937, use the Drive Cylinder Method only for soft, fine-grained, cohesive soils. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompact areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. 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.

3.15.1 Fill and Backfill Material Gradation

One test per 750 cubic yards stockpiled or in-place source material. Determine gradation of fill and backfill material in accordance with ASTM C 136.

3.15.2 In-Place Densities

- a. One test per 5100 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.
- b. One test per 1000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.
- c. One test per 200 linear feet, or fraction thereof, of each lift of fill, embankment or backfill for roads and utilities.

3.15.3 Check Tests on In-Place Densities

If ASTM D 6938 Procedure A is used, check in-place densities by ASTM D 1556 as follows:

- a. One check test per lift at the beginning and then weekly for each type of material being tested for each lift of fill or backfill compacted by other than hand-operated machines.
- b. One check test per lift for each 2500 square feet, of fill or backfill areas compacted by hand-operated machines.
- c. One check test per lift for each 10,000 linear feet, or fraction thereof, of embankment or backfill for roads.

3.15.4 Moisture Contents

In the stockpile, excavation, or borrow areas, perform a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, perform tests as dictated by local conditions and approved by the Contracting Officer.

3.15.5 Optimum Moisture and Laboratory Maximum Density

Perform tests for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 750 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.15.6 Tolerance Tests for Raw Subgrades

Perform continuous checks on the degree of finish specified in paragraph RAW SUBGRADE PREPARATION during construction of the subgrades.

3.15.7 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to 2, feet above the top of the pipe, the finished grade surface, inspect the pipe to determine whether significant displacement has occurred. Conduct this inspection in the presence of the Contracting Officer. Inspect pipe sizes larger than 36 inch, while inspecting smaller diameter pipe by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, replace or repair the defects as directed at no additional cost to the Government.

3.16 DISPOSITION OF SURPLUS MATERIAL

Provide surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber as wasted in Government disposal area indicated as directed by the Contracting Officer.

-- End of Section --

SECTION 31 05 22

GEOTEXTILES USED AS FILTERS

08/08

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 123	(2007) Terminology Relating to Textiles
ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a; R 2009) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004; R 2009) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2007) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2002; R 2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 4884	(1996; R 2003) Strength of Sewn or Thermally Bonded Seams of Geotextiles

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-2-1601	(1994; Change 1) Hydraulic Design of Flood Control Channels
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00

SUBMITTAL PROCEDURES:

SD-04 Samples

Geotextile

Geotextile samples for testing, if requested, to determine compliance with the requirements in this specification, a minimum of 60 days prior to the beginning of installation of the same textile. Upon delivery of the geotextile, submit duplicate copies of the written certificate of compliance signed by a legally authorized official of the manufacturer. The certificate shall state that the geotextile shipped to the site meets the chemical requirements and exceeds the minimum average roll value listed in TABLE 1. Upon request, supply quality control and quality assurance tests for the geotextile. Provide all samples from the same production lot as will be supplied for the contract, of the full manufactured width of the geotextile by at least 10 feet long, except that samples for seam strength may be a full width sample folded over and the edges stitched for a length of at least 5 feet. Samples submitted for testing shall be identified by manufacturers lot designation. For needle punched geotextile, the manufacturer shall certify that the geotextile has been inspected using permanent on-line metal detectors and does not contain any needles.

SD-07 Certificates

Geotextile

Manufacturer's certification of the geotextile material. All brands of geotextile and all seams to be used will be accepted on the basis of mill certificates or affidavits. Submit duplicate copies of the mill certificate or affidavit signed by a legally authorized official from the company manufacturing the geotextile. The mill certificate or affidavit shall attest that the geotextile meets the chemical, physical and manufacturing requirements stated in this specification.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver only approved geotextile rolls to the project site. All geotextile shall be labeled, shipped, stored, and handled in accordance with ASTM D 4873. No hooks, tongs, or other sharp instruments shall be used for handling geotextile.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Geotextile

2.1.1.1 General

Provide geotextile that is a non-woven pervious sheet of plastic yarn as defined by ASTM D 123 matching or exceeding the minimum average roll values listed in TABLE 1. Strength values indicated in the table are for the weaker principal direction.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	lb	200	ASTM D 4632
SEAM STRENGTH	lb	180	ASTM D 4632
PUNCTURE	lb	80	ASTM D 4833
TRAPEZOID TEAR	lb	40	ASTM D 4533
PERMEABILITY	cm/sec		ASTM D 4491
APPARENT OPENING SIZE	U.S. SIEVE	120	ASTM D 4751
PERMITTIVITY	sec ⁻¹		ASTM D 4491
ULTRAVIOLET DEGRADATION	Percent	50 AT 500 Hrs	ASTM D 4355

2.1.1.2 Geotextile Fiber

Fibers used in the manufacturing of the geotextile shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of polyolefins, polyesters, or polamides. Add stabilizers and/or inhibitors to the base polymer, if necessary to make the filaments resistant to deterioration caused by ultraviolet light and heat exposure. Reclaimed or recycled fibers or polymer shall not be added to the formulation. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Finish the edges of the geotextile to prevent the outer fiber from pulling away from the geotextile.

2.1.2 Seams

Sew the seams of the geotextile with thread of a material meeting the chemical requirements given above for geotextile yarn or bond the seams by cementing or by heat. Attach the sheets of geotextile at the factory or another approved location, if necessary, to form sections not less than 12 feet wide. Test seams in accordance with method ASTM D 4884. The strength of the seam shall be not less than 90 percent of the required grab tensile strength of the unaged geotextile in any principal direction.

2.1.3 Securing Pins

Secure the geotextile to the embankment or foundation soil by pins to prevent movement prior to placement of revetment materials. Other appropriate means to prevent movement such as staples, sand bags, and stone could also be used. Insert securing pins through both strips of overlapped geotextile along the line passing through midpoints of the overlap. Remove securing pins as placement of revetment materials are placed to prevent tearing of geotextile or enlarging holes. Maximum spacing between securing pins depends on the steepness of the embankment slope. The maximum pins spacing shall be equal to or less than the values listed in TABLE 2. When windy conditions prevail at the construction site, increase the number of

pins upon the demand of the Contracting Officer. Anchor terminal ends of the geotextile with key trench or apron at crest, toe of the slope and upstream and downstream limits of installation.

TABLE 2
MAXIMUM SPACING FOR SECURING PINS

EMBANKMENT	SPACING, feet
STEEPER THAN 1V ON 3H	2
1V ON 3H TO 1V ON 4H	3
FLATTER THAN 1V ON 4H	5

2.2 INSPECTIONS, VERIFICATIONS, AND TESTING

2.2.1 Manufacturing and Sampling

Geotextiles and factory seams shall meet the requirements specified in TABLE 1. Perform conformance testing in accordance with the manufacturers approved quality control manual.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Prepare surface, on which the geotextile will be placed, to a relatively smooth surface condition in accordance with the applicable portion of this specification and shall be free from obstruction, debris, depressions, erosion feature, or vegetation. Remove any irregularities so as to ensure continuous, intimate contact of the geotextile with all the surface. Any loose material, soft or low density pockets of material, shall be removed; erosion features such as rills, gullies etc. shall be graded out of the surface before geotextile placement.

3.2 INSTALLATION OF THE GEOTEXTILE

3.2.1 General

Place the geotextile in the manner and at the locations shown. At the time of installation, reject the geotextile if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.

3.2.2 Placement

Place the geotextile with the long dimension parallel to the centerline of the channel and laid smooth and free of tension, stress, folds, wrinkles, or creases. Place the strips to provide a minimum width of 12 inches of overlap for each joint. The placement procedure requires that the length of the geotextile be approximately 50 percent greater than the slope length. Adjust the actual length of the geotextile used based on initial installation experience. Temporary pinning of the geotextile to help hold it in place until the riprap is placed will be allowed. Remove the temporary pins as the riprap is placed to relieve high tensile stress which may occur during placement of material on the geotextile. Design

protection of riprap shall be in compliance with EM 1110-2-1601. Perform trimming in such a manner that the geotextile is not damaged in any way.

3.3 PROTECTION

Protect the geotextile at all times during construction from contamination by surface runoff; remove any geotextile so contaminated and replaced with uncontaminated geotextile. Replace any geotextile damaged during its installation or during placement of riprap at no cost to the Government. Schedule the work so that the covering of the geotextile with a layer of the specified material is accomplished within 7 calendar days after placement of the geotextile. Failure to comply shall require replacement of geotextile. Protect the geotextile from damage prior to and during the placement of riprap or other materials. This may be accomplished by limiting the height of drop to less than 1 foot, by placing a cushioning layer of sand or gravel on top of the geotextile before placing the material, or other methods deemed necessary. Care should be taken to ensure that the utilized cushioning materials will not impede the flow of water. Before placement of riprap or other materials, demonstrate that the placement technique will not cause damage to the geotextile. In no case shall any type of equipment be allowed on the unprotected geotextile.

3.4 PLACEMENT OF CUSHIONING MATERIAL

Perform placing of cushioning material in a manner to ensure intimate contact of the geotextile with the prepared surface and with the cushioning material. The placement shall also be performed in a manner that will not damage the geotextile including tear, puncture, or abrasion. On sloping surfaces place the cushioning material from the bottom of the slopes upward. During placement, the height of the drop of riprap material shall not be greater than 12 inches. Uncover any geotextile damaged beneath the cushioning material, as necessary, and replaced at no cost to the Government.

3.5 OVERLAPPING AND SEAMING

3.5.1 Overlapping

The overlap of geotextile rolls shall be 12 inches. Appropriate measures will be taken to ensure required overlap exists after cushion placement.

3.5.2 Sewn Seams

High strength thread should be used so that seam test conforms to ASTM D 4884. The thread shall meet the chemical, ultraviolet, and physical requirements of the geotextile, and the color shall be different from that of the geotextile. The seam strength shall be equal to the strength required for the geotextile in the direction across the seam. Overlapping J-type seams are preferable over prayer-type seams as the overlapping geotextile reduces the chance of openings to occur at the seam. Use double sewing, specially for field seams, to provide a safety factor against undetected missed stitches.

-- End of Section --

SECTION 32 01 19

FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS
08/08

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	(2007) Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D 789	(2007) 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
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1.2 SYSTEM DESCRIPTION

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started maintained in satisfactory condition at all times.

1.2.1 Joint Cleaning Equipment

1.2.1.1 Tractor-Mounted Routing Tool

Provide a routing tool, used for removing old sealant from the joints, 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.

1.2.1.2 Concrete Saw

Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, 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.

1.2.1.3 Sandblasting Equipment

Include with the sandblasting equipment 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 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. Demonstrate compressor capability, under job conditions, 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. Adjust the height, angle of inclination and the size of the nozzle as necessary to secure satisfactory results.

1.2.1.4 Waterblasting Equipment

Include with the waterblasting equipment a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. Provide water tank and auxiliary resupply equipment 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. Adjust the height, angle of inclination and the size of the nozzle as necessary to obtain satisfactory results. A pressure gauge mounted at the pump shall show at all times the pressure in psi at which the equipment is operating.

1.2.1.5 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

1.2.2 Sealing Equipment

1.2.2.1 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.

1.2.2.2 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. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held

air-powered equipment (i.e., caulking guns) may be used for small applications.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Recommendations; G.

Printed copies of manufacturer's recommendations, 21 days prior to use on the project, where installation procedures, or any part thereof, are required to be in accordance with those recommendations. 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, 21 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 21 days prior to the beginning of work. No material will be allowed to be used until it has been approved.

1.4 QUALITY ASSURANCE

1.4.1 Safety

Do not place joint sealant within 25 feet of any liquid oxygen (LOX) equipment, LOX storage, or LOX piping. Thoroughly clean joints in this area and leave them unsealed.

1.4.2 Test Requirements

Test the joint sealant and backup or separating material for conformance with the referenced applicable material specification. Perform testing of the materials in an approved independent laboratory and submit certified copies of the test reports for approval 21 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 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the job site for defects, unload, and store

them with a minimum of handling to avoid damage. Provide storage facilities at the job site for maintaining materials at the temperatures and conditions recommended by the manufacturer.

1.6 ENVIRONMENTAL REQUIREMENTS

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. Do not apply sealant 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 as follows:

Area	Sealing Material
All Other Areas	ASTM D 6690, Type II and COE CRD-C 525
Concrete Joints	ASTM D 5893

2.2 PRIMERS

When primers are recommended by the manufacturer of the sealant, use them in accordance with the recommendation of the manufacturer.

2.3 BACKUP MATERIALS

Provide backup material that is a compressible, nonshrinking, nonstaining, nonabsorbing material, 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.

PART 3 EXECUTION

3.1 PREPARATION OF JOINTS

Immediately before the installation of the sealant, thoroughly clean the joints 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 Sawing

3.1.1.1 Refacing of Random Cracks

Accomplish sawing of the cracks 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. Stiffen the blade, as necessary, with suitable dummy (or used) blades or washers. Immediately following the sawing operation, thoroughly clean the crack

opening using a water jet to remove all saw cuttings and debris.

3.1.2 Sandblasting

The newly exposed concrete joint faces and the pavement surfaces extending a minimum of 1/2 inch from the joint edges shall be waterblasted clean. use a multiple-pass technique 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, blow out the joints with compressed air and leave them completely free of debris and water.

3.1.3 Back-Up Material

When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a back-up material to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backup material is placed at the specified depth and is not stretched or twisted during installation.

3.1.4 Rate of Progress of Joint Preparation

Limit the stages of joint preparation, which include sandblasting, air pressure cleaning and placing of the back-up material 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. Withdraw and waste 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.

3.2.2 Single-Component, Cold-Applied Sealants

Inspect the ASTM D 5893 sealant and containers prior to use. Reject any materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory. 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

Seal joints 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, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 inch plus or minus 1/16 inch below the pavement

surface. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant 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, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints 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

Inspect joints during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Cleaned joints will be approved prior to installation of the separating or back-up material and joint sealant.

3.4.2 Joint Sealant Application Equipment

Inspect the application equipment to ensure conformance to temperature requirements and proper installation. Evidences of bubbling, improper installation, failure to cure or set will be cause to suspend operations until causes of the deficiencies are determined and corrected.

3.4.3 Joint Sealant

Inspect the joint sealant 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, remove all unused materials from the site and leave the pavement in a clean condition.

-- End of Section --

SECTION 32 11 16

BASE COURSE FOR RIGID AND SUBBASES FOR FLEXIBLE PAVING
08/08

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 T 180 (2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
- AASHTO T 224 (2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

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 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 D 1556 (2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
- ASTM D 1557 (2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
- ASTM D 2167 (2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
- ASTM D 2487 (2006) Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 4318 (2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D 6938 (2008a) Standard Test Method for In-Place Density and Water Content of Soil and

Soil-Aggregate by Nuclear Methods (Shallow Depth)

ASTM D 75 (2003) Standard Practice for Sampling Aggregates

ASTM E 11 (2004) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITION

Degree of compaction required 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. One exception is as follows: Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve will be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.3 SYSTEM DESCRIPTION

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Provide equipment which is adequate and has the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00
SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment

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 Field Density Tests

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.

1.5 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor, to be performed by an approved testing laboratory in accordance with Section 01 45 00.00 10 QUALITY CONTROL. Perform tests at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements.

1.5.1 Sampling

Take samples for laboratory testing in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

1.5.2.1 Sieve Analysis

Make sieve analysis in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.5.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D 4318.

1.5.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture in accordance with AASHTO T 180, Method D and corrected with AASHTO T 224.

1.5.2.4 Field Density Tests

Measure field density in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938 Procedure A. For the method presented in ASTM D 1556, use the base plate, as shown in the ASTM drawing. For the method presented in ASTM D 6938, check and adjust the calibration curves, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 6938 result in a wet unit weight of soil and ASTM D 6938 will 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 6938 Procedure A. 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, in ASTM D 6938, on each different type of material to be tested at the beginning of a job and at intervals as directed. Five percent of the density tests shall use the sand cone method.

1.5.2.5 Wear Test

Perform wear tests in conformance with ASTM C 131.

1.5.3 Testing Frequency

1.5.3.1 Initial Tests

Perform one of each of the following tests on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

- a. Sieve Analysis
- b. Liquid limit and plasticity index
- c. Moisture-density relationship
- d. Wear

1.5.3.2 In-Place Tests

Perform one of each of the following tests on samples taken from the placed and compacted subbase, select-material subbase or asphalt pavement base course. Samples shall be taken and tested at the rates indicated.

- a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 750 square yards, or portion thereof, of completed area.
- b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 1000 square yards, or portion thereof, of material placed.
- c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.
- d. Measure the thickness of each course at intervals providing at least one measurement for each 750 square yards or part thereof. The thickness measurement shall be made by test holes, at least 3 inches in diameter through the course.

1.5.4 Approval of Material

Select the source of materials 30 days prior to the time the material will be required in the work. Tentative approval will be based on initial test results. Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted course.

1.6 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Subbase Course

Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable, approved materials processed and blended or naturally

combined. Provide aggregates which are durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 2 inch and shall be within the limits specified as follows:

The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 5. The contractor shall be responsible for any additional blending of materials required to make the compacted subgrade have a plasticity index of 15 or less.

2.1.2 Select-Material Subbase Course

Provide materials consisting of selected soil or other materials from field excavation, stockpiles, or other sources and free from lumps and balls of clay and from organic and other objectionable matter. Not more than 25 percent by weight shall pass the No. 200 sieve. The portion of material passing the No. 40 sieve shall have a liquid limit less than 35 and a plasticity index less than 12. The maximum particle size shall not exceed 3 inches. The contractor shall be responsible for any additional blending of materials required to make the compacted subgrade have a plasticity index of 15 or less.

2.1.3 Asphalt Pavement Base Course

Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable, approved materials processed and blended or naturally combined. Provide aggregates which are durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. At least 50 percent by weight retained on each sieve shall have one freshly fractured face with the area at least equal to 75 percent of the smallest midsectional area of the piece. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 2 inches and shall be within the limits specified as follows:

The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 8. The Contractor is responsible for any additional stability required to provide a working platform for construction equipment. If the Contractor can demonstrate with a test section that a material has adequate stability to support construction equipment, the fractured face requirement can be deleted, subject to the approval of the Contracting Officer.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

Clearing, stripping and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified

time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, clear and level storage sites. Stockpile all materials, including approved material available from excavation and grading, 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.

3.3 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the subbase, select-material subbase or asphalt pavement base course, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Correct ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompact to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the overlying course. Accomplish stabilization by mixing the overlying course material 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 for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is placed.

3.4 GRADE CONTROL

The finished and completed course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

3.5 MIXING AND PLACING MATERIALS

Mix and place the materials to obtain uniformity of the material at the water content specified. Make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated on drawings. When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall be thicker than 6 inches nor be thinner than 3 inches when compacted.

3.7 COMPACTION

Compact each layer of the material, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to

within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, compact the mixture with hand-operated power tampers. Compaction shall continue until each layer is compacted through the full depth to at least 95 percent of laboratory maximum density, or as indicated on drawings. 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 subbase 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.

3.8 EDGES

Place approved material along the edges of the subbase and select-material subbase course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

3.9 SMOOTHNESS TEST

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements 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. Correct deviations exceeding this amount by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.10 THICKNESS CONTROL

The completed thickness of the course(s) shall be in accordance with the thickness and grade indicated on the drawings. The completed course shall not be more than 1/2 inch deficient in thickness nor more than 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 1/2 inch or more thicker than shown, the course will be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness shown.

3.11 MAINTENANCE

Maintain the completed course in a satisfactory condition until accepted.

-- End of Section --

SECTION 32 16 13

CONCRETE SIDEWALKS AND CURBS

04/08

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 A 185/A 185M (2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

ASTM A 615/A 615M (2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM C 143/C 143M (2010) Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C 171 (2007) Standard Specification for Sheet Materials for Curing Concrete

ASTM C 172 (2008) Standard Practice for Sampling Freshly Mixed Concrete

ASTM C 173/C 173M (2010b) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C 231 (2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 309 (2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C 31/C 31M (2010) Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C 920 (2008) Standard Specification for Elastomeric Joint Sealants

ASTM D 1751 (2004; R 2008) Standard Specification for

Preformed Expansion Joint Filler for
Concrete Paving and Structural
Construction (Nonextruding and Resilient
Bituminous Types)

ASTM D 1752

(2004a; R 2008) 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 SYSTEM DESCRIPTION

1.2.1 General Requirements

Provide plant, equipment, machines, and tools used in the work subject to approval and 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.

1.2.2 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.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following 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 ENVIRONMENTAL REQUIREMENTS

1.4.1 Placing During Cold Weather

Do not place concrete 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. Make provisions 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 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 exceed 85 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 exceed 95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE except as otherwise specified. Concrete shall have a minimum compressive strength of 4000 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 4 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.

2.1.3 Reinforcement Steel

Reinforcement bars shall conform to ASTM A 615/A 615M. Wire mesh reinforcement shall conform to ASTM A 185/A 185M.

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 Separate Curb and Gutter

Contraction joint filler for separate 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, width as indicated in drawings.

2.5 JOINT SEALANTS

Joint sealant, cold-applied shall conform to ASTM C 920 or ASTM D 5893.

2.6 FORM WORK

Design and construct form work 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. When separate curb and gutter is installed the

inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Curbs will be poured integral with the adjacent concrete pavement, if a full concrete pavement section is selected. 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 as indicated and 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 Separate 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

Set forms to the indicated alignment, grade and dimensions. Hold forms 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

Set forms for sidewalks 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 as indicated in the drawings. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Separate 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

Place concrete 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, finish the surface 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

Curbs will be poured integral with the adjacent concrete pavement, if full concrete pavement section is selected.

3.4.1 Separate 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

Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed for this work. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (3/4 inch wide) shall be provided at 600 feet maximum spacing, at all structures, intersection P.C.'s, and intersection P.T.'s, unless otherwise indicated.

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 as indicated. Immediately after removing the front curb form, 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 stiff bristled brush.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated in the drawings.

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 the depth indicated, 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. Joints shall be sealed as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 INTEGRAL CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of the curb and gutter. Joints shall align with joint spacing in adjacent pavement. Both joints in pavement and curb will be installed concurrently, since the curb is poured integral with the adjacent pavement.

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 the joint spacing in the adjacent pavement.

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. Joints shall be sealed as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect unhardened concrete 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. 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. If a membrane curing compound was used to protect the new concrete, all traces of the curing membrane shall be removed from exposed surface using approved methods. 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

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, 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

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

Determine air content 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.

-- End of Section --

SECTION 32 17 24.00 10

PAVEMENT MARKINGS

04/08

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 247 (2007) Glass Beads Used in Traffic Paints

ASTM INTERNATIONAL (ASTM)

ASTM D 4505 (2005) Preformed Retroreflective Pavement Marking Tape for Extended Service Life

ASTM D 792 (2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement

ASTM E 28 (1999; R 2004) Softening Point of Resins Derived from Naval Stores by Ring and Ball Apparatus

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325 (Rev C) Beads (Glass Spheres) Retro-Reflective (Metric)

FS TT-P-1952 (Rev D) Paint, Traffic and Airfield Markings, Waterborne

1.2 SYSTEM DESCRIPTION

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads and runways shall display low speed traffic markings and traffic warning lights.

1.2.1 Paint Application Equipment

1.2.1.1 Self-Propelled or Mobile-Drawn Pneumatic Spraying Machines

The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall have a speed during application not less than 5 mph, and shall be capable of applying the stripe widths indicated, at the paint coverage rate specified in paragraph APPLICATION, and of even uniform thickness with clear-cut edges. . The paint applicator shall have paint

reservoirs or tanks of sufficient capacity and suitable gauges to apply paint in accordance with requirements specified. Tanks shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gauges in full view and reach of the operator. Paint strainers shall be installed in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

1.2.1.2 Hand-Operated, Push-Type Machines

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.2.2 Thermoplastic Application Equipment

1.2.2.1 Thermoplastic Material

Thermoplastic material shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe.

1.2.2.2 Application Equipment

a. Application equipment shall provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the extrusion shoe or spray gun shall prevent accumulation and clogging. All parts of the equipment which come into contact with the material shall be easily accessible and exposable for cleaning and maintenance. All mixing and conveying parts up to and including the extrusion shoes and spray guns shall maintain the material at the required temperature with heat-transfer oil or electrical-element-controlled heat.

b. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skiplines". The equipment shall be capable of applying varying widths of traffic markings.

c. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.

1.2.2.3 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of two general types: mobile applicator and portable applicator.

a. Mobile Application Equipment: The mobile applicator shall be defined as a truck-mounted, self-contained pavement marking machine that is capable of hot applying thermoplastic by either the extrusion or spray method. The unit shall be equipped to apply the thermoplastic marking material at temperatures exceeding 375 degrees F, at widths varying from 3 to 12 inches and in thicknesses varying from 0.020 to 0.190 inch and shall have an automatic drop-on bead system. The mobile unit shall be capable of operating continuously and of installing a minimum of 20,000 lineal feet of longitudinal markings in an 8-hour day.

(1) The mobile unit shall be equipped with a melting kettle which holds a minimum of 6000 pounds of molten thermoplastic material. The kettle shall be capable of heating the thermoplastic composition to temperatures of 375 to 425 degrees F. A thermostatically controlled heat transfer liquid shall be used. Heating of the composition by direct flame will not be allowed. Oil and material temperature gauges shall be visible at both ends of the kettle. The mobile unit shall be equipped with a minimum of two extrusion shoes located one on each side of the truck, and shall be capable of marking simultaneous edgeline and centerline stripes. Each extrusion shoe shall be a closed, oil-jacketed unit; shall hold the molten thermoplastic at a temperature of 375 to 425 degrees F; and shall be capable of extruding a line of 3 to 8 inches in width; and at a thickness of not less than 0.125 inch nor more than 0.190 inch, and of generally uniform cross section.

(2) The mobile unit shall be equipped with an electronic programmable line pattern control system. The control system shall be capable of applying skip or solid lines in any sequence, through any and all of the extrusion shoes, or the spray guns, and in programmable cycle lengths. In addition, the mobile unit shall be equipped with an automatic counting mechanism capable of recording the number of lineal feet of thermoplastic markings applied to the pavement surface with an accuracy of 0.5 percent.

b. Portable Application Equipment: The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stopbars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. The portable applicator shall be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. The portable applicator shall be equipped with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 375 to 425 degrees F, of extruding a line of 3 to 12 inches in width, and in thicknesses of not less than 0.125 inch nor more than 0.190 inch and of generally uniform cross section.

1.2.3 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION, at all operating speeds of the applicator to which it is attached.

1.2.4 Preformed Tape Application Equipment

Mechanical application equipment shall be used for the placement of preformed marking tape. Mechanical application equipment shall be defined as a mobile pavement marking machine specifically designed for use in applying precoated, pressure-sensitive pavement marking tape of varying widths, up to 12 inches. The applicator shall be equipped with rollers, or other suitable compactive device, to provide initial adhesion of the preformed, pressure-sensitive marking tape with the pavement surface. Additional hand-operated rollers shall be used as required to properly seat the thermoplastic tape.

1.2.5 Surface Preparation Equipment

1.2.5.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cfm of air at a pressure of not less than 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water.

1.2.5.2 Waterblast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.2.6 Marking Removal Equipment

Equipment shall be mounted on rubber tires and shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Waterblasting equipment shall be capable of producing an adjustable, pressurized stream of water. Sandblasting equipment shall include an air compressor, hoses, and nozzles. The compressor shall be equipped with traps to maintain the air free of oil and water.

1.2.6.1 Shotblasting Equipment

Shotblasting equipment shall be capable of producing an adjustable depth of removal of marking and pavement. Each unit shall be self-cleaning and self-contained, shall be able to confine dust and debris from the operation, and shall be capable of recycling the abrasive for reuse.

1.2.6.2 Chemical Equipment

Chemical equipment shall be capable of application and removal of chemicals from the pavement surface, and shall leave only non-toxic biodegradable residue.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment; G

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation.

Composition Requirements

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications

Documentation on personnel qualifications, as specified.

SD-06 Test Reports

Sampling and Testing

Certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

1.4.2 Traffic Controls

Guidance for traffic control procedures shall be obtained from the Manual on Uniform Traffic Control Devices (TEXAS MUTCD) for Streets and Highways.

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.4.3 Maintenance of Traffic

1.4.3.1 Roads, Streets, and Parking Areas

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flagpersons, and related equipment for the safe passage of vehicles shall be provided.

1.5 DELIVERY, STORAGE, AND HANDLING

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.6 ENVIRONMENTAL REQUIREMENTS

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for airfields, roads, parking areas, and streets shall conform to FS TT-P-1952, color as indicated. Paint is to be used only on temporary pavement markings, or as indicated in the drawings. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 THERMOPLASTIC COMPOUNDS

The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

2.2.1 Composition Requirements

The binder component shall be formulated as a hydrocarbon resin. The pigment, beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

Component	Percent by Weight	
	White	Yellow
Binder	17 min.	17 min.
Titanium dioxide	10 min.	-
Glass beads,	20 min.	20 min.
Calcium carbonate & inert fillers	49 max.	*
Yellow pigments	-	*

*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of this specification are met.

2.2.2 Physical Properties

2.2.2.1 Color

The color shall be as indicated.

2.2.2.2 Drying Time

When installed at 70 degrees F and in thicknesses between 1/8 and 3/16 inch, after curing 15 minutes.

2.2.2.3 Softening Point

The composition shall have a softening point of not less than 194 degrees F when tested in accordance with ASTM E 28.

2.2.2.4 Specific Gravity

The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D 792.

2.2.3 Portland Cement Concrete Primer

The primer for Portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition. Epoxy primers recommended by the manufacturer shall be approved by the Contracting Officer prior to use. Requests for approval shall be accompanied with technical data, instructions for use, and a 1 quart sample of the primer material.

2.3 PREFORMED TAPE

The preformed tape shall be an adherent reflectorized strip in accordance with ASTM D 4505 Type I or IV, Class optional.

2.4 REFLECTIVE MEDIA

Reflective media for roads and streets shall conform to FS TT-B-1325, Type I, Gradation A or AASHTO M 247, Type I.

2.5 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers in the presence of the Contracting Officer. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Thoroughly clean surfaces to be marked before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements, apply a pretreatment with an aqueous solution, containing 3 percent phosphoric acid and 2 percent zinc chloride, to prepared pavement areas prior to painting.

3.1.2 Cleaning Existing Pavement Markings

In general, markings shall not be placed over existing pavement marking patterns. Remove existing pavement markings, which are in good condition but interfere or conflict with the newly applied marking patterns. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. New preformed and thermoplastic pavement markings shall not be applied over existing preformed or thermoplastic markings. Whenever grinding, scraping, sandblasting or other operations are performed the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

3.1.3 Cleaning Concrete Curing Compounds

On new portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

- a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.
- b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.
- c. All remaining curing compound is intact; all loose and flaking material is removed.
- d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.
- e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. The contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

- a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet/gallon. Glass spheres shall be applied uniformly to the wet paint on road and street pavement at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.
- b. Nonreflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet/gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until

cause of the slow drying is determined and corrected.

3.2.2 Thermoplastic Compounds

Thermoplastic pavement markings shall be placed upon dry pavement; surface dry only will not be considered an acceptable condition. At the time of installation, the pavement surface temperature shall be a minimum of 40 degrees F and rising. Thermoplastics, as placed, shall be free from dirt or tint.

3.2.2.1 Longitudinal Markings

All centerline, skipline, edgeline, and other longitudinal type markings shall be applied with a mobile applicator. All special markings, crosswalks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator, using the extrusion method.

3.2.2.2 Primer

After surface preparation has been completed the concrete pavement surface shall be primed. The primer shall be applied with spray equipment. Primer materials shall be allowed to "set-up" prior to applying the thermoplastic composition. The Portland cement concrete primer shall be allowed to dry in accordance with the thermoplastic manufacturer's recommendations. To shorten the curing time of the epoxy resins an infrared heating device may be used on the concrete primer.

- a. Portland Cement Concrete Primer: Primer shall be applied to all concrete pavements (including concrete bridge decks) at a wet film thickness of between 0.04 to 0.05 inch (320-400 square feet/gallon).

3.2.2.3 Markings

After the primer has "set-up", the thermoplastic shall be applied at temperatures no lower than 375 degrees F nor higher than 425 degrees F at the point of deposition. Immediately after installation of the marking, drop-on glass spheres shall be mechanically applied so that the spheres are held by and imbedded in the surface of the molten material.

- a. Extruded Markings: All extruded thermoplastic markings shall be applied at the specified width and at a thickness of not less than 0.125 inch nor more than 0.190 inch.
- b. Sprayed Markings: All sprayed thermoplastic markings shall be applied at the specified width and the thicknesses designated in the contract plans. If the plans do not specify a thickness, centerline markings shall be applied at a wet thickness of 0.090 inch, plus or minus 0.005 inch, and edgeline markings at a wet thickness of 0.060 inch plus or minus 0.005 inch.
- c. Reflective Glass Spheres: Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 pound/20 square feet of compound.

3.2.3 Preformed Tape

The pavement surface temperature shall be a minimum of 60 degrees F and the ambient temperature shall be a minimum of 60 degrees F and rising. The preformed markings shall be placed in accordance with the manufacturer's

written instructions.

3.2.4 Raised Reflective Markers

Prefabricated markers shall be aligned carefully at the required spacing and permanently fixed in place by means of epoxy resin adhesives. To insure good bond, pavement in areas where markers will be set shall be thoroughly cleaned by sandblasting and use of compressed air prior to applying adhesive.

3.2.5 Reflective Media

Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass spheres shall be accomplished to insure that reflective media is evenly distributed at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, operations shall be discontinued immediately until deficiency is corrected.

3.3 MARKING REMOVAL

Pavement marking, including plastic tape, shall be removed in the areas shown on the drawings. Removal of marking shall be as complete as possible without damage to the surface. Aggregate shall not be exposed by the removal process. After the markings are removed, the cleaned pavement surfaces shall exhibit adequate texture for remarking as specified in paragraph SURFACE PREPARATION. Contractor shall demonstrate removal of pavement marking in an area designated by the Contracting Officer. The demonstration area will become the standard for the remainder of the work.

3.3.1 Equipment Operation

Equipment shall be controlled and operated to remove markings from the pavement surface, prevent dilution or removal of binder from underlying pavement, and prevent emission of blue smoke from asphalt or tar surfaces.

3.3.2 Cleanup and Waste Disposal

The worksite shall be kept clean of debris and waste from the removal operations. Cleanup shall immediately follow removal operations in areas subject to air traffic. Debris shall be disposed of at approved sites.

-- End of Section --

SECTION 33 11 00

WATER DISTRIBUTION

11/09

PART 1 GENERAL

1.1 REFERENCE

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.

FORT BLISS WATER SERVICES COMPANY (FBWSC)

CONSTRUCTION STANDARDS FORT BLISS (September 1, 2011)

PART 2 PRODUCTS

2.1 MATERIAL - NOT USED

All materials and products that are used in the water distribution system of this project, shall meet the requirements defined in the FBWSC water distribution standard specifications and details.

PART 3 EXECUTION

3.1 INSTALLATION - NOT USED

All installation and testing for the water distribution system of this project will be in accordance with the installation requirements defined in the FBWSC water distribution standard specifications and details.

-- End of Section --

SECTION 33 30 00

SANITARY SEWERS

04/08

PART 1 GENERAL

1.1 REFERENCE

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.

FORT BLISS WATER SERVICES COMPANY (FBWSC)

CONSTRUCTION STANDARDS FORT BLISS (September 1, 2011)

PART 2 PRODUCTS

2.1 MATERIAL - NOT USED

All materials and products that are used in the water distribution system of this project, shall meet the requirements defined in the FBWSC water distribution standard specifications and details.

PART 3 EXECUTION

3.1 INSTALLATION - NOT USED

All installation and testing for the water distribution system of this project will be in accordance with the installation requirements defined in the FBWSC water distribution standard specifications and details.

-- End of Section --

SECTION 33 40 00

STORM DRAINAGE UTILITIES

02/10

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 198 (2008) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

ASTM INTERNATIONAL (ASTM)

ASTM A 48/A 48M (2003; R 2008) Standard Specification for Gray Iron Castings

ASTM A 536 (1984; R 2009) Standard Specification for Ductile Iron Castings

ASTM C 270 (2008a) Standard Specification for Mortar for Unit Masonry

ASTM C 425 (2004; R 2009) Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings

ASTM C 443 (2010) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

ASTM C 478 (2009) Standard Specification for Precast Reinforced Concrete Manhole Sections

ASTM C 76 (2008a) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

ASTM D 1557 (2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)

ASTM D 2167 (2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method

ASTM D 6938 (2008a) Standard Test Method for In-Place Density and Water Content of Soil and

Soil-Aggregate by Nuclear Methods (Shallow Depth)

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe

SD-04 Samples

Pipe for Culverts and Storm Drains

SD-07 Certificates

Frame and Cover for Gratings

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

Manufactured in accordance with and conforming to ASTM C 76, Class III .

2.2 MISCELLANEOUS MATERIALS

2.2.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4000 psi concrete under Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE.

2.2.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 6 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.2.3 Precast Reinforced Concrete Manholes

Conform to ASTM C 478. Joints between precast concrete risers and tops shall be made with flexible watertight, rubber-type gaskets meeting the requirements of paragraph JOINTS.

2.2.4 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48/A 48M, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans. The word "Storm Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.2.5 Joints

2.2.5.1 Flexible Watertight Joints

- a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.
- b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443. Certified copies of test results shall be delivered to

the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.3 HYDROSTATIC TEST ON WATERTIGHT JOINTS

2.3.1 Concrete

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443.

2.4 EROSION CONTROL RIPRAP

Provide nonerrodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness as shown in the plans.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 00 00 EARTHWORK and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than indicated in drawings to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheet piling and bracing, where required, shall be placed within the trench width as specified, without any overexcavation. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 31 00 00 EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth

required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in granular material minimum 4 inch in depth in trenches with soil foundation. Depth of granular bedding in trenches with rock foundation shall be 1/2 inch in depth per foot of depth of fill, minimum depth of bedding shall be 8 inch up to maximum depth of 24 inches. The middle third of the granular bedding shall be loosely placed. Bell holes and depressions for joints shall be removed and formed so entire barrel of pipe is uniformly supported. The bell hole and depressions for the joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

Note post installation requirements of paragraph 'Deflection Testing' in PART 3 of this specification for all pipe products including deflection testing requirements for flexible pipe.

3.3.1 Concrete

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4.1 Concrete

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established grade line, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet

brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If non-mastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.3 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete or precast reinforced concrete complete with frames and covers or gratings as indicated in drawings. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 BACKFILLING

3.6.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be

placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation equal to the midpoint (spring line) of RCP or has reached an elevation of at least 12 inches above the top of the pipe for flexible pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.6.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 12 inches. Use select granular material for this entire region of backfill for flexible pipe installations.

3.6.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.6.4 Compaction

3.6.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.6.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

- a. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
- b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.
- c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.6.5 Determination of Density

Testing is the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 6938. When ASTM D 6938 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 6938 results in a wet unit weight of soil and ASTM D 6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 6938. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.7 PIPELINE TESTING

3.7.1 Post-Installation Inspection

One hundred percent of all reinforced concrete pipe installations shall be checked internally for joint separations, soil migration through the joint, cracks greater than 0.01 inches, settlement and alignment by means of video to detect defects such as high and low spots, joint separations, offset joints, chipped ends, cracked or damaged pipe, infiltration points and debris in lines. provide Contracting Officer two copies of all video inspection in DVD format. All defects shall be corrected. For joint separations, low spots and chipped ends, the following maximum acceptable limits will apply:

- a. Joint separations: 1/2 inch
 - b. Low spots: 1 inch maximum depth
 - c. Chipped ends: 1/4 inch
- a. Replace pipes having cracks greater than 0.50 inches in width or deflection greater than 5 percent deflection. C.O.R shall evaluate all pipes with cracks greater than 0.01 inches but less than 0.50 inches to determine if any remediation or repair is required. Repair or replace

any pipe with crack exhibiting displacement across the crack, exhibiting bulges, creases, tears, spalls, or delamination.

- b. The mains shall be television inspected when the following work has been completed:
- (1) All sewers are installed and backfilled.
 - (2) All structures are in place, all channeling is complete and pipelines are accessible from structures.
 - (3) All other underground facilities, utility piping and conduits are installed.
 - (4) Final street grading is complete and ready for paving.
 - (5) Pipelines to be inspected have been preliminarily flushed or cleaned by a high pressure cleaner.
 - (6) Final leakage test has been completed and approved.
 - (7) Flood the storm system just prior to video inspection.
- c. Reports: The deflection results and final post installation inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, grade, deviation from line, deflection and deformation of flexible pipe systems, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

3.8 FIELD PAINTING

After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. After installation, clean steel covers and steel or concrete frames not buried in masonry or concrete to bare metal of mortar, dirt, grease, and other deleterious materials. Apply a coat of primer, to a minimum dry film thickness of 6 mil; and apply a top coat, to a minimum dry film thickness of 6 mils, color optional.

-- End of Section --

SECTION 33 51 15

NATURAL-GAS DISTRIBUTION

11/08

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 GAS ASSOCIATION (AGA)

AGA XR0603 (2006) AGA Plastic Pipe Manual for Gas Service

ASME INTERNATIONAL (ASME)

ASME B16.40 (2002; Errata 2003) Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems

ASME B31.8 (2007) Gas Transmission and Distribution Piping Systems

ASTM INTERNATIONAL (ASTM)

ASTM D 1598 (2002; R 2008) Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

ASTM D 1599 (2005) Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings

ASTM D 2513 (2008b) Thermoplastic Gas Pressure Pipe, Tubing, and Fittings

ASTM D 2683 (2004) Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

ASTM D 2774 (2008) Underground Installation of Thermoplastic Pressure Piping

ASTM D 3261 (2003) Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

ASTM D 3350 (2008) Polyethylene Plastics Pipe and Fittings Materials

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS
INDUSTRY (MSS)

MSS SP-25 (2008) Standard Marking System for Valves,
Fittings, Flanges and Unions

TEXAS ADMINISTRATIVE CODE (TAC)

16 TAC §8 Pipeline Safety Regulations

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

49 CFR 191 Transportation of Natural and Other Gas by
Pipeline; Annual Reports, Incident
Reports, and Safety-Related Condition
Reports

49 CFR 192 Transportation of Natural and Other Gas by
Pipeline: Minimum Federal Safety Standards

49 CFR 193 Liquefied Natural Gas Facilities: Federal
Safety Standards

49 CFR 195 Transportation of Hazardous Liquids by
Pipeline

1.2 SYSTEM DESCRIPTION

The gas distribution system includes natural gas piping and appurtenances and including the connection to the existing system, the gas meter, and the connection to the building stubout. Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

Contractors and their employees (or sub-contractors and their employees) installing, testing, or commissioning the natural gas system must be certified by the operating utility (Texas Gas Services) as outlined by the Railroad Commission of Texas Safety Division requirements, 49 CFR 192, and 16 TAC §8. Contractor Training & Testing will include contractor and their individual employees testing with written and oral examinations by the operating utility. Their work performance history and on-the-job training are also reviewed by the operating utility. Contractors installing, testing, and/or commissioning pipeline facilities are also subject to 49 CFR 191, 49 CFR 192, 49 CFR 193, or 49 CFR 195, testing all employees for the presence of prohibited drugs and alcohol.

1.2.1 Gas Distribution System and Equipment Operation

Include maps showing piping layout, locations of system valves, gas line markers and cathodic protection system test stations; step-by-step procedures for system start up, operation and shutdown (index system components and equipment to the system maps); isolation procedures including valve operation to shutdown or isolate each section of the system (index valves to the system maps and provide separate procedures for normal operation and emergency shutdown if required to be different). Submit Data Package No. 4.

1.2.2 Gas Distribution System Maintenance

Include maintenance procedures and frequency for system and equipment;

identification of pipe materials and manufacturer by locations, pipe repair procedures, and jointing procedures at transitions to other piping material or material from a different manufacturer. Submit Data Package No. 4.

1.2.3 Gas Distribution Equipment Maintenance

Include identification of valves and other equipment by materials, manufacturer, vendor identification and location; maintenance procedures and recommended tool kits for valves and equipment; recommended repair methods (i.e., field repair, factory repair, or replacement) for each valve and piece of equipment; and preventive maintenance procedures, possible failure modes and troubleshooting guide. Submit Data Package No. 3.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Pipe, Fittings, and Associated Materials

SD-03 Product Data

Materials and Equipment; G
Spare Parts; G

SD-05 Design Data

Connections to Existing Lines; G
Jointing of Polyethylene Piping; G

SD-06 Test Reports

Pressure and Leak Tests; G

Data in booklet form from all pressure tests of the distribution system.

SD-10 Operation and Maintenance Data

Gas Distribution System

Six copies, in booklet form and indexed, of site specific natural gas operation and maintenance manual for each gas distribution system including system operation, system maintenance, equipment operation, and equipment maintenance manuals described below. If operation and maintenance manuals are provided in a common volume, they shall be clearly differentiated and separately indexed.

Include, but not be limited to, the following in the System Operation Manual:

a. Drawings showing piping layout and locations of all system valves and gas line markers.

b. Step-by-step procedures required for system startup, operation, and shutdown. System components and equipment shall be indexed to the gas drawings.

c. Isolation procedures and valve operations to shut down or isolate each section of the system. Valves and other system components shall be indexed to the gas drawings.

d. Descriptions of Emergency Procedures including: isolation procedures including required valve operations with valve locations indexed to gas drawing, recommended emergency equipment, checklist for major emergencies and procedures for connecting emergency gas supply.

The Equipment Operation Manual shall include, but not be limited to, detail drawings, equipment data, and manufacturer supplied operation manuals for all equipment, valves and system components.

The System Maintenance Manuals shall include, but not be limited to:

a. Maintenance check list for entire gas distribution system.

b. Descriptions of site specific standard maintenance procedures.

c. Piping layout, equipment layout, and control diagrams of the systems as installed.

d. Identification of pipe materials and manufacturer by location, pipe repair procedures, and jointing procedures at transitions to other piping materials or piping from different manufacturer.

The Equipment Maintenance Manuals shall include but not be limited to the following:

e. Identification of valves and other equipment by materials, manufacturer, vendor identification and location.

f. Maintenance procedures and recommended maintenance tool kits for all valves and equipment.

g. Recommended repair methods, either field repair, factory repair, or whole-item replacement for each valve component or piece of equipment or component item.

h. Routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide.

Data packages, as specified.

SD-11 Closeout Submittals

Recycled Material Content; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

1.4.1.1 Jointing of Polyethylene Piping

a. Join piping by performance qualified PE joiners, qualified by a person who has been trained and certified by the manufacturer of the pipe, using manufacturer's pre-qualified joining procedures in accordance with AGA XR0603. Inspect joints by an inspector qualified in the joining procedures being used and in accordance with AGA XR0603. Welders training, qualifications and procedures, (metal and PE) includes use of equipment, explanation of the procedure, and successfully making joints which pass tests specified in AGA XR0603.

b. Submit a certificate of qualified jointing procedures, training procedures, qualifications of trainer, and training test results for joiners and inspectors. Notify the Contracting Officer at least 14 hours in advance of the date to qualify joiners and inspectors.

1.4.2 Pre-Installation Conference

1.4.2.1 Shop Drawings

Submit shop drawings, within 30 days of contract award, containing complete schematic and piping diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Show on the drawings proposed layout and anchorage of the system and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

Inspect materials delivered to the site for damage, and store with a minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.5.2 Handling

Handle pipe and components carefully to ensure a sound, undamaged condition. Take particular care not to damage pipe coating. Repair damaged coatings to original finish. Do not place pipe or material of any kind inside another pipe or fitting after the coating has been applied, except as specified in paragraph INSTALLATION. Handle plastic pipe in conformance with AGA XR0603.

1.6 EXTRA MATERIALS

Submit spare parts data for each different item of equipment and material specified, after approval of the detail shop drawings and not later than 2 months prior to the date of beneficial occupancy. Include in the data a complete list of parts and supplies, with current unit prices and source of supply.

1.7 SUSTAINABLE DESIGN REQUIREMENTS

1.7.1 Recycled Material Content

Use materials or products so that the sum of post-consumer recycled content value plus one-half of post-industrial recycled content value constitutes at least 10 percent of the total materials cost for the project.

PART 2 PRODUCTS

2.1 PIPE, FITTINGS, AND ASSOCIATED MATERIALS

Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of the products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Asbestos or products containing asbestos are not allowed. Provide written verification and point of contact for a supporting service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site. Mark all valves, fittings in accordance with MSS SP-25. Submit a complete list of materials and equipment, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions, including, but not limited to the following:

- a. Fittings
- b. Piping
- c. Shut-off Valves

2.1.1 Polyethylene Pipe, Tubing, Fittings and Joints

Provide polyethylene pipe, tubing, fittings and joints conforming to ASTM D 3350 and ASTM D 2513, pipe designations PE 2406 and PE 3408, rated SDR 11 or less, as specified in ASME B31.8. Mark pipe sections as required by ASTM D 2513. Provide butt fittings conforming to ASTM D 3261 and socket fittings conforming to ASTM D 2683. Match fittings to the service rating of the pipe. Use polyethylene pipe, tubing, and fittings as recommended by the manufacturer for use with LPG. Perform underground installations in conformance with ASTM D 2774.

2.1.2 Gas Transition Fittings

Provide manufactured steel gas transition fittings approved for jointing steel and polyethylene or fiberglass pipe, conforming to AGA XR0603 requirements for transition fittings.

2.2 VALVES

2.2.1 Polyethylene Valves

Provide polyethylene valves conforming to ASME B16.40. Polyethylene valves, in sizes 1/2 inch to 6 inches, may be used with polyethylene distribution and service lines, in lieu of steel valves, for underground installation only.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions

in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.2 EXCAVATION AND BACKFILLING

Earthwork is as specified in Section 31 00 00 EARTHWORK.

3.3 GAS MAINS

Provide polyethylene pipe for gas mains. Do not install polyethylene mains aboveground.

3.4 WORKMANSHIP AND DEFECTS

Make pipe, tubing, and fittings clear and free of cutting burrs and defects in structure or threading, and thoroughly brushed and blown free of chips and scale. Do not repair, but replace defective pipe, tubing, or fittings.

3.5 INSTALLATION

Install Gas Distribution System and equipment in conformance with the manufacturer's recommendations and applicable sections of ASME B31.8, AGA XR0603 and 49 CFR 192. Do not damage pipe when cutting. Only use an approved type of mechanical cutter. Use wheel cutters where practicable. Cut plastic pipe in accordance with AGA XR0603. Design valve installation in plastic pipe to protect the plastic pipe against excessive torsional or shearing loads when the valve is operated and from other stresses which may be exerted through the valve or valve box.

3.5.1 Installing Pipe Underground

Grade gas mains and service lines as indicated. Provide mains with 36 inch minimum cover; service lines with 24 inch minimum cover; and place both mains and service lines on firmly compacted select material for the full length. Where indicated, encase, bridge, or design the main to withstand any anticipated external loads as specified in ASME B31.8. Excavate the trench below pipe grade, bed with bank sand, and compact to provide full-length bearing. Laying pipe on blocks to produce uniform grade is not permitted. Ensure that the pipe is clean inside before it is lowered into the trench and keep free of water, soil, and all other foreign matter that might damage or obstruct the operation of the valves, regulators, meters, or other equipment. When work is not in progress, securely close open ends of pipe or fittings with expandable plugs or other suitable means. Minor changes in line or gradient of pipe that can be accomplished through the natural flexibility of the pipe material without producing permanent deformation and without overstressing joints may be made when approved. Make changes in line or gradient that exceed the limitations specified with fittings. When polyethylene piping is installed underground, place foil backed magnetic tape above the pipe to permit locating with a magnetic detector. After laying of pipe and testing, backfill the trench and maintain safety precautions for all pressure testing at all times during testing.

3.6 PIPE JOINTS

Design and install pipe joints to effectively sustain the longitudinal pullout forces caused by the contraction of piping or superimposed loads.

3.6.1 Threaded Steel Joints

Provide threaded joints in steel pipe with tapered threads evenly cut, made with UL approved graphite joint sealing compound for gas service or polytetrafluoroethylene tape applied to the male threads only. Caulking of threaded joints to stop or prevent leaks is not permitted.

3.6.2 Polyethylene Pipe Jointing Procedures

Use jointing procedures conforming to AGA XR0603. Avoid making indiscriminate heat fusion joining of plastic pipe or fittings made from different polyethylene resins by classification or by manufacturer if other alternative joining procedures are available. If heat fusion joining of dissimilar polyethylene is required, special procedures are required. Test the method of heat fusion joining dissimilar polyethylene resins in accordance with paragraph TESTS, subparagraph Destructive Tests of Plastic Pipe Joints.

3.7 VALVE BOXES

Provide valve boxes of cast iron not less than 3/16 inch thick at each underground valve except where concrete or other type of housing is indicated. Provide valve boxes with locking covers that require a special wrench for removal, and furnish the correctly marked wrench for each box. Cast the word "gas" in the box cover. When the valve is located in a roadway, protect the valve box by a suitable concrete slab at least 3 square feet. When in a sidewalk, provide the top of the box as a removable concrete slab 2 feet square and set flush with the sidewalk. Make the boxes adjustable extension type with screw or slide-type adjustments. Separately support valve boxes to not rest on the pipe, so that no traffic loads can be transmitted to the pipe. Only locate valves valve boxes or inside of buildings.

3.8 CONNECTIONS TO EXISTING LINES

Make connections between new work and existing gas lines, where required, in accordance with ASME B31.8, using proper fittings to suit the actual conditions. When connections are made by tapping into a gas main, provide the same size connecting fittings as the pipe being connected.

3.8.1 Connection to Government Owned/Operated Gas Lines

Provide connections to the existing gas lines in accordance with approved procedures. Deactivation of any portion of the existing system shall only be done at the valve location shown on the drawings. Reactivation of any existing gas lines will only be done by the Government. Submitted the approved Contractor's Connection Plan prior to making any connections to existing gas lines. This plan shall include the Operating Agency's required procedures which may be obtained from Fort Bliss Department of Public Works. Furnish a certification by Fort Bliss Department of Public Works that all utility work has been satisfactorily completed. Notify the Contracting Officer, in writing, 10 days before connections to existing lines are to be made.

3.9 TESTS

3.9.1 Destructive Tests of Plastic Pipe Joints

Each day, prior to making polyethylene heat fusion joints or fiberglass

adhesive joints, make a joint of each size and type to be installed that day by each person performing joining of plastic pipe that day and destructively test. Cut at least 3 longitudinal straps from each joint. Visually examine each strap for voids or discontinuities on the cut surfaces of the joint area, deformations by bending, torque, or impact. If failure occurs, it must not initiate in the joint area. If a joint fails the visual or deformation test, the qualified joiner who made that joint is not allowed to make further field joints in plastic pipe on this job until that joiner has been retrained and re-qualified. Record the results of the destructive tests including the date and time of the tests, size and type of the joints, ambient conditions, fusion iron temperature and names of inspectors and joiners.

3.9.2 Pressure and Leak Tests

Test the system of gas mains and service lines after construction and before being placed in service, using air as the test medium. Conform testing to ASTM D 1598 and ASTM D 1599 for plastic piping. The normal operating pressure for the system is 40 psi. The test pressure is 100 psi.

- a. Prior to testing the system, blow-out, clean, and clear the interior of all foreign materials. Remove all meters, regulators, and controls before blowing out and cleaning, and reinstall after clearing of all foreign materials.
- b. Perform testing of gas mains and service lines with due regard for the safety of employees and the public during the test. Keep persons not working on the test operations out of the testing area while testing is proceeding. Perform the test on the system as a whole or on sections that can be isolated.
- c. Test joints in sections prior to backfilling when trenches will be backfilled before the completion of other pipeline sections. Continue the test for at least 24 hours from the time of the initial readings to the final readings of pressure and temperature. Do not take the initial test readings of the instrument for at least 1 hour after the pipe has been subjected to the full test pressure. Do not take initial or final readings at times of rapid changes in atmospheric conditions, and temperatures are representative of the actual trench conditions. No indication of reduction of pressure is allowed during the test after corrections have been made for changes in atmospheric conditions in conformity with the relationship $T(1)P(2)=T(2)P(1)$, in which T and P denote absolute temperature and pressure, respectively, and the numbers denote initial and final readings.
- d. During the test, completely isolate the entire system from all compressors and other sources of air pressure. Test each joint by means of soap and water or an equivalent nonflammable solution prior to backfilling or concealing any work. Secure approval of testing instruments from the Contracting Officer. Furnish all labor, materials and equipment for conducting the tests subject to inspection at all times during the tests. Maintain safety precautions for air pressure testing at all times during the tests.

-- End of Section --

APPENDIX K
LIFE CYCLE COST ANALYSIS
UTILITY RATES



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
1 PERSHING ROAD
FORT BLISS, TX 79916-3803

SEP 03 2008

IMSW-BLS-PWF

MEMORANDUM FOR All Reimbursable Fort Bliss Utilities Customers

SUBJECT: New Natural Gas Rates

1. New utility rates are determined in accordance with HQ USACE Installation Support Division Policies, as spelled out in Technical Note Number 420-41 (Revision 1).

2. Natural gas prices have increased 43 percent higher than last year's price. Effective 1 October 2008, the new natural gas rates provided below will apply. Category "A" represents the rates for sales to Federal Government and Non-Appropriated Fund (NAF) activities. Category "B" represents the rates for private or commercial organizations. **NOTE:** PROPANE and STEAM will be handled on a case by case basis. The following rates shown are for metered facilities.

	Unit	A	B
Natural Gas	CCF	\$1.3810	\$1.5606

3. The following rates are for unmetered facilities whose cost is determined by the area.

	Unit	A	B
Natural Gas	SF/mo	\$0.1315	\$0.1690

4. Point of Contact for this action is Mr. Anthony Nitkowski, Utilities Sales Officer, Business Operation Integration Division, Directorate of Public Works, DSN 978-5465, email anthony.nitkowski@conus.army.mil.

DAVID N. SHAFII, P.E.
Director of Public Works

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
 US ARMY INSTALLATION MANAGEMENT COMMAND
 HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
 1 PERSHING ROAD
 FORT BLISS, TX 79916-3803

IMSW-BLS-PWF

9 JUNE 2008

MEMORANDUM FOR All Fort Bliss Utilities Customers

SUBJECT: New Utility Rates Effective 1 January 2008

1. New utility rates were determined in accordance with HQ USACE Installation Support Division Policies, as spelled out in Technical Note Number 420-41 (Revision 1).
2. The new rates are listed below. Category "A" represents the rates for sales to Federal Government and Non-Appropriated Fund (NAF) activities. Category "B" represents the rates for sales to private or commercial organizations. **NOTE:** PROPANE and STEAM will be handled on a case by case basis. The following rates shown are for metered facilities.

	Unit	A	B
Electricity	KWh	\$0.1352	\$0.1489
Natural Gas	CCF	\$1.1328	\$1.2801
Water	KGal	\$2.9280	\$3.9409
Sewage	KGal	\$2.1410	\$2.5197

3. The following rates are for unmetered facilities whose cost is determined by the area.

	Unit	A	B
Electricity	SF/mo	\$0.3851	\$0.4351
Natural Gas	SF/mo	\$0.0920	\$0.1183
Water	SF/mo	\$0.0288	\$0.0325
Sewage	SF/mo	\$0.0289	\$0.0327

4. Point of Contact for this action is Mr. Anthony Nitkowski, Utilities Sales Officer, Business Operation Integration Division, Directorate of Public Works, DSN 979-5470, email anthony.nitkowski@conus.army.mil.

FOR THE COMMANDER:

DAVID N. SHAFII, P.E.
 Director of Public Works

APPENDIX L

LEED PROJECT CREDIT GUIDANCE

APPENDIX L

LEED Project Credit Guidance (DEC 10)

This spreadsheet indicates Army required credits, Army preferred credits, project-specific ranking of individual point preferences, assumptions guidance for individual credits, and references to related language in the RFP for individual credits.

LEED Credit Paragraph	LEED Project Credit Guidance	Army Guidance: Required - Preferred - Avoid		Project Preference Ranking: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)
PAR	FEATURE			REMARKS
SUSTAINABLE SITES				
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
SS1	Site Selection		X	See paragraph LEED CREDITS COORDINATION.

SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION.
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION.
SS4.1	Alternative Transportation: Public Transportation Access		X	See paragraph LEED CREDITS COORDINATION.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref		Assume that non-transient building occupants are NOT housed on Post unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise. Assume that 50% of GOV fleet is NOT alternative fuel vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		

SS5.1	Site Development: Protect or Restore Habitat			
SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS6.2	Stormwater Design: Quality Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS7.1	Heat Island Effect: Non-Roof			
SS7.2	Heat Island Effect: Roof	Pref		Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
<u>WATER EFFICIENCY</u>				
WEPR1	Water Use Reduction (Version 3 only)	Rqd	Rqd	All LEED prerequisites are required to be met.
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref		See paragraph IRRIGATION. Project must include landscaping to be eligible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref		Project must include landscaping to be eligible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1			
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3	Water Use Reduction	Pref		See paragraph BUILDING WATER USE REDUCTION.

ENERGY AND ATMOSPHERE				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EA1	Optimize Energy Performance	Rqd	1	Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION , as a minimum, is required.
EA2.1	On-Site Renewable Energy	Pref		See paragraph ENERGY CONSERVATION .
EA3	Enhanced Commissioning	Rqd		See paragraph COMMISSIONING . The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification			Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	See paragraph LEED CREDITS COORDINATION .

MATERIALS AND RESOURCES				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Coordinate with Installation during design development on collection service and receptacles.
MR1	Building Reuse			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref		See paragraph CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3	Materials Reuse			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref		See paragraph RECYCLED CONTENT.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref		
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			

MR6	Rapidly Renewable Materials	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS and paragraph FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM.
MR7	Certified Wood	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS.
INDOOR ENVIRONMENTAL QUALITY				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise (family housing, barracks and other lodging are facility types where smoking may be permitted in some cases). Except where indicated otherwise, provide an outdoor designated smoking area (with signage but no structure) which will be at least 50 feet from common points of ingress/egress, building air intakes and operable windows. Designated smoking area will not be located in an area that is commonly used by nonsmokers.
EQ1	Outdoor Air Delivery Monitoring			
EQ2	Increased Ventilation			
EQ3.1	Construction IAQ Management Plan: During Construction	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.

EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.3	Low Emitting Materials: Carpet/Flooring Systems	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option unless indicated otherwise.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design	Rqd		See paragraph HEATING, VENTILATING AND AIR CONDITIONING.
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref		See paragraph DAYLIGHTING.
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
INNOVATION & DESIGN PROCESS				
IDc1.1	Innovation in Design			See paragraph INNOVATION AND DESIGN CREDITS. Assume Government will not provide any activities associated with ID credits.
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design

				and construction is required.
REGIONAL PRIORITY CREDITS (Version 3 only)				See paragraph LEED CREDITS COORDINATION.

APPENDIX M

LEED OWNER'S PROJECT REQUIREMENTS



LEED 2009 for New Construction and Major Renovations

Project Checklist

JLENS II TADSS

14-Jul-11

1	3	5		11
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Sustainable Sites Possible Points: 26

Y	DB	Y GOV	N	? DB	? GOV	d/C
Y						
		1				
			1			
					6	
			1			
			3			
		2				
					1	
					1	
					1	
					1	
					1	
1						

- C Prereq 1 Construction Activity Pollution Prevention
- d Credit 1 Site Selection 1
- d Credit 2 Development Density and Community Connectivity 5
- d Credit 3 Brownfield Redevelopment 1
- d Credit 4.1 Alternative Transportation—Public Transportation Access 6
- d Credit 4.2 Alternative Transportation—Bicycle Storage and Changing Rooms 1
- d Credit 4.3 Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles 3
- d Credit 4.4 Alternative Transportation—Parking Capacity 2
- C Credit 5.1 Site Development—Protect or Restore Habitat 1
- d Credit 5.2 Site Development—Maximize Open Space 1
- d Credit 6.1 Stormwater Design—Quantity Control 1
- d Credit 6.2 Stormwater Design—Quality Control 1
- C Credit 7.1 Heat Island Effect—Non-roof 1
- d Credit 7.2 Heat Island Effect—Roof 1
- d Credit 8 Light Pollution Reduction 1

Notes:

2	2	0	0	0
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Water Efficiency Possible Points: 10

Y	DB	Y GOV	N	? DB	? GOV	d/C
Y						
		2				
2						

- d Prereq 1 Water Use Reduction—20% Reduction
- d Credit 1 Water Efficient Landscaping 2 to 4
 - Reduce by 50% 2
 - No Potable Water Use or Irrigation 4
- d Credit 2 Innovative Wastewater Technologies 2
- d Credit 3 Water Use Reduction 2 to 4
 - Reduce by 30% 2
 - Reduce by 35% 3
 - Reduce by 40% 4

Notes:

19	0	4	0	0
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Energy and Atmosphere

Possible Points: 35

Y DB Y GOV N ? DB ? GOV

Y				
Y				
Y				
15				

C	Prereq 1	Fundamental Commissioning of Building Energy Systems		
d	Prereq 2	Minimum Energy Performance		
d	Prereq 3	Fundamental Refrigerant Management		
d	Credit 1	Optimize Energy Performance	1 to 19	
		<input type="checkbox"/> Improve by 12% for New Buildings or 8% for Existing Building Renovations	1	
		<input type="checkbox"/> Improve by 14% for New Buildings or 10% for Existing Building Renovations	2	
		<input type="checkbox"/> Improve by 16% for New Buildings or 12% for Existing Building Renovations	3	
		<input type="checkbox"/> Improve by 18% for New Buildings or 14% for Existing Building Renovations	4	
		<input type="checkbox"/> Improve by 20% for New Buildings or 16% for Existing Building Renovations	5	
		<input type="checkbox"/> Improve by 22% for New Buildings or 18% for Existing Building Renovations	6	
		<input type="checkbox"/> Improve by 24% for New Buildings or 20% for Existing Building Renovations	7	
		<input type="checkbox"/> Improve by 26% for New Buildings or 22% for Existing Building Renovations	8	
		<input type="checkbox"/> Improve by 28% for New Buildings or 24% for Existing Building Renovations	9	
		<input type="checkbox"/> Improve by 30% for New Buildings or 26% for Existing Building Renovations	10	
		<input type="checkbox"/> Improve by 32% for New Buildings or 28% for Existing Building Renovations	11	
		<input type="checkbox"/> Improve by 34% for New Buildings or 30% for Existing Building Renovations	12	
		<input type="checkbox"/> Improve by 36% for New Buildings or 32% for Existing Building Renovations	13	
		<input type="checkbox"/> Improve by 38% for New Buildings or 34% for Existing Building Renovations	14	
		<input checked="" type="checkbox"/> Improve by 40% for New Buildings or 36% for Existing Building Renovations	15	
		<input type="checkbox"/> Improve by 42% for New Buildings or 38% for Existing Building Renovations	16	
		<input type="checkbox"/> Improve by 44% for New Buildings or 40% for Existing Building Renovations	17	
		<input type="checkbox"/> Improve by 46% for New Buildings or 42% for Existing Building Renovations	18	
		<input type="checkbox"/> Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19	
	d	Credit 2	On-Site Renewable Energy	1 to 7
		<input checked="" type="checkbox"/> 1% Renewable Energy	1	
		<input type="checkbox"/> 3% Renewable Energy	2	
		<input type="checkbox"/> 5% Renewable Energy	3	
		<input type="checkbox"/> 7% Renewable Energy	4	
		<input type="checkbox"/> 9% Renewable Energy	5	
		<input type="checkbox"/> 11% Renewable Energy	6	
		<input type="checkbox"/> 13% Renewable Energy	7	
	C	Credit 3	Enhanced Commissioning	2
	d	Credit 4	Enhanced Refrigerant Management	2
	C	Credit 5	Measurement and Verification	3
	C	Credit 6	Green Power	2

1				
---	--	--	--	--

		2		
3				
		2		

Notes:

3	0	4	0	0
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Materials and Resources

Possible Points: 14

Y DB Y GOV N ? DB ? GOV

Y				
		3		

d Prereq 1 Storage and Collection of Recyclables

c Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof

1 to 3

- Reuse 55%
- Reuse 75%
- Reuse 95%

1
2
3

		1		
1				

c Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements

1

c Credit 2 Construction Waste Management

1 to 2

- 50% Recycled or Salvaged
- 75% Recycled or Salvaged

1
2

--	--	--	--	--

c Credit 3 Materials Reuse

1 to 2

- Reuse 5%
- Reuse 10%

1
2

1				
---	--	--	--	--

c Credit 4 Recycled Content

1 to 2

- 10% of Content
- 20% of Content

1
2

1				
---	--	--	--	--

c Credit 5 Regional Materials

1 to 2

- 10% of Materials
- 20% of Materials

1
2

c Credit 6 Rapidly Renewable Materials

1

c Credit 7 Certified Wood

1

Notes:

3	0	0	0	0
---	---	---	---	---

Indoor Environmental Quality

Possible Points: 15

Y DB Y GOV N ? DB ? GOV

Y				
Y				
1				
1				
1				

- d Prereq 1 Minimum Indoor Air Quality Performance 1
- d Prereq 2 Environmental Tobacco Smoke (ETS) Control 1
- d Credit 1 Outdoor Air Delivery Monitoring 1
- d Credit 2 Increased Ventilation 1
- C Credit 3.1 Construction IAQ Management Plan—During Construction 1
- C Credit 3.2 Construction IAQ Management Plan—Before Occupancy 1
- C Credit 4.1 Low-Emitting Materials—Adhesives and Sealants 1
- C Credit 4.2 Low-Emitting Materials—Paints and Coatings 1
- C Credit 4.3 Low-Emitting Materials—Flooring Systems 1
- C Credit 4.4 Low-Emitting Materials—Composite Wood and Agrifiber Products 1
- d Credit 5 Indoor Chemical and Pollutant Source Control 1
- d Credit 6.1 Controllability of Systems—Lighting 1
- d Credit 6.2 Controllability of Systems—Thermal Comfort 1
- d Credit 7.1 Thermal Comfort—Design 1
- d Credit 7.2 Thermal Comfort—Verification 1
- d Credit 8.1 Daylight and Views—Daylight 1
- d Credit 8.2 Daylight and Views—Views 1

Notes:

1	0	0	0	0
---	---	---	---	---

Innovation and Design Process

Possible Points: 6

Y DB Y GOV N ? DB ? GOV

1				

- d/C Credit 1.1 Innovation in Design: Specific Title 1
- d/C Credit 1.2 Innovation in Design: Specific Title 1
- d/C Credit 1.3 Innovation in Design: Specific Title 1
- d/C Credit 1.4 Innovation in Design: Specific Title 1
- d/C Credit 1.5 Innovation in Design: Specific Title 1
- d/C Credit 2 LEED Accredited Professional 1

Notes:

1	0	0	0	0
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Regional Priority Credits

Possible Points: 4

Y DB Y GOV N DB ? DB ? GOV

1				

- d/C Credit 1 Regional Priority: Water Efficient Landscaping (0%) 1
- d/C Credit 1 Regional Priority: Water Use Reduction (40%) 1
- d/C Credit 1 Regional Priority: Optimize Energy Performance (18%) 1
- d/C Credit 1 Regional Priority: Construction Waste Management (75%) 1
- d/C Credit 1 Regional Priority: Materials Reuse (10%) 1
- d/C Credit 1 Regional Priority: Regional Materials (20%) 1

Notes:

30	5	13	0	11
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35	13	11
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Total Possible Points: 110

APPENDIX N

LEED Requirements for Multiple Contractor Combined Projects (29 Sep 09)

When site work and building(s) for a project are accomplished by separate contractors, it is referred to as a Combined Project for purposes of LEED scoring and documentation and the following is required:

- LEED points relating to site work must be combined with the LEED points for each building to arrive at a single LEED Combined Project score.
- LEED points having both building requirements and site requirements (combined bldg/site points) must be coordinated between the contractors.
- LEED aggregate materials points must be coordinated between the contractors and a division of responsibilities for each contractor's required contribution to the point must be developed.
- LEED Project documentation from separate contractors must be combined.

Multiple Contractor Combined Project Definition. See paragraph MULTIPLE CONTRACTOR COMBINED PROJECT in paragraph PROJECT SPECIFIC REQUIREMENTS of the Statement of Work to see if this project is part of a Multiple Contractor Combined Project. A summary of the separate projects that constitute the Combined Project may be provided at paragraph SUSTAINABLE DESIGN – ADDITIONAL INFORMATION or may be obtained from the Contracting Officer's Representative. Typical Multiple Contractor Combined Projects are comprised of the site work contract and all the building-only contracts for buildings that the site work is provided for in the separate site work contract.

LEED Points Coordination. See Appendix LEED Multiple Contractor Responsibilities Table(s) for the total number of points each contractor is responsible for obtaining, for special requirements relating to combined building/site points and for each contractor's requirement relating to aggregate materials points each portion of this Multiple Contractor Combined Project. Each contractor providing a building is referred to as Building CTR and Site CTR refers to the contractor providing the site development. For each building included in the site work contract, the site work contractor is both Building CTR and Site CTR for that building. Aggregate materials percentages indicated in the table(s) are percentage of that contractor's materials total.

Point Substitutions. During preparation of the Proposal, each contractor is free to substitute other LEED points for those indicated in the LEED Multiple Contractor Responsibilities Table(s), except points marked "NO" in the "Building CTR Substitutions Permitted" column may not be deleted or added by substitution by building contractor and points marked "NO" in the "Site CTR Substitutions Permitted" column may not be deleted or added by substitution by site contractor. Credit substitutions after award are not permitted except with the advance approval of the Contracting Officer.

LEED Documentation. Each contractor is responsible for developing all project LEED documentation demonstrating compliance for their portion of the work and must utilize the LEED Letter Templates. Each contractor is responsible for updating construction phase LEED documentation at least monthly until construction closeout. No CTR will duplicate the data of another CTR within their own documentation. Each contractor will include the contractor name, project name and number and individual building description as applicable on each Letter Template. The LEED Letter Templates are copyright protected and shall be used only for this specific contract and this registered project.

Compiling LEED Documentation from Multiple Contractors. At completion and acceptance of final design submittals the completed design phase letter templates and their attachments from all CTRs in the Multiple Contractor Combined Project will be compiled at the registered site project. All CTRs will furnish electronic copies of their completed letter templates and their attachments for this purpose. Monthly during construction and at construction closeout all CTRs current construction phase letter templates and their attachments will be compiled at the registered site project. Summary letter templates for all aggregate credits (see AGMBC for which credits are aggregate credits) will be created and maintained monthly with summary data from all from

all CTRs in the Multiple Contractor Combined Project at the registered site project. All CTRs will furnish electronic copies of the current updated templates and their attachments for this purpose monthly and at closeout.

Site Work Portion of Multiple Contractor Combined Project, Administration by the Government. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is by the Government, the Government will provide access to blank Letter Templates for site CTRs use and the Government will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.

Site Work Portion of Multiple Contractor Combined Project, Shared Administration. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is shared between Contractor and Government, the Contractor will administer the registered site project until final design acceptance, at which point administration will be transferred to the Government. The Government will administer the project during construction and the Government will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.

Site Work Portion of Multiple Contractor Combined Project, Administration by the Contractor. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is by the Contractor, the Contractor will administer the project and **the Contractor will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.**

Standard Design Building(s) portion of Multiple Contractor Combined Project, Administration by the Government. If paragraph 16.4.2 CREDIT VALIDATION indicates this is a standard design building(s) portion of a Multiple Contractor Combined Project and that administration of the online project is by the Government, the Government will provide access to blank Letter Templates for standard design building CTRs use as follows:

Instructions for Obtaining LEED Letter Templates for Registered Army Standard Designs

General. Contractors providing Army standard design buildings only (site work by another contractor) in a Multiple Contractor Combined project obtain their LEED Letter Templates for the project from the Center of Standardization (COS) for that standard design.

Information You Need to Provide. After award, contact the COS POC indicated below requesting LEED Letter Templates for your project. In your request, indicate the following:

Project name, location, Contractor name, PN number and contract number

Description of building(s) you are responsible for (example: S/M/L/L COF w/detached admin)

LEED Documentation Responsible Party name, phone number, email contact info

Responsible party certification of understanding that Letter Templates furnished by the Government for this project are copyright protected and will not be used for any purposes other than for this project documentation.

Attach the LEED Registered Project Checklist from conformed proposal which indicates the points the project will earn/contribute to.

SAMPLE EMAIL REQUEST:

To: (COS POC below)

CC: (Contracting Officer's Representative (COR) for your contract)

Subject: COS LEED Letter Templates Request

We have an awarded contract and request COS LEED Letter Templates for:

Project: 4th BCT Complex

Location: Fort Bragg, NC

Contractor: Great Design Builder Inc.

Project Number/Contract Number: PN 65555, W912HN-08-C-0001
Standard Design Building Type(s): Large Brigade HQ, Medium Battalion HQ

Our **Responsible Party** for LEED Documentation for this project is (name, phone number, email).

Certification: I, (sender name), certify that the LEED Letter Templates furnished by the Government for this project are copyright protected and I will ensure that they are not used for any purpose other than project documentation for this project only.

Attached Checklist: Please see attached LEED Project Checklist, which indicates the points this project will earn.

Salutation,
Name

COS Points of Contact for Obtaining Letter Templates. Email your request to the applicable POC indicated below. If there is no POC indicated for the standard design you are providing, contact your project COR for direction.

Army Standard Design

- Army Family Housing
- Battalion Headquarters
- Brigade Headquarters
- Company Operations Facilities (COF)
- Criminal Investigation Facilities
- Enlisted Personnel Dining Facilities
- General Instruction Buildings/Classroom XXI
- Military Entrance Processing Stations
- Tactical Equipment Maintenance Facilities (TEMF)
- Transient Officer’s Quarters (part of ORTC)

Point of Contact

- Lisa.A.Bobotas@usace.army.mil
- judith.f.milton@usace.army.mil
- judith.f.milton@usace.army.mil
- judith.f.milton@usace.army.mil
- Matthew.C.Scanlon@usace.army.mil
- David.A.Gary@usace.army.mil
- Huong.M.Huynh@usace.army.mil
- Lisa.A.Bobotas@usace.army.mil
- judith.f.milton@usace.army.mil
- paul.m.kai@usace.army.mil

Furnishing Completed Documentation to COS Letter Template Library. Certain completed design phase letter templates with attachments may be requested by the COS for future use as part of the standard design. If requested, provide an electronic copy to the COS Point of Contact indicated above. The Center of Standardization (COS) for individual Army standard designs may maintain a library of completed LEED documentation for that standard design. The Government will make the completed templates available to subsequent standard design projects in order to reduce duplication of documentation effort to the extent possible. To inquire about reviewing or obtaining completed LEED documentation that may be applicable to a particular project, contact the Center of Standardization POC.

APPENDIX O
LEED Strategy Tables

Not Used

APPENDIX P

LEED Registration of Army Projects

15 April 2010

Number of Registrations

Each building must be registered separately, except multiple instances of a standard building on a shared site may be registered as a single project. If a single registration for multiple buildings is chosen, all buildings under the single registration must earn exactly the same points. Do not register buildings that are exempt from a specific LEED achievement requirement.

Typical Registration Procedure

1. Login, complete the online registration form (see guidance below) at the GBCI LEED Online website <http://www.gbci.org/DisplayPage.aspx?CMSPageID=174> and submit it online.
2. Pay the registration fee via credit card (USACE staff: credit card PR&C is funded by project design or S&A funds).
3. GBCI will follow up with a final invoice, the LEED-online passwords and template information.
4. The individual who registers the project online is, by default, the Project Administrator.

Completing the Registration Form

BEFORE YOU BEGIN:

Create a personal account with USGBC if you do not have one.

You will need the following information:

Project name as it appears in P2 (obtain from USACE Project Manager)

Building number/physical address of project

Zip code for Installation/project location

Anticipated construction start and end dates

Total gross area all non-exempt buildings in registration

Total construction cost all non-exempt buildings only (see Project Details Section instructions below)

ACCOUNT/LOGIN INFORMATION

1. The person registering the project **must have an account with USGBC** (login and password) to complete the form. Go to <http://www.gbci.org/>, click on "register a project" at the drop-down menu for project certification (at the top of the page) and select "register now for LEED 2009" to start the project registration process. If you have an account, login with your email address and password and select "register new project" to proceed. If you do not have an account, you may select "register a new account" and follow the instructions. It is recommended that you create an account separately on the USGBC website before you start the form. **IMPORTANT: USACE team members are members of USGBC and are eligible for Member prices. USACE team members registering projects should be sure to include the USACE Corporate Access ID in their personal account profile (if you do not have it contact richard.l.schneider@usace.army.mil or judith.f.milton@usace.army.mil for the number).**
2. The Account/Login Information section is filled out by the person registering the project. It may be a Contractor or a USACE staff member.

ELIGIBILITY SECTION

Follow directions (accepting the terms and conditions)

Review your profile information and make corrections if needed

RATING SYSTEM SELECTION SECTION

Select single project registration and I know which rating system.

Select the rating system - currently only LEED-NC and LEED for Homes are approved for Army use without special approval.

LEED Minimum Program Requirements: select YES

RATING SYSTEM RESULTS SECTION

Confirm selected rating system.

PROJECT INFORMATION SECTION

Project Title: Begin the project title with a one-word identifier for the Installation. Do not include the word "Fort". After this match the project name used in P2 (contact the USACE Project Manager for this information) and identify the building being registered. Example: "Stewart 4th IBC - DFAC".

Project Address 1 and 2: This is the physical location of the project. Provide building number, street address, block number or whatever is known to best describe the location of the project on the Installation.

Project City: Installation Name

State, Country, Zip Code: Self-explanatory

Anticipated Construction Start and End Dates: Self-explanatory – give your best guess if unknown. Note that required data entry format is: 1 or 2 digit month/1 or 2 digit date/4 digit year (example 3/23/2010)

Gross Square Footage: Provide total area all buildings in LEED project. Exclude the area of any buildings that are exempt from the LEED achievement requirement (for example, exclude an unconditioned storage shed to be constructed with a barracks complex).

Is Project Confidential: Indicate NO except, if project has security sensitivity (elements that are FOUO or higher security), indicate YES.

Notification of Local Chapter: Indicate NO unless Government/USACE Project Manager requests you to indicate YES.

Anticipated Project Type: Select the most appropriate option from the drop-down menu.

Anticipated Certification Level: Select the applicable option from the drop-down menu (Silver is the usual level).

PROJECT OWNER INFORMATION SECTION

Project Owner First Name, Last Name, email, phone, address: The Project Owner is the USACE Project Manager. Obtain this info from the USACE Project Manager.

Organization: U.S. Army Corps of Engineers. This field MUST be completed this way because it will be used as a search field by higher HQ to find all USACE registered projects. You may supplement it with district name at the end but DO NOT revise or use an acronym.

May we publish Owner information: Indicate NO

Owner Type: Pick Federal Government from drop-down menu.

Project Owner Assertion: Check the box

PAYMENT INFORMATION

Self-explanatory

APPENDIX Q
REV 2.1 – 30 SEP 2010
AREA COMPUTATIONS

Computation of Areas: Compute the “gross area” and “net area” of facilities (excluding family housing) in accordance with the following subparagraphs:

(1) Enclosed Spaces: The “gross area” is the sum of all floor spaces with an average clear height $\geq 6'-11"$ (as measured to the underside of the structural system) and having perimeter walls which are $\geq 4'-11"$. The area is calculated by measuring to the exterior dimensions of surfaces and walls.

(2) Half-Scope Spaces: Areas of the following spaces shall count as one-half scope when calculating “gross area”:

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- **Covered but not enclosed spaces, canopies, training, and assembly areas**
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

(3) Excluded Spaces: The following spaces shall be excluded from the “gross area” calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

(4) Net Floor Area: Where required, “net area” is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall “assignable net area” is determined by subtracting the following spaces from the “gross area”:

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

RMS SUBMITTAL REGISTER INPUT FORM			CONTRACT NUMBER		DELIVERY ORDER																				
TITLE AND LOCATION																									
Button	<----Right click for Instructions		TYPE OF SUBMITTAL								CLASSIFICATION				REVIEWING OFFICE										
SECTION	PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	01 - PRECON SUBMITTALS	02 - SHOP DRAWINGS	03 - PRODUCT DATA	04 - SAMPLES	05 - DESIGN DATA	06 - TEST REPORTS	07 - CERTIFICATES	08 - MFRS INSTRUCTIONS	09 - MFRS FIELD REPORT	10 - O&M DATA	11 - CLOSEOUT SUBMITTALS	F10 - 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				
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				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			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			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	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	3.7	Independent Technical Review					X								X					X	X				
01 33 16	3.2.5/3.8	Design Complete Submittal Package(s)					X								X					X	X				
01 33 16	3.3.3	Design and Code Review Checklists					X								X					X	X				
01 33 16	A-2.0	SID - Interim and Final (as applicable)			X	X	X							X						X					
01 33 16	B-2.0	FFE (as Applicable)					X							X						X					
01 33 16	F-3.1.3	BIM Model and data					X								X					X	X				
01 45 04.00 10	3.2	Design and Construction QC Plan	X												X					X					
01 57 20.00 10	1.2	Environmental Protection Plan	X												X					X					
01 78 02.00 10	1.2.1	Final as-Built Drawings/ BIM Model											X		X										
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					
01 78 02.00 10	1.12	Interim Form DD 1354											X							X					
Appendix T	A. 1	Life Cycle Analysis for Light Level Tuning					X								X					X	X				
Appendix T	A. 4.	Lif Cycle Analysis Automated Sahing.					X								X					X	X				
Appendix T	B.1.	Qualifications of Testing Agent						X							X					X	X				
Appendix T	B. 1.	Functional area Lighting Control Tests						X							X					X	X				

Appendix S

REV 1.1 JUL 2011.

Manufacturing Performance Requirements for Plumbing Fixtures From The Energy Policy Act of 1992 (PL 102-486) (Including Exceptions for Projects Registered for LEED 3.0 or higher)

Note: This information is for use in establishing the Baseline to calculate flow rate reductions from said Baseline, where required by the contract.

Subtitle C--Appliance and Equipment Energy Efficiency Standards

SEC. 123. ENERGY CONSERVATION REQUIREMENTS FOR CERTAIN LAMPS AND PLUMBING PRODUCTS.

... (j) STANDARDS FOR SHOWERHEADS AND FAUCETS- (1) The maximum water use allowed for any showerhead manufactured after January 1, 1994, is 2.5 gallons per minute when measured at a flowing water pressure of 80 pounds per square inch. Any such showerhead shall also meet the requirements of ASME/ANSI A112.18.1M-1989, 7.4.3(a).

`(2) The maximum water use allowed for any of the following faucets manufactured after January 1, 1994, when measured at a flowing water pressure of 80 pounds per square inch, is as follows:

`Lavatory faucets: 2.5 gallons per minute **(BUT SEE BELOW**)**

`Lavatory replacement aerators: 2.5 gallons per minute

`Kitchen faucets : 2.5 gallons per minute

`Kitchen replacement aerators: 2.5 gallons per minute

`Metering faucets: 0.25 gallons per cycle

`(k) STANDARDS FOR WATER CLOSETS AND URINALS- (1)(A) Except as provided in subparagraph (B), the maximum water use allowed in gallons per flush for any of the following water closets manufactured after January 1, 1994, is the following:

`Gravity tank-type toilets --1.6 gpf.

`Flushometer tank toilets --1.6 gpf.

`Electromechanical hydraulic toilets --1.6 gpf.

`Blowout toilets --3.5 gpf.

`(B) The maximum water use allowed for any gravity tank-type white 2-piece toilet which bears an adhesive label conspicuous upon installation consisting of the words `Commercial Use Only' manufactured after January 1, 1994, and before January 1, 1997, is 3.5 gallons per flush.

`(C) The maximum water use allowed for flushometer valve toilets, other than blowout toilets, manufactured after January 1, 1997, is 1.6 gallons per flush.

`(2) The maximum water use allowed for any urinal manufactured after January 1, 1994, is 1.0 gallon per flush.

**** EXCEPTIONS for Projects Registered under LEED 3.0 or higher.**

1. Any exceptions identified in the applicable LEED criteria.
2. Public lavatory faucets shall deliver a maximum flow rate of 0.5 gallons per minute, when tested in accordance with ASME A 112.18/CSA B125. Use that flow rate as the Baseline figure for calculating any required reductions from the Baseline.

APPENDIX T

FUNCTIONAL AREA LIGHTING CONTROL STRATEGY (FALCS)

A. GENERAL LIGHTING CONTROL SYSTEM ENERGY MANAGEMENT STRATEGIES

SUMMARY: This appendix describes various lighting energy management strategies to utilize across functional areas. These strategies are intended to supplement and NOT supersede the requirements of ASHRAE 90.1.

1. Consider **LIGHT LEVEL TUNING** to maintain the appropriate light level for a given space. Initial light levels are set high to compensate for light depreciation over time. Where dimming ballasts or dimmable LED drivers are used, they shall be digital and addressable in nature (where available) that can provide individual fixture light level tuning and reconfigurability that dims the light level to the target level, saving the energy that otherwise would be used to compensate for future light depreciation. Provide a life-cycle cost-benefit analysis (LCCBA) of light level tuning for all spaces where the general lighting luminaires are equipped with digital addressable dimming ballasts or LED drivers. The LCCBA shall follow the methodology contained in the IESNA Lighting Handbook. Provide light level tuning where the LCCBA shows it to be economical.
2. Use **OCCUPANCY/VACANCY SENSORS** to automatically turn off lighting a specified time after all occupants leave the space. The off time shall be adjustable settable to 1, 5, 15, or 30 minutes. Select the type (single or dual technology, wired or wireless) based on the use and configuration of the space. Lighting control system shall have the capability to manage both hard-wired and wireless sensors where applicable. Single technology solutions shall incorporate signal processing technology that distinguishes between background noise and actual motion without automatically changing their sensitivity threshold. To maximize energy savings potential, all occupancy sensors shall be either **MANUAL ON – AUTOMATIC OFF** (vacancy sensor) or **AUTOMATIC ON** (to a specified light level of 50% or less) – **AUTOMATIC OFF** to maximize energy savings. Occupancy/Vacancy sensors properly located in the space and set appropriately can offer typical lighting energy savings of 15% or more.
3. Use **DAYLIGHT HARVESTING** to control lighting in areas within at least two window head heights (head height is the distance from the floor to the top of the glazing) adjacent to exterior view windows. Typical daylight penetrates three times the window head height into the space. To maximize energy savings, daylight dimming strategies need to penetrate beyond the first row of luminaires (first daylight zone). When daylighting installed fluorescent or LED luminaires, accomplish daylight harvesting by digitally addressable dimming ballasts or drivers. As the natural light in the space increases, the artificial light level should dim gradually to maintain a uniform light level and prevent disruption to the occupants. One daylight sensor must be able to control multiple daylighting zones (cross-zoning) without the need of adding more sensors. All controls (daylight sensors, occupancy sensors, wall stations) shall have the capability to connect to the system via hard wire or wireless. Apply the same daylighting strategies to areas where skylights are available (refer to ASHRAE 189.1 daylight zone definitions). Daylighting systems properly tuned and calibrated can offer typical lighting energy savings of 15% or more.
4. Consider **AUTOMATED SHADING** in spaces utilizing daylight harvesting to maximize the energy savings of the day lighting system. The shades shall be controlled to reduce glare and unwanted heat gain while still allowing natural light to enter the space. When utilizing automated shading consider the following :
 - A. For ease of use and space aesthetics, operate the automated shades by common controls, wired or wireless (i.e. same appearance and design) with the lighting control system.
 - B. For maximum energy savings the automated shading system shall predictably position the shades based on a combination of time of day, façade direction, and sky conditions.
 - C. For maximum design flexibility and ease of installation, shade system should have the capability to address and control each shade individually.
 - D. The shading system shall have a manual override that allows the occupant to temporarily adjust the shades to any desired position. The system will revert back to automatic control after a specified period of time.

Provide a life-cycle cost-benefit analysis (LCCBA) of automated shading for all spaces where daylight harvesting is provided. The LCCBA shall follow the methodology contained in the IESNA Lighting Handbook. Provide automated shading where the LCCBA shows it to be economical.

5. Use SCENE BASED DIMMING in multiple-use areas including auditoriums, conference rooms and classrooms. Also provide scene based dimming in dining rooms and gymnasiums with multiple functions. One button preset touch recall shall allow multiple zones of light within a space to go to the appropriate light levels, known as a scene, for a specific task or use. Scene based control shall allow the integration of AV controls, shading/projection screens and lighting to work seamlessly with one button preset touch (i.e. lights dim, projection screen lowers, and shades go down). If dimming ballasts or LED drivers are used, they shall also be digital and addressable in nature (where available) to take advantage of installation and life-cycle reconfiguration benefits.
6. Provide PERSONAL CONTROL of lighting in spaces to allow the user of the space to vary the general light level based on the task at hand. Personal control can be achieved by wall mounted controls (hard wired or wireless), Infrared or Radio Frequency (RF) wireless devices, or via computer. Digital addressable ballasts and LED drivers allow the control flexibility of personal dimming of installed lighting on the occupant's work area (i.e. dim the luminaire over their cubicle to the appropriate light level).
7. Consider WIRELESS lighting control options for all installations, including retrofit projects (easy installation, lower installed cost, no power packs necessary). Wireless products shall include but not be limited to occupancy / vacancy sensors, daylight sensors, local wall controls, plug in switching and dimming appliance and parasitic load modules. To avoid interference, wireless products should communicate in an FCC frequency band that does not allow continuous transmissions and is free of Wi-Fi devices.

B. FUNCTIONAL TESTING AND MANUFACTURER SUPPORT

SUMMARY: This section describes functional testing to be performed on the lighting control system and the support required from the lighting control manufacturer.

1. Hire an independent agent with no less than three years experience in testing of complex lighting control systems to conduct and certify functional testing of lighting control devices and control systems. The testing agent shall not be directly involved in either the design or construction of the project and shall certify the installed lighting controls meet or exceed all requirements of ASHRAE 90.1 and all documented performance criteria. The lighting control manufacturer's authorized technical representative may serve as the testing agent. Submit qualifications of the testing agent for approval. Submit copies of test results to the Government.
2. LIGHTING CONTROL MANUFACTURER SUPPORT shall include technical phone support located in the United States. The technical phone support shall be available 24 hours a day, 365 days a year.

APPENDIX AA

FORT BLISS IDG EXCERPTS

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4.1.3 Environmental Setting

The arid southwest ecoregion is comprised of essentially two provinces, the Chihuahuan Desert Province and the American Semi-desert and Desert Province (Fig. 4.4). Both provinces share similar climatic conditions of extreme aridity as well as extremely high air and soil temperatures, which are characteristics of tropical/subtropical deserts. Direct sun radiation is strong, as is outgoing radiation at night, causing extreme variations between night and day temperatures (35-45° F), and rare nocturnal frosts. Annual precipitation is typically less than 9 inches and vegetation is xeriphytic, widely dispersed and providing negligible groundcover. Many annual species are present but only appear with heavy rains that saturate the soil. The dominant soil formation process is salinization, which produces areas of salt crust. Calcification also occurs in well-drained uplands and forms caliche (calcium carbonate) layers at soil depths of at least 12 inches below the surface. Humus in the soil is lacking (except along riparian areas) and soils are mostly Aridisols (soils formed in very dry conditions) and dry Entisols (recently developed soils).

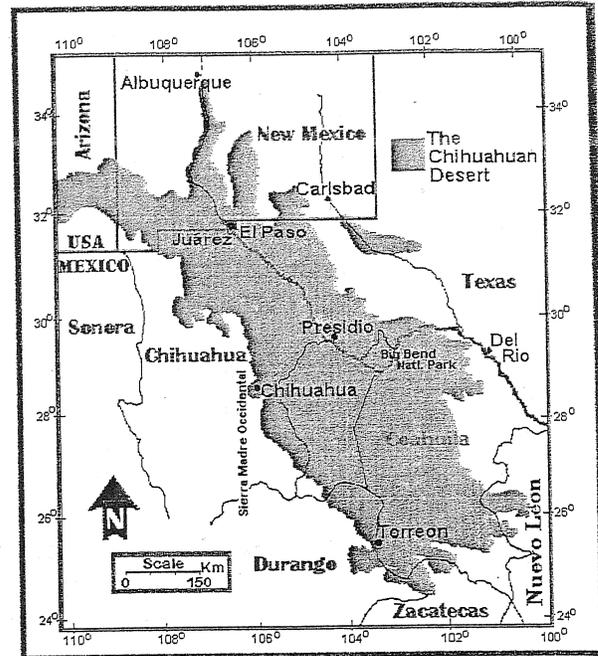


Fig. 4.4 - Chihuahuan Desert (map from UTEP website)

4.1.3.1 Topography

Fort Bliss is located partially within the Chihuahuan Desert Province and the American Semi-desert and Desert Province of the southwest region of the United States. The Chihuahuan Desert consists of southeastern Arizona, southern New Mexico and western Texas, encompassing approximately 85,200 square miles. The high desert consists of undulating plains, elevations near 4,000 feet and isolated mountains rising 2,000 to 5,000 feet. The American Semi-desert and Desert Province consists of southwestern California, southwestern Arizona, and southern Nevada and includes the Mojave, Colorado, and Sonoran deserts. (87,700 sq. mi.) The topography is characterized by gently undulating plains, isolated mountains, and buttes. Elevations range from 280 feet below sea level to 4,000 feet in valleys and basins. Some mountain ranges reach as high as 11,000 feet. Most of the province drains to the sea via dry washes or through underground seepage. The Colorado River is the largest and principal river through the province.

4.1.3.2 Geology

The Rio Grande Drainage Basin's geologic history generally ranges from Precambrian to late Cretaceous. During this time, the area experienced folding, broad regional uplifting, and inundations by continental seas. The current topography in the area reflects Cenozoic structural deformation.

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Fault patterns in the area indicate that extension in the southwestern United States was the result of both broad regional uplift and differential drift within the North American Plate. These forces combined to form a physiographic province characterized by dropped basins (called grabens) bounded by tilted fault block ridges (called horsts). More simply stated, grabens and horsts are formed when rock layers move upward along a fault line creating a ridge (horsts) and/or rock layers subside along a fault line creating a basin (graben). A structural trough was created by mid-Tertiary high-angle extension faults running north-south in front of the Franklin Mountains (Fig. 4.5). This represents both the approximate combined throw along two identified fault planes and the subsequent thickest Hueco bolson unconsolidated fill deposits.

Minor faulting continues in the area affecting Pleistocene and early Holocene bolson deposits. Evidence of the faulting is seen in the fault-scarp of the alluvial fan (created by sediments carried down from the mountains in a fan shape) that parallels the bedrock front of the Franklin Mountains. Movement along this fault was normal, with the basinwood blocks subsiding approximately 200-300 feet relative to the mountain front. Smaller displacement faults (trending north-south) extend eastward across the Hueco bolson. These faults cut bolson deposits, Holocene alluviums, Pleistocene gravels, and the subsurface caliche layer. These Quaternary faults may uplift/basin-subsidence episodes. The proximity of the area to the eastern edge of the Rio Grande Rift Zone accounts for the extensive presence of various volcanic dikes and sills that crosscut existing structures.

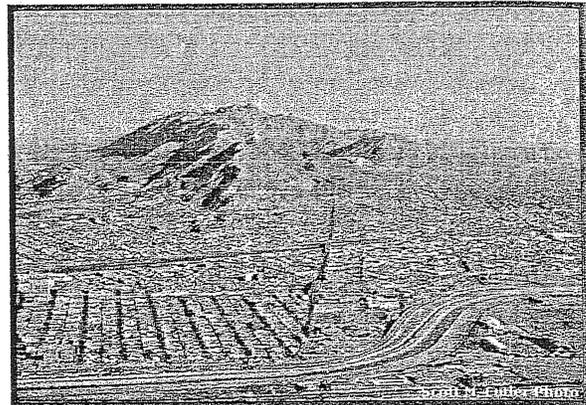


Fig. 4.5 - Franklin Mountains

4.1.3.3 Soils

Soils are mostly aridisols in the western and northern portions of the province. Entisols and aridisols are found in the southern areas of the province. Alkaline conditions are present and salt crusting at the surface and caliche below the surface are typical. Soils are shallow and well drained, and gravelly or sandy in texture. Primary soil type is aridisols but entisols occur on older alluvial fans and terraces. Gravel or bare rock covers much of the ground near the bases of some mountains due to strong desert rainstorms that allow little soil development to occur.

4.1.3.4 Climate

Climate within the Chihuahuan Desert is distinctly arid with long hot summers, brief cold winters and occasional hard freezes (mean temp. 10-20°F) There are approximately 230-245 frost-free days but freezes are common and can last up to 72 hours. Spring and early summer are extremely dry; three quarters of the rainfall comes in summer monsoons, the rest as gentle rains in winter. **Eight inches of rain falls in the desert and up to 20 inches in the mountains.** Severe droughts occur about every 20 years have been recorded since 1890's.

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7.5.3.1 Hot Arid Regions. Design and site development to minimize solar heat gain and maximize shade and encourage humidity in outdoor spaces (Fig. 7.5).

7.5.4 Views and Vistas. The installation will be designed to preserve and enhance scenic and other attractive views and vistas, and to screen unattractive views and vistas. Visual extensions through open spaces provide a sense of orientation, relief, and enjoyment.

7.5.5 Vegetation. The installation will be designed to protect and preserve existing native vegetation. This preservation reduces maintenance and enhances sustainability. A preferred plant matrix (Appendix O, Plant Palette) is included in this Installation Design Guide. (Also, see Section 10 – Landscape Design Component).

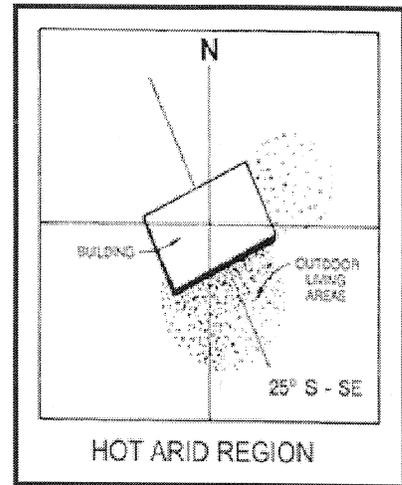


Fig. 7.5 – Building Orientation Minimizes Solar Heat Gain

7.6 MANMADE SITE CONDITIONS

7.6.1 The site plan provides the locations of the manmade development that will occur on site. It establishes the spatial relationships as well as the relationships between manmade and existing natural features. Manmade site conditions include all development on the installation to include buildings, roadways, parking lots, walkways, walls, fences, utilities, and other facilities. Buildings, roadways, parking lots and above ground utilities are the primary manmade visual determinants.

7.6.2 The following site planning guidelines will be used in the visual and spatial review of the installation:

7.6.2.1 Cluster buildings to reduce impact on the natural environment, and reduce roadways and utility corridors needed to serve the development; at the same time, give full consideration to antiterrorism and force protection requirements.

7.6.2.2 Locate large buildings in relatively flat areas to reduce cut and fill, preserve natural vegetation and drainage, and orient to topography (Fig. 7.6).

7.6.2.3 Minimize solar heat gain for cooling.

7.6.2.4 Site buildings with consideration for the microclimate conditions of the site that result in variances in wind or light because of adjacent land forms, structures, or trees.

7.6.2.5 Orient outdoor pedestrian areas for most comfortable exposure.

7.6.2.6 Utilize lighter colored building surfaces exposed to the sun and darker colors on recessed surfaces to absorb radiation.

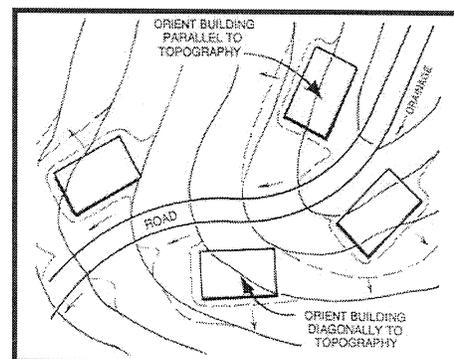


Fig. 7.6 - Orient Buildings and Roads to Topography

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- 7.6.2.7 Orient windows according to impact of climatic conditions.
- 7.6.2.8 Locate development on leeward side of hills.
- 7.6.2.9 Design and locate roads to provide a hierarchy of traffic carrying capacities.
- 7.6.2.10 Locate roads to blend with topography and vegetation.
- 7.6.2.11 Design and locate parking lots to minimize visual impact of broad expanses of pavement and vehicles.
- 7.6.2.12 Design and locate pedestrian walkways and bicycle paths to fit the physical environment; and, provide a comfortable pedestrian experience, limiting conflicts with vehicular traffic.
- 7.6.2.13 Locate trees and shrubs to buffer harsh natural conditions (Fig. 7.7).

7.6.2.14 Deciduous material allows for sun in the winter and provides shade in the summer. Evergreen material provides windbreaks for cold north winds.

7.6.2.15 Design and locate site elements to blend with and enhance the physical environmental.

7.6.2.16 Force Protection requirements should be designed and located to blend with the physical environment.

7.7 SPECIFIC SITE PLANNING CONSIDERATIONS

7.7.1 Site planning considerations must adhere to the physical historic context, or setting, of a historic district. The setting of a historic district is the area or environment in which a historic property is found. The elements of setting, such as the relationship of buildings to each other, setbacks, views, driveways and walkways, and street trees collectively create the character of a district. In instances, such as at Fort Bliss, buildings themselves form a neighborhood or setting that create the character of the district.

New site planning and new construction in Fort Bliss historic districts or in a historic district's view shed shall be physically compatible with the visual and spatial character of the historic district. Site planning considerations shall take into account the historical planning of the installation. This includes: location and orientation of buildings, spaces between

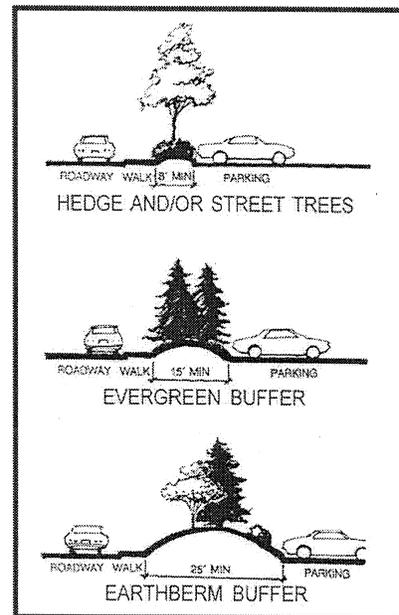


Fig. 7.7 - Screen Parking Areas

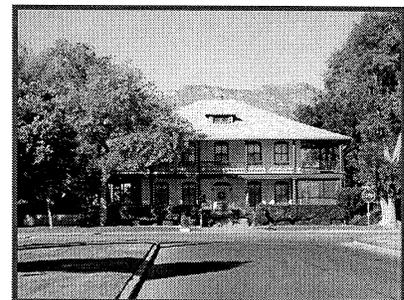


Fig. 7.8 - Pershing House –
Historic District

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SECTION 8 BUILDINGS DESIGN STANDARDS

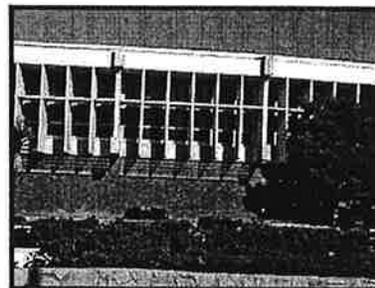
8.1 INTRODUCTION

8.1.1 The design character of an installation's buildings affects the installation's overall image. The visual analysis of buildings and related structures helps define visual zones and themes and is an important part of an installation's assets and liabilities assessment.

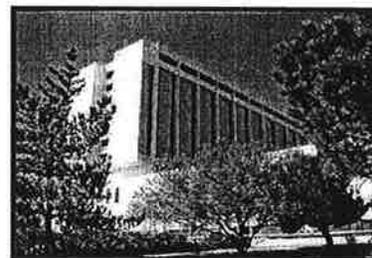
8.1.2 The building design component encompasses the character of the buildings as well as the arrangement of buildings relative to one another and to their environment. In general, use architectural style, materials, and colors indigenous to the region. The preservation of historically and culturally significant structures adds to an installation's character and provides the sense of a heritage.

8.1.3 The visual analysis of structures also includes concerns for accessibility, use of materials, placement of entrances, incorporation of additions and renovations, the incorporation of plazas and courtyards, interior design and the appropriateness and quality of building maintenance.

8.1.4 This section provides the objectives and visual determinants that should be utilized to identify and assess the building design quality of the installation. The section also provides standards and guidance pertaining to the development and maintenance of the various interiors and exteriors of buildings on the installation.



**Fig. 8.1 – Architectural Detail
of USASMA Building**



**Fig. 8.2 – The Medical Center
Main Building**

8.2 BUILDING OBJECTIVES

8.2.1 Sustainability. The architectural style of existing and future buildings should reflect and reinforce the sustainability of the installation. Sustainable design reduces construction and maintenance cost and conserves energy through proper construction and materials selection. See [Appendix D](#) for a

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more complete discussion on Sustainable Design.

8.2.2 Building Design Objectives:

8.2.2.1 Adapt building designs to natural site conditions (Fig. 8.3).

8.2.2.2 Design buildings in clusters to preserve land and reduce construction and maintenance costs.

8.2.2.3 Develop a coherent architectural style that results in the blending of new and old structures. However, when considering historical buildings, one should be able to differentiate between the historic fabric and the new material.

8.2.2.4 Design buildings to include more floors in a vertical structure that results in a smaller footprint and more efficiently utilizes limited installation land areas.

8.2.2.5 Combine multiple activities in one building to reduce the number of buildings required and more efficiently utilize limited installation land areas.

8.2.2.6 Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements.

8.2.2.7 Use indigenous construction materials and practices that require less energy to produce and transport and may be recycled at the end of their usefulness.

8.2.2.8 Locate windows to maximize natural light, ventilation and outward views.

- a) All windows and other glazed areas exposed to the sun, including all glass within 20 degrees east or west of true south, shall be completely shaded on the exterior no less than 50 percent of the time between 0900 and 1730 (solar time) daily during the period from 30 April through 1 October. Partial shading all the time is an acceptable alternative provided the total solar gain does not exceed the amount permitted above, based on actual solar studies. Shading may be achieved by building projections (either horizontal or vertical), by a deep reveal, or any combination of these measures or other architectural design.
- b) True South: Magnetic declination for Fort Bliss is 12 degrees east; that is, a compass reads 12 degrees east of True North or 12 degrees west of True South.
- c) Optimum Direct Gain Aperture Range (percent range of glazed opening to floor area): 11.6 percent.
- d) Minimum profile angle for fixed shade design (may declination): 65.5 degrees.
- e) Recommended shade devices (East and West): Trees and shrubs.

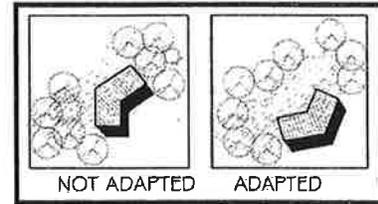


Fig. 8.3 - Adapt Building Design To Site Conditions

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- f) Optimum orientation of facility for passive solar and topo conditions: Within 20 degrees east or west of True South.

8.2.2.9 Consider adaptive reuse of buildings once their initial use is no longer required.

8.3 STRUCTURAL CHARACTER

8.3.1 The character of installation architecture varies according to the use of the structure and when it was built. This use and age variation can result in character incompatibilities.

8.3.2 The difference in character may also result when the designer ignores the character and scale of adjacent buildings or uses an imitative technique unsuccessfully.

8.3.3 The coordination of structural character on an installation provides a consistent and coherent “sense of order” and “sense of place”. This relationship of design comes from using compatible scales, massing, form, color, texture, materials, and fenestration. These design techniques can be utilized in the visual review and analysis of the installation. They are further explained below:

8.3.3.1 Scale. Scale refers to the size of a building facade in relation to humans. Buildings that include predominant vertical facades, which dwarf the individual, are defined as monumental in scale. Buildings with more horizontal facades designed to relate more to the size of the human figure are defined as human scale (Fig. 8.4). The scale of most buildings on installations should be more human than monumental. All new construction should be compatible in scale with adjacent buildings. Monumental architectural design is typically utilized for more ceremonial buildings, such as worship centers, headquarters complexes, and hotel facilities. These buildings make use of large, glazed areas at entrances and oversized fenestration elements to create a scale appropriate to the building’s use. Scale and relief should be provided through roof form, fenestration, building articulation and landscape plantings.

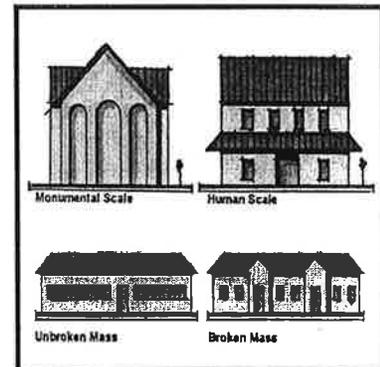


Fig. 8.4 - Structure Scale and Massing

8.3.3.2 Massing. Massing refers to the overall bulk or volume of a building or buildings (Fig. 8.4). The size and proportion of the individual buildings in a grouping of buildings should be designed to be proportionally compatible with the adjacent structures.

8.3.3.3 Form. The form of a building is determined by its size, mass, shape and proportions. The use of similar building forms provides continuity to the installation architectural image.

8.3.3.4 Color. The use of a color scheme that is consistent throughout the installation, where possible, results in a continuity of buildings and contributes to a sense of place



Fig. 8.5 - Color and Form Contribute to a Sense of Place.

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(Fig. 8.5). However, color schemes throughout the installation often vary according to the visual zone and visual theme in which the structure is located.

8.3.3.5 Texture. The use of building materials of similar texture provides visual continuity for the installation.

8.3.3.6 Materials. The use of similar building exterior finish and trim materials provides visual continuity.

8.3.3.7 Fenestration. Building fenestration includes features such as doors, windows, and decorative details. These features should be similar in arrangement, design, size, and proportion for architectural compatibility and visual consistency (Fig. 8.6).

8.3.3.7.1 Discourage Bird Habitat. When designing new construction, consider the use of design components that discourage birds from nesting on buildings. Birds and bird droppings are a nuisance, damaging to buildings and unhealthy to the human work environment. The following architectural features are attractive to birds and should not be used unless proper measures are taken to discourage their attractiveness to birds:

- Deep, uninhabited porches
- Flat architectural relief that projects from buildings or structures at least 4 inches
- Deep window sills
- Exposed gutters
- Flat and accessible areas under open stairs
- HVAC equipment that provide a water source for birds

8.4 BUILDING ENTRANCES

8.4.1 The building entrance is a primary feature of any building design. It should be defined and recognizable as the point of entry regardless of the size or importance of the building (Fig. 8.7).

8.4.2 The entrance to a building should be in a prominent location and should be oriented toward the primary adjacent public spaces such as a courtyard, lawn, parking lot, or street.

8.4.3 The details of an entrance should be designed to

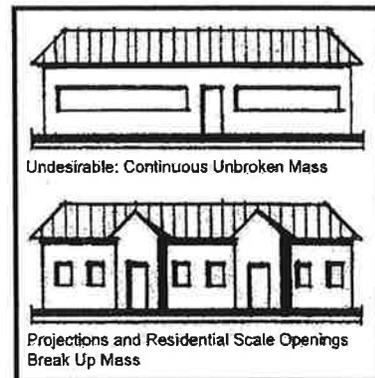


Fig. 8.6 - Fenestration Breaks Up Mass.

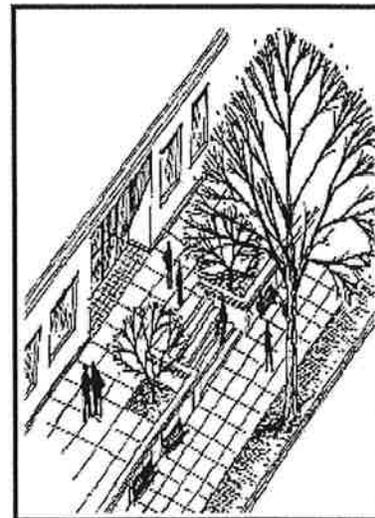


Fig. 8.7 - Entrance is Positive Visual Experience

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provide continuity with other entrances to the building and the entrances of adjacent buildings.

8.5 SERVICE AREAS

8.5.1 Service areas, such as loading docks and trash dumpsters, should be screened from the views of primary use areas such as entrances, courtyards, gathering areas, streets, and parking lots.

8.5.2 Service areas should be enclosed by masonry or rock walls. Screen walls should be between six and eight feet high and should be in harmony with the adjacent building.

(Fig. 8.8)

8.5.3 Trash and garbage collection areas must be located a minimum of 25 meters (82 feet) from troop billeting, family housing areas (containing more than 12 units), and stand-alone retail facilities (UFC 4-010-01, Table B-1).

8.6 NOT USED

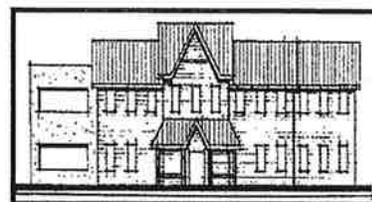


Fig. 8.8 – Screened Loading Dock

8.7 NOT USED

8.8 INDIGENOUS STRUCTURES

Sustainability in the design and construction of buildings includes incorporating time-proven building designs that are indigenous to the region. Indigenous design elements should be utilized in the design of new buildings (Fig. 8.11).



Not This This
Fig. 8.10 – Renovation/ Additions
should be Compatible.



Fig. 8.11 – Building with Stucco Finish

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8.14.1.2 Use the following guidelines when selecting exterior building materials.

8.14.1.2.1 Choose materials for their longevity and maintenance characteristics.

8.14.1.2.2 Use materials with integral colors - avoid painting exterior colors.

8.14.1.2.3 Use installation standard colors for exterior walls. Add accent colors sparingly. Accent colors can be used in recesses and to accent certain portions of a buildings façade.



Fig. 8.21 – The Medical Center at WBAMC

8.14.1.2.4 Exposed exterior materials shall not require periodic repainting. Preferred materials are factory prefinished, integrally colored, or have similarly intrinsic weathering finishes. Ferrous metals shall not be exposed to the weather unless prefinished with a protective coating that has a minimum 20-year warranty.

8.14.1.2.5 Use dark bronze anodized aluminum for exterior windows. Use dark bronze anodized aluminum storefront doors for Main Entrance doors.

8.14.1.2.6 ~~Use blended colors, T lock type, on shingle pitched roofs;~~ fully adhered white 45 mil chlorosulfonated polyethylene (CSPE) or 60 mil Thermo Plastic Olefin (TPO), ¼” to 12” slope for “flat” roofs.

8.14.1.2.7 If a stucco look is desired, more durable materials such as EIFS or stucco-like finish on prefabricated metal panels or concrete panels shall be used. If EIFS is used a heavy duty reinforcing mesh shall be used around all doors and window openings, and extend a minimum 8’0” above finished floor elevation on all exterior walls. The heavy duty reinforcing mesh used on the EIFS shall have a minimum combined weight of 20 ounces per square yard and this standard can be met by using two layers. Use high impact mesh on all other surfaces.

8.14.1.2.8 NOT USED

8.14.1.2.9 Metal, wood, or vinyl siding should not be used. Vinyl or wood trim should not be used.

8.14.1.2.10 Satellite dishes, whether roof mounted or ground mounted, are not allowed. This requirement does not apply to Family Housing, nor to McGregor Range.

8.14.1.2.11 Not Used.

8.14.2 Appendix K, Exterior Materials Charts list the building materials applicable to the visual zones listed. – Under Development

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8.14.3 Exterior Building Color

8.14.3.1 Color charts have been developed for specific geographical areas giving consideration to climate, geography, culture, facility function, historical context, architectural character, etc. Color changes will be implemented during normally scheduled paint cycles (see [Appendix L, Exterior Color Charts – Under Development](#)).



Fig. 8.22 - The Geographical Areas for Exterior Colors.

8.14.3.2 Color is closely linked to the appropriate selection of exterior building materials and is a critical design element in relating adjacent buildings and creating a compatible visual environment within an installation.

8.14.3.3 Overhead doors color shall be light beige or white.

8.14.3.4 Historic Buildings. Repaint the building or structure to match the existing colors or colors that can be documented to have been used on that building.

8.15 KEY FACILITY TYPES STANDARDIZATION

8.15.1 The Assistant Chief of Staff for Installation Management (ACSIM) establishes Army facility standards and approves deviations from the standards.

8.15.2 Residential Communities Initiative

8.15.2.1 The intent of the Residential Communities Initiative (RCI) is to improve the housing for military families by providing quality housing in attractive neighborhoods.

8.15.2.2 The Military Housing Privatization Initiative (MHPI) legislation allows developers to build and renovate housing to local standards. In those areas where local standards do not meet the quality of life requirements of soldiers, the Community Development and Management Plan (CDMP) process allows a negotiated determination of those standards. To ensure a uniform level of quality throughout RCI, Headquarters, Department of the Army has developed new construction and renovation standards for RCI family housing to be used as reference points during CDMP preparation. These standards are routinely updated. Revisions apply to CDMP collaboration contracts awarded within specific time frames and are not retroactive to previous projects.

8.15.2.3 All RCI projects planned or under design will meet the "Gold" SPiRiT rating (as of 18 March 2003). See [Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003](#).

8.15.3 Not Used

8.15.5 Army Lodging.

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SECTION 10

LANDSCAPE DESIGN STANDARDS

10.1 INTRODUCTION

10.1.1 The Landscape Design Standards includes selection, placement, and maintenance of plant material on the installation. Landscape plantings provide a simple and cost effective enhancement to the general appearance of the installation.

10.1.2 The visual image conveyed by a military installation is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation.

10.1.3 Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses.

10.2 LANDSCAPE OBJECTIVES

10.2.1 The overall objective of the use of plant material within the installation is to improve the physical and psychological well being of the people who live and work on the installation. This is achieved through the following objectives:

10.2.1.1 Preserve and enhance natural desert terrain where applicable.

10.2.1.2 Because trees are the largest and most visible vertical elements in the landscape, the most benefit to the appearance and physical environment of the Fort Bliss is achieved through the addition of trees. Trees must be the primary element and type of plant material in the Fort Bliss landscape to conserve water and minimize maintenance. Use shrubs and ground cover primarily as accent elements to delineate building entrances and special outdoor spaces such as plazas and patios, and at vehicular entryways.



Fig. 10.1 -Use Locally Adapted Plants to Improve Visual Quality

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Improve the overall visual quality of the installation through the use of native or locally adapted plant material to (Fig. 10.1):

10.2.1.2.1 Blend built environment with the natural environment.

10.2.1.2.2 Provide scale and comfort to pedestrian environments (Fig. 10.2).

10.2.1.2.3 Reinforce the hierarchy of the circulation system (Fig. 10.3).

10.2.1.2.4 Screen unsightly views or elements.

10.2.1.2.5 Buffer incompatible land uses.

10.2.1.2.6 Minimize maintenance through the use of native plant materials that require less maintenance to survive.

10.2.1.2.7 Enhance antiterrorism capabilities.

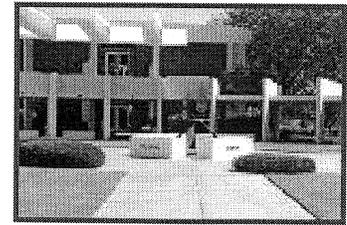


Fig. 10.2 – Provide Comfort to Pedestrians

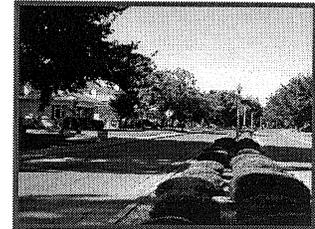


Fig. 10.3 - Landscaping Reinforces Circulation Hierarchy.

10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

10.3.1 Landscape design is based on the following principles.

10.3.1.1 **Unity.** The selection and placement of plant material can blend, screen, and soften incompatible architectural or other unattractive visual impacts. Plant material as a unifying element can be placed in front of a building or view to frame and enhance the visual impact.

10.3.1.2 **Balance.** Except in some historic areas, informal planting designs which utilize masses of plant materials rather than rows and hedges are most desirable. Not only do such designs offer more visual interest, but, generally, they require less maintenance. Also in an informal design, when one or a few plants die, the design intent is less likely to be lost than in a formal design.

10.3.1.3 **Contrast.** Plant material can be selected and placed to provide differences in size and shape that add interest to the environment. Plants can be located to provide a backdrop for other plants such as by placing a hedge behind a bed of annuals or perennials.

10.3.1.4 **Rhythm.** Repetition of a single plant or a mass of plants provides visual interest and formality to the landscape. Rhythm

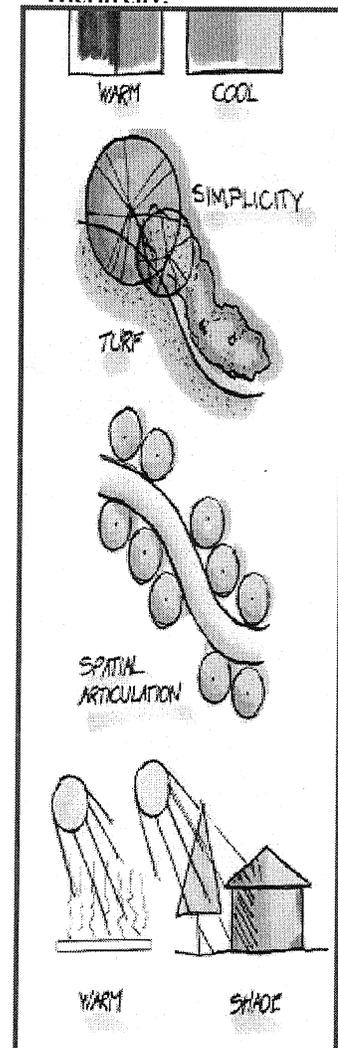


Fig. 10.4 - Principles of Design

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produces emphasis and unity and is especially effective in articulating main circulation routes.

10.3.1.5 Color and Texture. Plants can be selected and placed to provide visual interest according to their color and texture. Colors are classified as either warm (red, orange, yellow) or cool (violet, blue, green). Texture is classified as either coarse or fine.

10.3.1.6 Simplicity. Landscape plans should be broad and simple in form to limit excessive maintenance. Plants usually look better and achieve more impact when massed than when used alone. When groups of seven or less plants are used, odd numbers of plants make the most pleasing masses. Groups or clusters of plant materials should also be visually connected to successfully delineate space. Overspacing causes the composition to appear disjointed and is likely to increase maintenance.

10.3.1.7 Ultimate Effect. The landscape plan should be prepared with consideration for the mature size of all plants. The spacing of all material should utilize nursery industrial standards for mature material to account for spread as well as height. The ultimate height of the material should also be considered in relation to windows and other visual concerns.

10.3.1.8 Spatial Articulation. Plants can be selected and placed to create enclosed spaces or to separate spaces from one another. They can also be used to direct people by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement is dependent upon the density, form, and type of plants used.

10.4 SUSTAINABLE LANDSCAPE DEVELOPMENT

10.4.1 The use of plant material on the installation promotes the sustainability. Trees, shrubs, groundcover, and vines provide aesthetic appeal, energy conservation, climate modification, erosion control, air purification, wind/dust mitigation, reduction of glare and noise abatement (Fig. 10.5).

10.5 LANDSCAPE DESIGN GUIDELINES

10.5.1 Proposed plantings must be reviewed to ensure that site conditions (soil, topography, adjacent uses, and architecture) and climatic criteria (sun, shade, and moisture requirements) are considered in the desired plant design and selection (i.e., form, texture, color, size). The uses and users of the site must also be considered. Landscape planting plans should be approved by qualified personnel to provide quality assurance and promote design consistency within each visual zone.

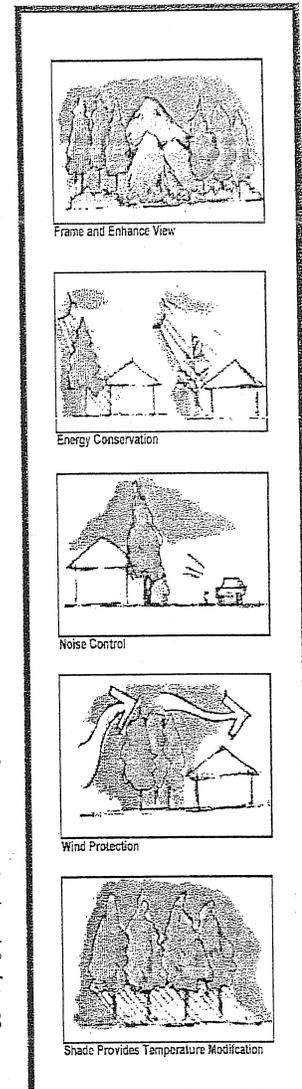


Fig. 10.5 - Plant Material Promotes Sustainability

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10.5.2 The following paragraphs present landscaping guidelines for the various locations of plant material use.

10.5.2.1 **Foundation Planting.** To conserve water and minimize maintenance, trees must be the primary element and type of plant material in the Fort Bliss landscape. Because trees are the largest and most visible vertical elements in the landscape, the most benefit to the appearance and physical environment of the post is achieved through the addition of trees (Fig. 10.6).

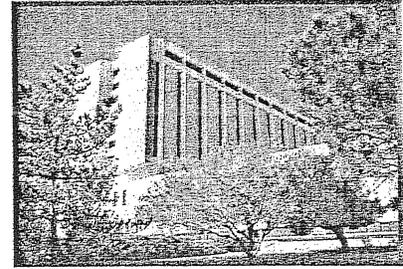


Fig. 10.6 – The Medical Center at WBAMC

10.5.2.1.1 Focal and seasonal plantings should be located at building entries for pedestrian interest.

10.5.2.1.2 Use the architecture of the building to evaluate the planting design and selection of plants.

10.5.2.1.3 Plant materials should not block windows and views from interior spaces.

10.5.2.1.4 Trees shall be set back from the building walls to provide space for mature growth and to prevent root systems from damaging the foundation.

10.5.2.1.5 Except in some historic areas, informal planting designs which utilize masses of plant materials rather than rows are most desirable.

10.5.2.1.6 Due to the possibility of insect problems (bee stings, etc.), do not plant flowering plants near entrances.

10.5.2.2 **Screening.**

10.5.2.2.1 **Windscreens.** Measures to mitigate high winds and blowing dust must be considered for very large open areas such as parking lots, perimeter open space areas and recreational areas. Plant materials can be used for wind control by breaking, directing or filtering the wind. Use a combination of evergreen and deciduous trees to provide windbreak protection from prevailing winds. Windbreak plantings should be irregular in form, rather than straight and evenly spaced, in order to provide more effective wind control and to visually blend with the natural character of the installation.

10.5.2.2.2 Not Used.

10.5.2.3 **Buffer Planting.** Use a mixture of evergreen and deciduous trees and shrubs to visually separate land uses and to help separate visual zones or to screen unpleasant views or noises (Fig. 10.7).

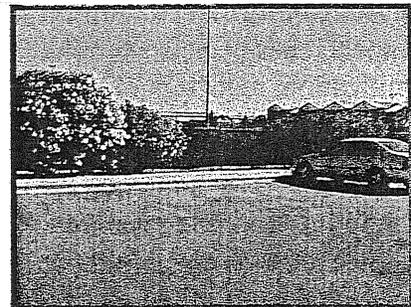


Fig. 10.7 – Buffer Planting

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10.5.2.4 Open Space Planting / Natural Recovery Areas. The preservation and enhancement of existing landscape is encouraged (Fig. 10.8).

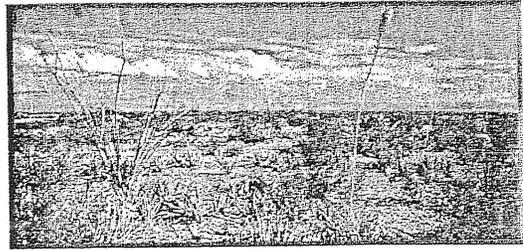


Fig. 10.8 – Desert Vegetation

A program directed to allow natural recovery in almost 100 large open areas on Fort Bliss is ongoing (Fig. 10.9). The main objective is to suppress dust emissions from these areas during wind events that are common in the region. Dust is a nuisance for people in many ways: it increases the need for cleaning inside homes and working spaces, creates accumulation of soil around buildings and against walls, and commonly produces a safety risk factor as visibility is greatly reduced for motorists (Fig. 10.10).



Fig. 10.9 - Natural Recovery Area

There are more than 40 locally adapted plants that are able to get established naturally in open soil, including native and exotic species, which can live with natural rainfall. This eliminates the need for maintenance.

The following is a list of recommended actions to promote both natural vegetation recovery and aesthetics in these open areas. This approach is applicable to any open areas where the soil has been disturbed.

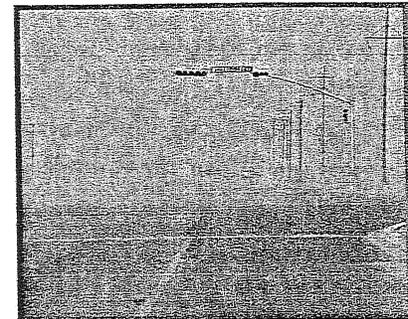


Fig. 10.10 – Dust Problem

Initial preparations. Level soil to desired grade, leaving a rough surface so it traps seeds and retains moisture. Do not disturb ground except to conduct the maintenance described below. Soils left alone, even without vegetation, produce less dust than disturbed surfaces.

Year 1 and 2. Conduct bush-hogging at 8 inches in August and November to cut off the tops of taller vegetation and protect low-growing plants. This will allow them to grow and produce new seeds. Any undesirable tumbleweeds that proliferate during this period will be gradually outcompeted by other native vegetation and can be controlled by bush-hogging.

Year 3. If tumbleweeds are still present, mow at 8 inches in August and November. If these plants are nearly absent, mowing may be optional to improve area appearance. Do not mow less than 6 inches high.

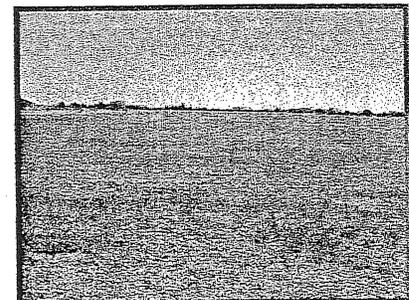


Fig. 10.11 - Ground Covered by Natural Vegetation in a Natural Recovery Area

Year 4 and on. Areas may be left undisturbed to protect vegetation cover and soil. Dust emissions should be greatly reduced or eliminated by this time. To improve appearance in highly visible areas mowing to 6 inches may be conducted in June or November.

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It is not recommended to clean the edges of areas with weed-eater machines that re-expose the soil. This promotes the establishment of tumbleweeds along the perimeters, creating more work to remove them, as they are a source for seeds that may invade recently-recovered areas.

10.5.2.5 Street Trees. Street tree plantings should be used to reinforce vehicular hierarchy, orient and direct traffic, upgrade views, and to visually de-emphasize on-street parking (Fig. 10.12). Also, in the design of a street tree planting, separate plant species may be used to identify distinctive details or areas of the installation, for example, a particular land use relationship, historical district, community area, or other similar entity.

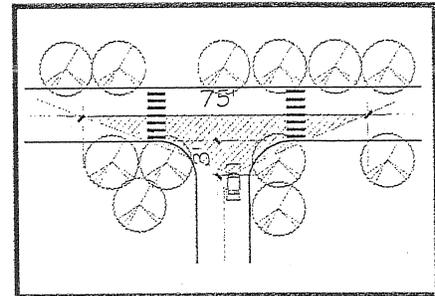


Fig. 10.12 – Use Street Trees to Visually Reinforce Road Hierarchy

10.5.2.5.1 Except in some historical areas, where specific landscape guidelines apply, use Mondel Pine, Afgan Pine, Honey Mesquite, Washingtonia Palm Tree, and Desert Willow street trees in clusters to visually reinforce primary and secondary roads (Fig. 10.13).

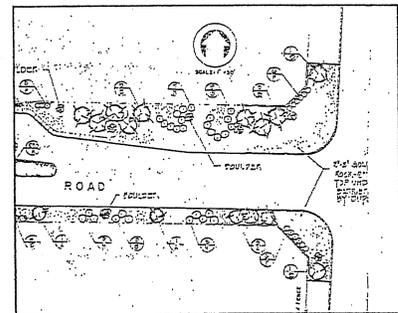


Fig. 10.13 - Trees and Plants in Clusters.

10.5.2.5.2 Except in some historic areas (where specific landscape guidelines apply), use informal groupings of street trees along tertiary routes. Utilize medium size trees to screen on-street parking along roadways. Set trees 1 to 2 meters (3 to 6 feet) from the back of curbs.

10.5.2.5.3 As a general rule, street trees should be resistant to salt and root pressure, and should have a 10' to 12' high clearance between the street pavement and branch height to allow adequate clearance for pedestrian and vehicle traffic to pass unimpeded by lower branches.

10.5.2.5.4 The street tree layout should be coordinated with the layout of proposed street lighting.

10.5.2.5.5 Appropriate plant heights should be used within sight triangles to ensure safe views from intersections.

10.5.2.5.6 Weeping trees should not be used where they may hang over roadways or block views.

10.5.2.6 Parking Lot Planting. Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berms can greatly improve the appearance of these areas, while helping to define circulation and reduce heat gain during summer months (Fig. 10.14).

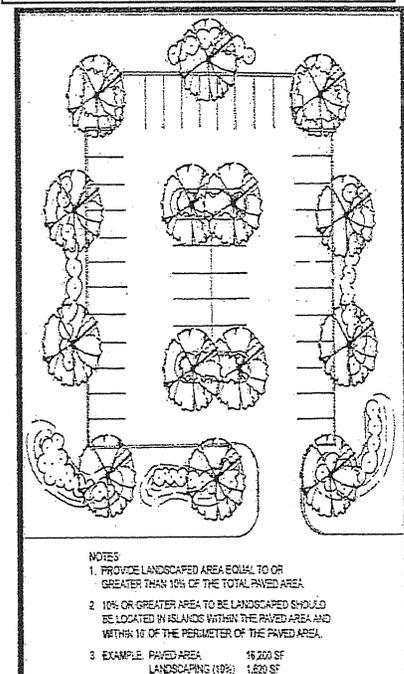


Fig. 10.14 - Provide Parking lot Planting to Reduce Heat Gain

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- 10.5.2.6.1 Use shade tree plantings at parking lots to reduce glare and moderate ambient air temperatures on the lot. Optimum spacing of parking lot shade trees is 10 to 12 meters (35 to 40 feet) on center.
- 10.5.2.6.2 Choose trees and shrubs that require minimum maintenance and will not litter the parking area with leaves, fruit, or nuts.
- 10.5.2.6.3 Consider sight distances near entrances and exits when selecting and placing plant material.
- 10.5.2.6.4 Select trees, shrubs, and ground covers that can withstand harsher conditions, such as sun, glare, heat, and reduced water supply.
- 10.5.5.6.5 Use a mix of evergreen and deciduous plant material to screen parking areas from adjacent uses.
- 10.5.2.7 Environmental Control Planting. When properly placed, plants can provide environmental benefits, as well as address visual concerns.
- 10.5.2.7.1 Use deciduous trees and shrubs at courtyards, buildings and along streets to provide shade, moderate temperatures and reduce glare during the summer months while allowing solar exposure in the winter.
- 10.5.2.7.2 Locate deciduous plantings on the southeast and southwest corner of buildings or courtyards to mitigate solar radiation and glare due to heat build-up and lower sun angles in the mid-morning and late afternoon hours.
- 10.5.2.7.3 Use mixed massings of deciduous shrubs and evergreen trees and shrubs to provide sound control along primary and secondary roads.
- 10.5.2.8 Image Planting. The image of the installation is formed by the visual impressions that exist within the installation. The primary locations of highly visible images are the main gate, along primary circulation systems, and at areas of high concentrations of people. Features such as signs, statues, static displays, and other primary visual images can be improved by the use of trees, shrubs, and ground cover.
- 10.5.2.9 Entrances to the Installation. The entrances and streetscapes into the installation are areas to place landscaping that will develop a strong visual image and provide visual interest during all four seasons. The entrance to the installation creates the first visual impression for the visitor.
- 10.5.2.9.1 The landscape materials and planting areas should be proportional in scale to the hierarchy of the street on which they are located.
- 10.5.2.9.2 Landscaping must be integrated with the Force Protection requirements of Section 12. Low shrubs, groundcover, annual/perennial plants and canopy trees provide

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seasonal interest as well as maintain views required to ensure force protection measures. Adequate lines of sight must be maintained for guard personnel to observe vehicular and pedestrian traffic approaching the gate.

10.5.2.10 **Zeroscaping.** Zeroscaping is the use of only inert materials such as rock, gravel, bricks and pavement. When absolutely necessary, zerospacing may be the only option. For a zeroscape installation, landscape rock or gravel will be underlaid with 6-mil plastic. Finished surface is to be 1" below top of curbs and paving. Landscape rock will be 1" – 1.5" and approximately 2" deep. 1" fines will be placed on the plastic to keep the rock from tearing it. Pea gravel is not desirable in areas where pedestrians walk. (Note: Zeroscaping is not the same as "Open Space Planting and Treatment Management" described in 10.5.2.4.)

10.5.2.11 **Xeriscape.** Xeriscape is the use of water-saving landscape designs incorporating desert-adapted plants. It may also include sections of rock landscapes that are typical of zeroscaping (para 10.5.2.10). Instead of 6-mil plastic use woven polypropylene weed barrier. Creative xeriscapes not only look attractive, but also save money, water and maintenance. All tree/plants in a xeriscape installation will be provided with automatic drip irrigation.

10.6 PLANT MATERIAL SELECTION

10.6.1 Trees, shrubs, ground cover and turf are the major elements of a planting composition. Basic plant selection criteria should consider creating a unified composition utilizing native materials for low maintenance and sustainability, avoiding incompatible colors, textures and forms, and matching the appropriate plant to the land use, situation, and environmental condition. Also, plantings in designated historic areas only should follow the Fort Bliss Landscape Handbook for Historic Residences.

10.6.2 The ability of plant material to provide lasting benefit is dependent upon the plant's hardiness and its appropriateness to the site use. Major factors affecting plant hardiness are soil type and organic content, temperature, moisture and light. These climatic conditions can be modified to an extent by specific site conditions, such as wind protection, solar orientation, and planting design, to create microclimates.

10.6.3 Selecting appropriate plants for a given condition is only one aspect of planting design. Compositional arrangement to provide texture variety and to accent site and building features is another. The selection and composition of a planting design requires an understanding of each plant's characteristics, form, and environmental needs as well as how each plant can relate to and complement other plants in the design. Plants are used in four basic design categories (Fig. 10.15):

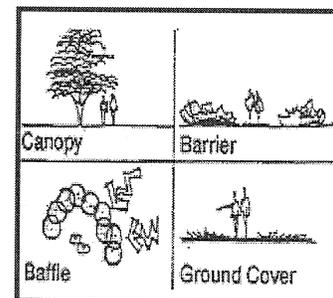


Fig. 10.15 - Four Basic Design Categories

- Canopy
- Barrier
- Screen (or Baffle)

APPENDIX CC

Waste Management Documents

El Paso and Regional Recyclers

<http://www.yellow.com/>

http://www.cleantexas.org/index.cfm?fuseaction=public.memberprofiles_bymembername_rtolquery1

<http://www.tceq.state.tx.us/assistance/P2Recycle/renew/renew.html>

Company	Address	Phone	Notes
Acoustic Tile			
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Cardboard/Paper/Fiber			
Durango McKinley Paper Co	1520 Myrtle Ave., El Paso	915-351-7970	drop off services available
Master Fibers Inc.	1710 East Paisano Dr., El Paso	915-544-2299	drop off services available, top prices paid for cardboard, customized recycling program
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Carpet/Carpet Tile			
Sunshine Padding and Foam	8172 Elder Creek Rd, Sacramento, CA 95824	916-383-5213	accepts carpet, padding, foam, mail in program
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Landfill/Hauling/Collection			
Duncan Disposal/Alpine	3001 Old Marathon Hwy., Alpine, TX 79830	432-837-1244	Hauling, Collection, Landfill (approx 200 miles from El Paso)
Charter Landfill	12035 West Murphy St., Odessa, TX 79763	432-381-4722	landfill (approx 240 miles from El Paso)
Duncan Disposal/Midland	8220 West Hwy. 80, Midland, TX 79706	432-563-5060	Hauling, Collection (approx 260 miles from El Paso)
Saguaro Environmental Svcs	5055 South Swan Rd, Tucson, AZ 85706	520-745-8820	Hauling/Collection (approx 260 miles from El Paso)
Duncan Disposal/Lubbock	1408 N. Martin Luther King Blvd., Lubbock, TX 79403	806-762-6464	Hauling, Collection (approx 300 miles from El Paso)

Company	Address	Phone	Notes
San Angelo Landfill	1422 Hughes Ave., San Angelo, TX 76903	325-655-6869	landfill (approx 360 miles from El Paso)
TrashAway Svcs Duncan San Angelo	1422 Hughes Ave., San Angelo, TX 76903	325-653-6957	Hauling, Collection (approx 36 miles from El Paso)
Metal			
American Metal Recycling	11201 Alameda Ave., Socorro, TX	915-859-4916	
Asa Recycling	1042 Eastside Road, El Paso	915-779-3326	drop off services available
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
El Paso Iron and Metal	1535 East San Antonio Ave., El Paso	915-532-6981	
Lopez Scap Metal, Inc.	351 North Nevarez Rd., El Paso	915-859-0770	drop off services available
Lucero Scrap	10717 Alameda Ave., Socorro, TX	915-872-9880	pick-up services available, provide containers
M&M Metal Inc.	12751 Pellicano Dr., El Paso	915-852-2080	
Shapiro Sales Co	206 Dodge Rd., El Paso	915-881-1991	drop off services available
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
W Silver Recycling, Inc.	1720 Magoffin Ave., El Paso	915-532-5643	Container and trailer service available
Environmental Center	800 South Piedras, El Paso	915-593-2784	
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Plastics			
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
National Recycling, Inc.	10400 Griffin Rd., Suite 101, Cooper City, FL, 33328	954-680-8802	buy, sell, offers waste stream solutions,
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
United Plastics Services	12572 Darrington Rd., Suite 10, Horizon City, TX	915-851-9460	
Environmental Center	800 South Piedras, El Paso	915-593-2784	#1, #2
FDA Packaging	2355 Nevada St., Las Cruces, NM 88001	505-524-1997	#6
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
The Alliance of Foam Packaging Recyclers	2128 Esprey Court, Crofton, MD 21114	800-944-8448	packing peanuts, other forms of packing material, foam
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	#1, #2
Diversified Plastics Recycling	7340 State Road 245 East, North Lewisburg, OH 43060	937-747-3040	#1, #2, #4, #5, #6, #7

Company	Address	Phone	Notes
Propoly	Marlboro, NJ 07746	732-431-2200	#1, #2, #3, #4, #5, #6, #7
Wood			
Custom Crates and Pallets	1501 Westway Blvd., Canutillo, TX	915-892-2660	
Forproducts Corp	3624 East Gateway, El Paso	915-532-6710	pulpwood
Kastro's Wood Pallets, Inc.	13781 Davidson Blvd., El Paso	915-855-8011	
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Unknown Material			
Alpha Recycling	1820 East Mills Ave., El Paso	915-313-0333	drop off services available
Border Trading, Inc.	6940 Commerce Ave., El Paso	915-775-2546	drop off services available
Gandara's Recycling	10721 North Loop Dr., Socorro, TX	915-860-9596	drop off services available
Haro's Company, Inc.	11369 Alameda Ave., Socorro, TX	915-851-2028	drop off services available
Newell Recycling of El Paso	6800 Market Ave., El Paso	915-772-2728	
RG&M	11309 Alameda Ave., Socorro, TX	915-851-0995	drop off services available



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New Construction Waste Management

Plans and Methods



Army Policy on Waste Management

- 50% diversion (by weight) from landfill of construction and demolition waste for all Army projects.
- Waste type and quantities must be tracked, documented, and upward reported (SWAR)



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Contract Requirements for Waste Management

- 50% diversion (by weight) from landfill of construction and demolition waste
(01010, Section 6)
- A Waste Management Plan is required
(01355 Environmental Protection Plan)



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Added Bonus

- **The two easiest LEED credit points:**
 - Automatically pick up LEED Credit MR 2.1
(Achieve 50% diversion of C&D waste from landfill)
 - With little effort, pick up LEED Credit MR 2.2
(Achieve 75% diversion of C&D waste from landfill)



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Management Plan

- Section 1 – Company Philosophy
- Section 2 – Project Waste Management Goals
- Section 3 – Communication Plan
- Section 4 – Expected Waste Streams, Disposal, and Handling



How to Meet Army and USACE Waste Management Goals (WMP Section 2)

- Prevent – don't create/promote the waste in the first place
- Reduce – reduce the amount of waste generated for a given material/element
- Reuse – reuse scrap
- Recycle – send back to the company for remanufacturing or to a recycling facility



Prevention

- Pre-fabrication/Pre-cut – manufacture to exact dimensions
- Accurately order the amount of material needed
- Measure carefully to avoid end cuts
- Store materials so they are not damaged



Reduce

- Order and ship in bulk where possible, avoiding excess packaging
- To encourage efficient use of materials, avoid paying installers on the basis of smaller units of measure (i.e. sq. ft. instead of sheet)
- GCs include similar recycling/diversion requirements in subcontracts (incl. Mgmt Plans, monitoring, and documentation).



Reuse

- Save sizeable pieces for use elsewhere
 - carpet tiles piece from one edge may fit at the edge of another location
 - wallboard pieces can be used around doors and windows
 - lumber pieces can be used as spacers or blocking
 - Reuse PVC cut-offs for use as stubs for wall drains
- Optimum Value Engineering for wood construction



Recycle

- Concrete/Asphalt/Masonry
- Drywall/Gypsum
- Metal
- Plastics
- Cardboard/paper/fibers
- Site/Landclearing Debris
(vegetation, soils)
- Wood
- Glass
- Carpet/Carpet
Tile
- Paints
- Floor Tile
- Acoustical Tile



Ft. Bliss Resources

- Now
 - Cardboard/paper – Ft. Bliss can accept small quantities of paper and cardboard for recycling
- Future
 - Clean wood – Ft. Bliss owns a shredder, but no end use of shredded material is currently identified.
 - Soil – provide native fill material, accept native soil
 - Concrete/Aggregate/Asphalt/Masonry



Site Handling

- Interior collection containers in centralized convenient locations for the trades.
- Exterior recycling containers clearly labeled and located in convenient locations for the trades.
- For pieces of materials to be reused – make sure the trades know where they can find these materials.



Site Handling

- Keep garbage out of interior and recycling containers.
- Provide frequent and well labeled garbage containers, both interior and exterior.
- Training and Communication
- Whole Building Design Guide Construction Waste Management Resource Page (www.wbdg.org/design/cwm.php)



Keeping Track

- Collect and organize documentation from receiving facilities (weight tickets, reports)
- Obtain/Estimate weights for those items not taken to a facility (elements returned to manufacture, wood taken to Ft. Bliss for mulching, etc.)
- Organize incoming information daily (DCQCRs, Excel spreadsheet)
- Keep quarterly (Dec, March, June, and Oct) and final (end of project) reports in mind
 - keeping track daily/regularly will make the final report easy.



Government Oversight

- Plan-Do-Check-Act
- Review and approval of Waste Mgmt Plan prior to start of construction.
- QAR will check regularly interior and exterior collection bins to confirm appropriate use.
- QAR will ask regularly to see your tracking document/notebook/file.
- QAR will conduct periodic quick calculations to confirm that waste diversion is on track.
- Final waste report – diversion calculation must be verifiable (values easily matched to waste documentation)



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Questions?



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of Engineers.

Need Help?

Elizabeth Chien

206-764-6718

206-499-6119 cell

Elizabeth.A.Chien@usace.army.mil

Tom Napier

217-373-3497

Thomas.R.Napier@usace.army.mil

Tips to improve Reduce, Reuse, and Recycle

Material	Planning	On-Site
General	<ul style="list-style-type: none"> > Order products with recycled content. > To reduce waste and cost, accurately order in the amount of material needed. > Request suppliers to limit packaging. > Ask your vendors to take non-recyclable packaging back for reuse. > Use larger pieces elsewhere on the project (fillers and shorter pieces can be used to fill in). 	<ul style="list-style-type: none"> > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Concrete	<ul style="list-style-type: none"> > Use concrete mix containing fly ash as part of the cementitious content of the concrete. > Request CMUs that contain recycled content from your supplier. 	<ul style="list-style-type: none"> > Separate and recycle asphalt and concrete. > Use reusable forms and supports to the maximum extent possible. > Reuse removed crushed concrete and asphalt as aggregate, sub-base material or fill. > Designate a location for excess concrete for use in paving, post footing anchorage, reinforcement, etc. > Store materials so that they are not damaged or discolored.
Drywall	<ul style="list-style-type: none"> > Order drywall with recycled content gypsum. > To reduce waste and cost, accurately order in the amount of material needed. > To encourage efficient use of materials, avoid paying installers on the basis of sheets of material installed (try using sq. ft. installed instead). 	<ul style="list-style-type: none"> > Store materials so they are not damaged. > Measure carefully to avoid end cuts. > Separate and recycle waste drywall. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Save sizeable pieces of drywall for use around doors, windows, or built-ins, or for reuse on another job.
Electrical	<ul style="list-style-type: none"> > Order plumbing and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Separate and recycle cardboard. > Separate and recycle metals and wire. > Separate and recycle plastics, such as PVC pipe. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.

Material	Planning	On-Site
Mechanical	<ul style="list-style-type: none"> > Order electrical, plumbing, and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Try precut and prefabricated components such as commercial heating and cooling ductwork or commercial sprinkler systems. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Separate and recycle cardboard. > Separate and recycle plastics, such as PVC pipe. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Plumbing	<ul style="list-style-type: none"> > Order plumbing and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Retain PVC cut-offs for use as stubs for wall drains. > Properly clean joints to prevent leaking. > Separate and recycle plastic, including PVC, if possible. > Separate and recycle cardboard. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Site/Landclearing	<ul style="list-style-type: none"> > shred vegetation for reuse in project landscaping. > design landscaping that reuses stone. 	<ul style="list-style-type: none"> > Separate and recycle asphalt and concrete/masonry. > Sell all marketable trees designated for removal. > Grind, chip, or shred other vegetation for mulching and composting. > Separate stumps, brush, and other wood waste for recycling. > Separate and recycle rebar and other metals. > Reuse removed crushed concrete and asphalt as aggregate, sub-base material or fill. > Provide on-site locations for as much excavated rock, soil, and vegetation as possible.

Material	Planning	On-Site
Wood	<ul style="list-style-type: none"> > To reduce waste and cost, accurately order the amount of material needed. > Use larger pieces elsewhere on the project (fillers and shorter pieces can be used to fill in). > Use building systems such as modular systems or foam-core panels that minimize the use of wood (systems that contain recycled wood chips or wood from small diameter secondary trees). 	<ul style="list-style-type: none"> > Segregate bits and ends for recycling from useable pieces to be used elsewhere. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts. > Save sizeable pieces of wood in a central area for use as spacers, blocking, kindling, or for use on another job. > Designate a central area for end-cuts and damaged wood, making it convenient for carpenters to find and use scrap wood.

CONSTRUCTION / DEMOLITION SWARWeb PICKLIST		
MAJOR CATEGORY	SUB-CATEGORY	DEFINITION
Wood		
	Structural	TBD
	Finished	TBD
	Treated	TBD
	Other (C/D Wood)	TBD
Metal		
	Steel	TBD
	Copper	TBD
	Aluminum	TBD
	Mixed Metal	TBD
	Other (C/D Metal)	TBD
Masonry/Asphalt/Concrete/ Stone		
	Asphalt	TBD
	Brick	TBD
	Concrete	TBD
	Concrete Block Unit	TBD
	Stone	TBD
	Other (C/D Masonry/Asphalt)	TBD
Land Clearing Debris		
	Top Soil	TBD
	Sub Soil	TBD
	Petroleum-Contaminated Soil	TBD
	Non-Hazardous Lead-Contaminated Soil	TBD
	Vegetation/Timber (tree trunks & limbs)	TBD
	Crushed Stone/Base	TBD
	Other (C/D Land Clearing)	TBD
Other		
	Siding	TBD
	Composition Roof	TBD
	Insulation	TBD
	Doors/Windows/Stairs/Cabinets	TBD
	Ceiling Tile	TBD
	Gypsum/Plaster	TBD
	Plastic	TBD
	Glass	TBD
	Paper	TBD
	Other (C/D Other)	TBD
Additional Information		
Project Number		
Building Number(s)		
Reuse (Installation)		
Reuse (Off-Site)		
Recycle (Installation)		
Recycle (Off-Site)		
Bury (Installation)		
Bury (Off-Site)		
Dispose (Installation)		
Dispose (Off-Site)		
Other		
Source: Army Environmental Center, Charles Harris, (410) 436-1224, charles.harris2@us.army.mil		

Non- Hazardous Waste Management Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to reduce solid waste generation.
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. Identification of waste streams, including estimated types and quantities, of the waste to be generated.
- e. Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
- f. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled. Recycling facilities that will be used shall be identified. If a recycling facility (public or private) exists within a 50 mile radius of the project site, its use is required for all materials that facility accepts and that cannot be otherwise reused.
- g. Identification of materials that cannot be recycled/reused with an explanation or justification.
- h. Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Hazardous Waste Management Plan (in addition to the requirements above)

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points,

or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).

d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).

e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).

f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).

g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).

h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, a statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).

i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.

j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.

k. LDR forms. This should provide copies of the LDR forms from the proposed receiving facilities.

l. Recycling Facilities. This should discuss how the waste is to be salvaged, reused, and/or recycled. The name, address, and phone number of the facilities proposed for waste diversion should be provided.

Waste Management Plan Template

Section 1. Company Mission Statement/Company Philosophy and Organization

- a. Philosophy – basic company approach to waste management (i.e.: prevent, reduce, reuse, recycle, dispose)

Section 2. Project Waste Management Goal

- a. Contract required goal.
- b. Specific actions that will be taken to prevent or reduce solid waste generation. This includes identifying those companies providing material and equipment that are willing to accept the return of the resulting waste product after installation (floor tiles, ceiling/acoustical tiles, carpet tiles, etc.). Also identify material/companies willing to send large quantities of items in bulk, rather than individually wrapped (box of 200 door knobs instead of individually wrapped door knobs, pallets of stacked floor tiles instead of box of 12 floor tiles).
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled.
- e. Identification of materials that cannot be recycled/reused with an explanation or justification.

Generally, it's better (more resourceful) to reduce, than to reuse, and better to reuse than to recycle. However, it's not realistic to eliminate all waste, or salvage all materials not used on a particular job. Following is our Waste Management Plan.

Reduce means to prevent waste before it happens. You can reduce waste significantly on a construction project by “tweaking” your practices a bit; this means designing in less waste to begin with and minimizing damage and inefficient material use.

Reuse means to reuse materials as much as possible in your construction project. This includes:

- Materials removed during demolition
- Scrap generated on site
- Used materials or scraps from other jobs

Recycle means to separate recyclable materials from non-recyclable materials and supply them to a hauler or business so they can be processed and used to make new products. Another aspect of recycling is to Buy Recycled. Buying building materials with recycled content helps develop a market for the waste materials you recycle from your job site and “closes the loop.”

Section 3. Communication Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to communicate waste management issues throughout the project.
- c. Specific actions that will be taken to communicate the waste management plan and procedures to new employees/subs.
- d. Specify where containers will be placed, how they will be labeled, how waste management practices will be enforced (acceptable and unacceptable items and practices), and how this information will be communicated to the site staff.
- e. Specific procedures and details on how the waste information (what where, how much, who, how) will be documented, organized, and tracked. This includes all waste streams that are returned, salvaged, reused, recycled, and landfilled.
- f. Specific details on how the waste information will be reported to the government (routinely – weekly? monthly? quarterly? and at project closeout – final total details).

Section 4. Expected Waste Streams, Disposal, and Handling (non-hazardous only)

- a. Identification of waste stream (both diverted and landfilled).
- b. Quantity of each type of waste stream identified.
- c. Receiving facility or entity.
 - o Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
 - o Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- d. Specific site handling procedures.
- e. Identification of transportation method or company.

Example Table Identifying Possible Waste Streams, Quantity, Disposal/Diversion Method, and Handling Procedures

Material	Qty.	Disposal Method (where applicable)	Handling and Transportation Procedure
<i>New Construction</i>			
Concrete	15 cy		Break up concrete onsite with an excavator, load in trucks and haul to Echo Park Recycle
Forming Boards	6 tons	Reused as many times as possible then recycled to Renu Recycling	Stack next to supply of new form boards for reuse. Recycle clean unusable form in "clean wood" recycling dumpster
Clean Wood Scrap	3 tons	Scraps reused for form work, fire-breaks, etc., then recycled by Renu Recycling	Stack reusable pieces next to dumpster for Reuse. Separate unusable clean wood into "clean wood" recycling dumpster (including wood pallets)
CMUs	75 yds	Henson Masonry to recycle and submit report to recycling coordinator	Will request CMUs that contain recycled Content from supplier
Scrap Metal	5 tons	Renu Recycling Service	Deposit all metals in "metal" dumpster
Acoustical Tile			
Floor Tile			
Carpet Tile			
Gypsum/Wall board			
Cardboard			
Plastic			
Etc.			

Section 5. Hazardous Waste Management Plan (in addition to the requirements above)

Be sure to coordinate Hazmat procedures with Tom Curcio (FL DPW) 253-966-6458.

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points, or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).
- d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).
- e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).
- f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).
- g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).
- h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, a statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).
- i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.
- j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.
- k. LDR forms, if required. This should provide copies of the LDR forms from the proposed receiving facilities.

<i>Hazardous Material</i>			
ACM	1500 cyds	XYZ Landfill	Abatement by XXX Abatement Co., transported to landfill by XXX Transport
PCB Ballasts			Stored in drums provided by Ft. Lewis hazmat office at location building XYZ
Flourescent Lamps			
Mercury Switches			
Ozone-Depleting Substances			
Lo-level Rad elements			
Etc.			
Etc.			

APPENDIX DD

Water Quality



Texas Department of Health

1100 WEST 49TH STREET
AUSTIN, TEXAS 78756-3194
(512) 458-7318

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT METALS -

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD
-SDWA PROGRAM MANAGER
ATZC-DOE BLDG 622
FORT BLISS, TX 79916

Laboratory Number: EP216501
Sample Type:
Sample Source:
Entry Points: 001
Collector Remarks:

Date Collected: 10/17/2002
Date Received: 10/18/2002
Date Reported: 11/12/2002

Constituent Name	Result	Units	+/-
Aluminum	<	0.0200	mg/l
Arsenic	<	0.0068	mg/l
Barium	<	0.0492	mg/l
Cadmium	<	0.0010	mg/l
Calcium	<	18.80	mg/l
Chromium	<	0.0100	mg/l
Copper	<	0.0809	mg/l
Iron	<	0.011	mg/l
Lead	<	0.0054	mg/l
Magnesium	<	6.20	mg/l
Manganese	<	0.0020	mg/l
Mercury	<	0.0004	mg/l
Nickel	<	0.0010	mg/l
Selenium	<	0.0032	mg/l
Silver	<	0.0100	mg/l
Sodium	<	110.00	mg/l
Antimony	<	0.0030	mg/l
Beryllium	<	0.0010	mg/l
Thallium	<	0.0010	mg/l
Zinc	<	0.0321	mg/l
Total Hardness as CaCO3	<	72.4	mg/l



Texas Department of Health

1100 WEST 49TH STREET
AUSTIN, TEXAS 78756-3194
(512) 458-7318

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT MINERALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
EL PASO, TX 79916

Laboratory Number: EP216498
Sample Type:
Sample Source:
Entry Points: 001
Collector Remarks:

Date Collected: 10/17/2002
Date Received: 10/18/2002
Date Reported: 12/19/2002

Constituent Name	Result	Units	+/-
Chloride	70	mg/l	
Fluoride	0.9	mg/l	
Nitrate	1.40	mg/l	
Sulfate	66	mg/l	
pH	7.1		
Dil. Conduct (umhos/cm)	720		
Tot. Alka. as CaCO3	134	mg/l	
Bicarbonate	163	mg/l	
Carbonate	0	mg/l	
Dissolved solids	353	mg/l	
P. Alkalinity as CaCO3	0	mg/l	

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT
WATER ANALYSIS REPORT
MINERALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
FORT BLISS, TX 79916-0000

Laboratory Number: EP411262

Sample Type:

Sample Source: CMO 1C

Entry Points: 001

Collector Remarks: NITRATE

Date Collected: 05/13/2004
Date Received: 05/14/2004
Date Reported: 05/19/2004

Constituent Name

Nitrate

Nitrite

NOT TESTED - OTHER

Result Units

1.56 mg/l

Monday, December 12, 2011

1100 W. 49th Street
Austin, TX 78758

Texas Department of Health Trihalomethanes by GC-ELCD

Contact: Gary Fest
(512)458-7552

Submitter ID: 0710078
TDH Lab ID: EP04-11271
Method: EPA 502.2 Rev. 2.1 (THM)
Data File: 05170019.D
QC File: D:\HPCHEM\1\DATA\IO01G0517
Sample Type: Water

Date Collected: 05/13/2004
Date Prepared: 05/17/2004
Date Analyzed: 05/17/2004 8:50
Analyst: M. Gerlach
Dilution Factor: 1
Concentration Units: µg/l

Compound:**Result:**

Chloroform	< 2.0
Bromodichloromethane	< 2.0
Dibromochloromethane	< 2.0
Bromoform	< 2.0
Total THM's	< 8.0

COMMENTS:Approval: *Hossein Hajipour*

Monday, December 12, 2011

MAY 19 2004

1100 W 49th Street

Austin TX 78756

Texas Department of Health Haloacetic Acids GC Results

Contact: Gary Fest

(512) 458-7552

Submitter Sample Number 0710078
 TDH Sample Name EP4-11294
 Method 552.2
 Data File Name 0519023.D
 QC File C:\MSDCHEM\2\DATA\O18P0519\
 Sample Type Water

Date Collected 5/13/2004
 Date Extracted 5/18/2004
 Date Analyzed 5/20/2004 4:17
 Analyst M. Kabay
 Dilution Factor 1
 Concentration Units µg/L

Regulated Compounds:	Result:
Monochloroacetic acid	<2.0
Dichloroacetic acid	<1.0
Trichloroacetic acid	<1.0
Monobromoacetic acid	<1.0
Dibromoacetic acid	<1.0
Total:	<6.0

Monitor Compounds:	Result:
Bromochloroacetic acid	<1.0
Dalapon	<1.0

Comments:

Rev #3 1/03 HP6890N SNus10338045

Approval: 

Monday, December 12, 2011

MAY 21 2004



Texas Department of Health

1100 WEST 49TH STREET
AUSTIN, TEXAS 78756-3194
(512) 458-7318

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT RADIOCHEMICALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
EL PASO, TX 79916

Laboratory Number: EP216503
Sample Type:
Sample Source:
Entry Points: 001
Collector Remarks:

Date Collected: 10/17/2002
Date Received: 10/18/2002
Date Reported: 04/01/2003

Constituent Name	Result	Units	+/-
Radium 226	< 0.2	pCi/l	
Radium 228	1.5	pCi/l	
Gross Beta	9.3	pCi/l	0.5
Gross Alpha Particle Activity	4.6	pCi/l	1.3
			1.4

APPENDIX EE

CorrShield NT 402



GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 01-SEP-2004

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

CORRSHIELD NT402

PRODUCT APPLICATION AREA:

CORROSION INHIBITOR.

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
7632-00-0	SODIUM NITRITE Oxidizer; toxic (by ingestion); potential blood toxin
12179-04-3	BORIC ACID,DISODIUM SALT,PENTAHYDRATE Irritant (abraded skin); slight irritant (respiratory)

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING

May cause moderate irritation to the skin. Severe irritant to the eyes. Mists/aerosols cause irritation to the upper respiratory tract.

DOT hazard: Toxic Liquid, RQ
Emergency Response Guide #151
Odor: Slight; Appearance: Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus(full face-piece type). Proper fire-extinguishing media: Flood with water. Use of CO2 or foam may not be effective.

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause moderate irritation to the skin.

ACUTE EYE EFFECTS:

Severe irritant to the eyes.

ACUTE RESPIRATORY EFFECTS:

Mists/aerosols cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

Toxic;
May cause gastrointestinal irritation with possible nausea, vomiting, headache, dizziness, unconsciousness and injury to the kidneys and liver.

TARGET ORGANS:

Prolonged or repeated exposures may cause CNS depression and/or toxicity to the liver, kidney, and blood system.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin.

4 FIRST AID MEASURES

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Dilute contents of stomach. Induce vomiting by one of the standard methods. Immediately contact a physician.

NOTES TO PHYSICIANS:

No special instructions

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

Flood with water. Use of CO2 or foam may not be effective.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

FLASH POINT:

> 200F > 93C P-M(CC)

MISCELLANEOUS:

Toxic Liquid, RQ
UN3287;Emergency Response Guide #151

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Contains an oxidizer. Avoid all contact with reducing agents, oils, greases, organics and acids. Do not allow to dry.

STORAGE:

Keep containers closed when not in use. Protect from freezing.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS**CHEMICAL NAME****SODIUM NITRITE**

PEL (OSHA): NOT DETERMINED

TLV (ACGIH): NOT DETERMINED

BORIC ACID, DISODIUM SALT, PENTAHYDRATE

PEL (OSHA): NOT DETERMINED

TLV (ACGIH): 1 MG/M3

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.
USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.
If air-purifying respirator use is appropriate, use a respirator with dust/mist filters.

SKIN PROTECTION:

rubber gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav.(70F,21C)	1.250	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	< < 0	Vapor Density (air=1)	< 1.00
Freeze Point (C)	< -18		
Viscosity(cps 70F,21C)	12	% Solubility (water)	100.0

Odor	Slight
Appearance	Yellow
Physical State	Liquid
Flash Point	P-M(CC) > 200F > 93C
pH As Is (approx.)	11.6
Evaporation Rate (Ether=1)	< 1.00

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY**STABILITY:**

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"B"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT:	~275 mg/kg
NOTE - Estimated value	
Dermal LD50 RABBIT:	>5,000 mg/kg
NOTE - Estimated value	

12 ECOLOGICAL INFORMATION**AQUATIC TOXICOLOGY**

Ceriodaphnia 48 Hour Static Renewal Bioassay
 LC50= 61; No Effect Level= 15.6 mg/L
 Daphnia magna 48 Hour Static Renewal Bioassay pH of test solutions was adjusted to a level of 6-9.
 LC50= 100; No Effect Level= 38 mg/L
 Fathead Minnow 96 Hour Static Renewal Bioassay
 LC50= 1072; No Effect Level= 500 mg/L
 Rainbow Trout 96 Hour Static Acute Bioassay
 LC50= 180; No Effect Level= 100 mg/L

BIODEGRADATION

BOD-28 (mg/g): 1
BOD-5 (mg/g): 0
COD (mg/g): 79
TOC (mg/g): 4

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Toxic Liquid, RQ
UN / NA NUMBER: UN3287
DOT EMERGENCY RESPONSE GUIDE #: 151

15 REGULATORY INFORMATION

TSCA:
All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):
32 gallons due to SODIUM NITRITE;

SARA SECTION 312 HAZARD CLASS:
Immediate(acute);Delayed(Chronic)

SARA SECTION 302 CHEMICALS:
No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

CAS#	CHEMICAL NAME	RANGE
7632-00-0	SODIUM NITRITE	21.0-30.0%

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:
No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS		CODE TRANSLATION
Health	2	Moderate Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles,Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE -----	REVISIONS TO SECTION: -----	SUPERCEDES -----
MSDS status:	13-FEB-1997		** NEW **
	23-JUN-1997		13-FEB-1997
	16-NOV-2001	15	23-JUN-1997
	09-OCT-2002	12	16-NOV-2001
	10-OCT-2002	4,16	09-OCT-2002
	26-NOV-2002	12	10-OCT-2002
	01-SEP-2004	3,5,14	26-NOV-2002

APPENDIX FF
FORT BLISS PERMITS

1) ACCESS CONTROL POLICY

2) FIRE PREVENTION CONTRACTOR'S
GUIDE

3) STANDARD EXCAVATION REQUEST



REPLY TO
ATTENTION OF:

5

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
1 PERSHING ROAD
FORT BLISS, TX 79916-3803

December 27, 2006

Office of the Garrison Commander

Dear Fort Bliss Business Partner:

Fort Bliss continues to take steps to ensure the safety of our personnel, facilities, vendors, suppliers, contractors, service providers and visitors on our post. Effective February 1, 2007, Fort Bliss is instituting a new standardized entry protocol called the *RAPIDGate*TM Program for all new and existing vendors, suppliers, contractors and service providers (companies) who require routine access to Fort Bliss. The *RAPIDGate* Program is one of several steps Fort Bliss is undertaking to comply with Homeland Security Presidential Directive 12 (HSPD-12). The *RAPIDGate* Program, provided by Eid Passport, Inc., will provide a standardized background check, an identification badge and entry procedure that improves security while at the same time significantly speeding up entry for participating companies.

Companies participating in the *RAPIDGate* Program will be able to enter Fort Bliss through any of the 8 currently open gates (Cassidy, Sheridan, Marshal, Chaffee, Remagan, Robert E. Lee, Jeb Stuart South, and Pershing) without having to stop and obtain a day pass. Of course, due to the size constriction of some vehicles, larger vehicles in the size of semi-truck or larger will be only allowed to enter through the Cassidy, Sheridan, Chaffee, and Robert E. Lee access points. Companies can enroll in the *RAPIDGate* Program by calling 1-877 *RAPIDGATE* (1-877-727-4342). Once enrolled, employees can register at the self-service Registration Stations located at the Chaffee Gate, Bldg. 505 (Vehicle Registration) or the BAAF Main Gate. Based on the information collected at the self-service Registration Station, the *RAPIDGate* Program runs a 10-year felony background screen, other criminal screens, and validates the social security number. The *RAPIDGate* Program also verifies that the individual is either a U.S. Citizen or is legally eligible to work in the United States. Upon passing the screening process, participants will be issued a personalized *RAPIDGate* identification badge that when verified by a security officer will allow the participant to enter Fort Bliss without having to sign in for a day pass. The *RAPIDGate* identification badge will be valid for a period of twelve (12) months. Your company will be given an opportunity at the end of the 12 month period to renew enrollment in the program. Fort Bliss will no longer accept background checks from other sources beginning February 1, 2007.

Companies that chose not to participate in the *RAPIDGate* Program will be allowed access only through the Fort Bliss Chaffee (Commercial) Gate where, before entering the installation, these personnel will be required to obtain a day pass at the Chaffee Pass Office. To receive the one day pass, you will need to park your vehicle and have all occupants enter the gate pass office to sign in, individually, for the day pass. All vehicle occupants must be prepared to provide a government issued photo ID, and the driver of the vehicle will be required to provide proof of

vehicle registration, proof of insurance, and a state issued drivers license. Extended Passes will no longer be available beginning February 1, 2007 while currently issued extended passes will be honored until their expiration date.

The *RAPIDGate* Program not only saves you time, but also increases the safety and security for Fort Bliss and all personnel who work on the base. We encourage your participation in the *RAPIDGate* Program. Please note, *RAPIDGate* participants are still subject to random inspections.

To enroll, please follow the guidelines on the attached document (*RAPIDGate* Program Enrollment Information). Questions about the Fort Bliss *RAPIDGate* program should be addressed to info@rapidgate.com with the subject line RE: *RAPIDGate* Program.

Sincerely,



Robert T. Burns
Colonel, US Army
Commanding

Forms of Acceptable Identification

List A – One Needed

- U.S. Passport (unexpired or expired)
- Certificate of U.S. Citizenship (Form N-560 or N-561)
- Certificate of Naturalization (Form N-550 or N-570)
- Unexpired foreign passport, with I-551 stamp or attached Form I-94 indicating unexpired employment authorization
- Permanent Resident Card or Alien Registration Receipt Card with photograph (Form I 151 or I-551)
- Unexpired Temporary Resident Card (form I-688)
- Unexpired Employment Authorization Card (Form I-688A)
- Unexpired Reentry Permit (Form I-327)
- Unexpired Refugee Travel Document (Form I-571)
- Unexpired Employment Authorization Document issued by DHS that contains a photograph (Form I-688B)

List B – Two Needed

- Driver's license or ID card issued by a state
- ID Card issued by federal, state or local government agencies or entities
- School ID card with a photograph
- Voter's registration card
- U.S. Military card or draft record
- Military Dependent's ID card
- U.S. Coast Guard Merchant Mariner Card
- Native American tribal document
- Driver's license issued by a Canadian government authority
- U.S. Social Security card issued by the Social Security Administration
- Certification of Birth Abroad issued by the Department of State (Form FS-545 or Form DS-1350)
- Original or certified copy of a birth certificate issued by a state, county, municipal authority or outlying possession of the United States bearing an official seal
- Native American tribal document
- U.S. Citizen ID Card (Form I-197)
- ID Card for use of Resident Citizen in the United States (Form I-179)
- Unexpired employment authorization document issued by DHS (other than those listed under List A)

RAPIDGate Program Enrollment Information

Enroll your company by calling Eid Passport at 1-877-*RAPIDGATE* (1-877-727-4342) and provide a Fort Bliss sponsor point of contact that includes a name, phone number, and e-mail address. Once your request is received, final authorization to participate in the *RAPIDGate* Program will be granted by the Fort Bliss Office of the Provost Marshal.

Once your company has been approved for enrollment and paid the enrollment fee, instruct your employees who need access to Fort Bliss to register for the *RAPIDGate* Program using the self-service Registration Station located within the Chaffee Gate Pass Office, Bldg. 505 (Vehicle Registration Office) or the BAAF Main Gate Pass Office. Each employee should be ready to provide your company's *RAPIDGate* company code, his or her address, phone number, date of birth, and Social Security number for proof of identification and background screening. The Registration Station will capture the employees photograph and fingerprints for identity verification and badging during the application process.

Once your company has approved each employee for participation, and paid the registration fee, the employee will undergo a background screen. Upon passing the screen, your company will be notified to send the employee to pickup their personalized *RAPIDGate* Badge at the Fort Bliss Vehicle Registration Office located within bldg. 505. The employee will be required to show identification at the time of badge pickup. The employees can show one form of identification from List A, or two forms of identification from List B. Please see last page for listing.

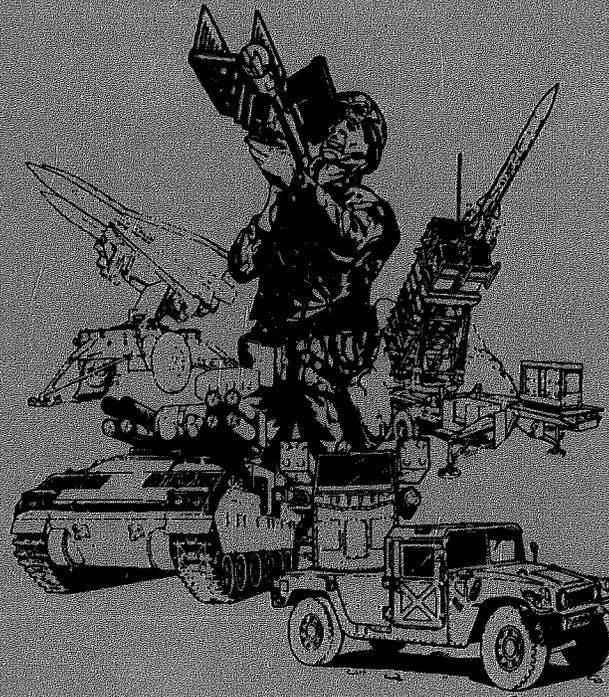
Once a *RAPIDGate* Badge is issued, employees will be required to present their Badge to gain entry to Fort Bliss, and must wear and display the Badge at all times while on the premises. Questions about the Fort Bliss *RAPIDGate* program should be addressed to info@rapidgate.com with the subject line RE: *RAPIDGate* Program.

Continuation -

Due to ongoing construction on Fort Bliss, Biggs AAF, and WBAMC several temporary access gates have been constructed to facilitate entry onto the cantonments. The additional access gates are not included within the Letter To Vendors due to their temp status and their construction after the letter was issued. The additional access gates, located on Biggs AAF, are Global Reach ACP, General Harmon ACP and IBCT ACP. These listed temp access gates will follow the same access control procedures as outlined for all members of the Rapid Gate system. Please be advised that, due to their temporary construction status, care should be taken when attempting access with larger than standard sized vehicles. These temp access gates are constructed with 10' to 12' in width paved traffic lanes and an overhead clearance of no less than 14.5'. Traffic speed limits upon approaching, entering, and leaving the temp access gates are listed as 15mph.

FEB 1, 2009

Fort Bliss Fire Department



Fire Prevention Contractors Guide

FIRE PREVENTION CONSTRUCTION GUIDE

Fires during construction, alteration, or demolition operations are an ever-present threat. The fire potential is inherently greater during these operations than in the completed structure due to previous occupancy hazards and the presence of large quantities of combustible materials and debris, together with ignition sources such as temporary heating devices, cutting/ welding/ soldering operations, open fires and smoking. The threat of arson is also greater during construction and demolition operations due to the availability of combustible materials on site and open access.

Fires during construction, alteration, or demolition operations can be eliminated or controlled through the early planning, scheduling and implementation of fire prevention measures, fire protection systems, rapid communications and on-site security. An overall construction or demolition fire safety program shall be developed; essential items to be emphasized include:

- a. Good housekeeping
- b. On-site security
- c. Installation of new fire protection systems as construction progresses.
- d. Preservation of existing systems during demolition
- e. Organization and training of on-site fire brigade
- f. A pre-fire plan developed with the fire department.
- g. Rapid communication availability
- h. Consideration of special hazards in and around site.
- i. Protection of existing structures and equipment from exposure fires resulting from construction, alterations and demolition operations.
- j. Prohibiting employees from smoking at the job site or establishing designated smoking areas.

A fire safety program shall be included in all construction, alteration or demolition contracts. It is the responsibility of the Fire Department to administer and enforce this program. Contractors need to refer to NFPA 1, Uniform Fire Code, and Chapter 41 for Hot Work Permits. The standards for safeguarding construction, alteration and demolition operations are found in NFPA 241. It is the contractors' responsibility to provide extinguishers at the job site. The suitability, distribution and maintenance of extinguishers shall be in accordance with NFPA-10. These standards provide measures for preventing or minimizing fire damage during these types of operations. Contact the Fire Department for guidance (568-8194/568-8195). The unique and dangerous situations confronting fire fighters during such operations demand that a complete exchange of pertinent information be established and continue during the life of the project.

The installation Fire Chief or (designated representative) will monitor contractor operations on maintenance and repair, construction and self-help projects. The contracting officer representative (COR) will notify the contractor and request prompt corrective action when they find fire hazards, unsafe practices or non compliance with specifications. The Fire Chief, if delegated this authority by the commander may stop any operation or activity when there is imminent danger to life and property.

This Contractor Fire Prevention Brochure is designed to assist you in establishing fire procedures on Fort Bliss property. The unsafe practices listed herein are just a fraction of many hazardous situations that could occur in or around construction areas.

The most hazardous situations have been listed for ready references. The Fire Department solicits your help in preventing fires. We stand ready to assist you in any matter pertinent to fire prevention or safety. Feel free to call on us any time you have a problem or any situation that might lead to a problem. We are located in building 11211, on Biggs Army Airfield and our phone numbers are 744-8194 or 744-8195.

CONTRACTOR'S FIRE PREVENTION GUIDE

1. Prior to performing "Hot Work" (welding, soldering, cutting, tar pots, etc.) or operating other flame producing devices, contractor shall request the issuance of a Hot Work Permit. Permits will not be issued in advance. Insure all equipment is in place prior to calling. The telephone number to request the permit is 568-5283.
2. All painting materials to include paint brushes, empty paint cans, drop cloths etc., and flammable liquids shall be stored outside in authorized storage containers. The containers will be located at a safe distance from the building and insure they are not obstructing any Fire Department connections to that building.
3. Accumulation of trash, papers, shavings, sawdust, excelsior, boxes and other packing materials will be removed from the building at close of work day and disposed in proper containers located away from the building. Areas outside of the building undergoing work will be kept clean of trash, paper or other discarded combustibles.
4. Storage of lumber, roofing paper or other combustible supplies needed during construction shall be kept at a safe distance from the building if no storage yard is assigned.
5. All portable electric devices (saws, sanders, compressors, extension cords or lights) will be disconnected at the close of each workday.
6. All contractors will require their employees to familiarize themselves with locations of the nearest administrative telephones and the procedures when using their own cell phones. Employees will dial the emergency numbers provided in this guide book.
7. Contractors will report all fires no matter how small they may be. Use emergency numbers provided in the guide book.
8. Fire extinguishers in buildings shall not be removed from their locations or used for any purpose other than fire.
9. Fire hydrants will not be utilized without getting the consent of Ft. Bliss Water (569-5360) and the Asst Chief of Fire Prevention at 744-9896.
10. Fort Bliss Water will provide personnel for the operation of water valves pertaining to our water distribution system.
11. Smoking in buildings undergoing work is prohibited. Assign a designated smoking area with a proper receptacle for discarded smoking material
12. Contractors will notify the Fire Department if roads, Fire Lanes, etc., are to be blocked or closed. Call 568-5283, 744-8195.
13. Contractors will not work on sprinkler systems or any part of the alarm system without the approval of the Fort Bliss Fire Department. Call 568-5283 or 744-8195 prior to commencing work.

14. Prior to close of business the contractor will inspect the exterior and interior of the building to insure all guide lines have been followed.

Listed below are other areas of concern which may pose problems in and around the construction site:

- a. Improper storage of flammable materials
- b. Cleaning with flammables
- c. Improper use of extension cords
- d. The use of electrical equipment with faulty wiring
- e. The use of tools that are not UL approved
- f. Not following Hot Work Permit guide lines
- g. Smoking in unauthorized areas and or improper discard receptacles
- h. Blocking Fire Department Connections

Charles J. Butler, YN-02
Fire Chief
Fire and Emergency Service Division
Directorate of emergency Services

Receipt of Contractor's Fire Prevention Guide Acknowledgement

Date _____

Name: _____ Company _____

E-Mail Address _____

Work Site _____ Telephone _____

Fire Inspector: _____

E-Mail Address: _____

Signature _____

Telephone _____

Contractor Copy

Receipt of Contractor's Fire Prevention Guide Acknowledgement

Date _____

Name: _____ Company _____

E-Mail Address _____

Work Site _____ Telephone _____

Fire Inspector: _____

E-Mail Address: _____

Signature _____

Telephone _____

Inspectors
Copy

Section I: To Be Completed By Requesting IndividualGovernment Representative
Name/Phone numberPN#, NEPA#, WO#, SO#
Gov. Contract NumbersCompany name, address
and phone numberPurpose and location of
request:
(Describe what and where)

(Equipment must meet safety standards established by the Dept of Army and OSHA)

Requesting individual: (please print name, grade, title, PH#) Signature:

Date:

Section II: To Be Completed By Utility Integrator (COE), Bldg P140A, Next to T0071 @ Longknife

Resident Engineer: (print name, title, phone number)

Signature:

Date:

Section III: To Be Completed By DPW Master Planning Maps, Room 1 - Bldg 777 (915) 569-8400 Location of excavation has been checked and the location of existing utilities or interfering facilities is located on the maps furnished. No mechanical excavation will be accomplished within three feet of utilities and hand tools will be used without exception. Area excavated will be satisfactorily backfilled Drawings/electronic files furnished (to include irrigation systems) Return to Operations & Maintenance Division (Room 317) after completion with **as-builts**

Signature:

Date:

Section IV: To Be Completed By DPW Master Planning Division Chief, Room 113 - Bldg 777 (915) 569-8449

Recommend:

Signature:

Date:

 Approval Disapproval**Section V: To Be Completed By Directorate of Information Management (DOIM) - Bldg 56 (915) 744-4344** Location of the proposed excavation has been checked and no underground communication cables exist in the vicinity of the excavation. Location of proposed excavation has been checked and under ground communication cables exist in the vicinity of the excavation.
Call (915) 744-4344 prior to the beginning of any excavation work.

Recommend:

Signature:

Date:

 Approval Disapproval**Section VI: To Be Completed By DPW-Environmental (DPW-E) - Bldg 624 (915) 568-6999 / 568-6746**

Recommend:

Comments:

 Approval Disapproval

Signature:

Date:

Section VII: Obtain Following Approval Signatures:**Please note:** A service order is required to mark all utilities.Rio Grande Electric Service Representative
3633 Mattox Ave. (915) 778-0152

Date:

Signature:

Texas Gas Service Representative
4700 Pollard St. (915) 680-7329/680-7274

Date:

Signature:

Ft. Bliss Water Service Representative
Water and Sewer Bldg 1320 (915) 569-5359

Date:

Signature:

Pride Representative
(915) 568-1107

Date:

Signature:

Balfour Betty Representative Bldg 2022
(915) 564-0459

Date:

Signature:

Section VIII: Obtain Final Approval Signature:Final Approval from O&M Division Chief
Bldg 777, Room 317/ (915) 568-5233

Date:

Signature:

MANDATORY NO EXCEPTIONS. MUST HAVE THE CONTRACT OR WORK ORDER NUMBER FROM THE GOVERNMENT NOT FROM YOUR GENERAL CONTRACTOR IF YOU ARE A SUBCONTRACTOR TO ONE OF THE UTILITY COMPANIES. PLEASE WRITE IN GDR, WHATEVER UTILITY (E.G.) AND THEIR WORK ORDER NUMBER. THIS IS THE ONLY EXCEPTION TO THE ABOVE

DESCRIBE THE TYPE OF EXCAVATION YOU ARE PERFORMING AND THE LOCATION. (I.E. BLDG #, STREET INTERSECTION ETC.)

COMPLETED BY DPW MASTER PLANNING MAPS, ROOM 1, BLDG 777.

COMPLETED BY DPW MASTER PLANNING DIVISION CHIEF ROOM 113, BLDG 777.

COMPLETED BY DDIM @ BLDG 56

COMPLETED BY UTILITY COMPANIES EXCEPT @ LONGKNIFE, BCT & IBCT AREAS. PRIDE SIGNS OFF FOR THESE AREAS. INITIATING THIS STARTS AT THE WORK ORDER DESK IN BLDG 777.

MANDATORY NO EXCEPTIONS. MUST HAVE THE NAME AND PHONE # OF YOUR GOVERNMENT REPRESENTATIVE, EITHER FROM DPW DR COE. THE PHONE NUMBER MUST ALSO BE A LOCAL 915 AREA CODE. IF YOU ARE A SUBCONTRACTOR TO ONE OF THE UTILITY COMPANIES, YOUR REP FOR FT. BLISS WATER AND TEXAS GAS. WILL BE JR MORALES 568-2779, YOUR REP FOR EL PASO ELECTRIC AND RIO GRANDE ELECTRIC WILL BE LALO RODRIGUEZ 568-5914. THESE ARE THE ONLY EXCEPTIONS TO THE ABOVE.

NAME ADDRESS AND PHONE NUMBER (COMPANIE'S OFFICE) OF YOUR COMPANY

PRINT YOUR NAME AND CELL PHONE NUMBER, SIGN AND DATE

IF THIS IS A CORPUS OF ENGINEERS CONTRACT THE RESIDENT ENGINEER MUST SIGN OFF IN THIS AREA. PRINT THEIR NAME AND OFFICE PHONE NUMBER, SIGN AND DATE. THIS MUST BE ACCOMPLISHED BEFORE GOING TO SECTION III.

COMPLETED BY DPW-E ENVIRONMENTAL BLDG 624

THE ABSOLUTELY LAST SIGNATURE. ACCOMPLISHED AFTER ALL OTHER SIGNATURES ARE ACCOMPLISHED. THIS SIGNATURE CAN BE OBTAINED AT BLDG 777 ROOM 317.

STANDARD EXCAVATION REQUEST
(IAW AR 415-15)

No Ground Disturbance Is Authorized Before Concurring Signatures In ALL SIGNATURE BOXES Have Been Obtained

Section I: To Be Completed By Requesting Individual

Print Form

Government Representative Name (Phone number) _____ PMA/EPWA WORK ORDER/CONTRACT NUMBER _____

Company Name, address and phone number _____ Purpose and location of request: (Describe what and where) _____

(Equipment must meet safety standards set by the Dept. of Transportation, CSMVA)

Requesting individual: (please print name, grade, title, PH#) Signature: _____ Date: _____

Section II: To Be Completed By Resident Engineer (COE), Bldg 10070, Bldg 10071, Bldg 6999 (if Applicable)

Resident Engineer: (print name, title, phone number) Signature: _____ Date: _____

Section III: To Be Completed By DPW Master Planning Maps, Room 1 - Bldg 777 (915) 569-8400

No mechanical excavation will be accomplished within three feet of utilities and hand tools will be used without exception.

Area excavated will be satisfactorily backfilled Drawings/electronic files furnished (to include irrigation systems)

Return to Operations & Maintenance Division (Room 317) after completion with as-builts

Signature: _____ Date: _____

Section IV: To Be Completed By DPW Master Planning Division Chief, Room 113 - Bldg 777 (915) 569-8449

Recommend: Approval Disapproval Signature: _____ Date: _____

Section V: To Be Completed By Directorate of Information Management (DOIM) - Bldg 56 (915) 744-4344

Location of the proposed excavation has been checked and no underground communication cables exist in the vicinity of the excavation.

Location of proposed excavation has been checked and underground communication cables exist in the vicinity of the excavation. Call (915) 744-4344 prior to the beginning of any excavation work.

Recommend: Approval Disapproval Signature: _____ Date: _____

Section VI: To Be Completed By DPW Environmental (DPW-E) - Bldg 624 (915) 568-6999 / 568-6746

Recommend: Approval Disapproval Signature: _____ Date: _____

Section VII: Obtain Following Approval Signatures: *Please note: A service order is required to mark utilities.*

Rio Grande Electric Service Representative Date: _____ Signature: _____
3633 Major Ave. (915) 778-0152

Texas Gas Service Representative Date: _____ Signature: _____
4700 Pollard St. (915) 680-7329/680-7274

FT. Bliss Water Service Representative Date: _____ Signature: _____
Water and Sewer Bldg 1320 (915) 569-5559

Blissnet Betty Representative Bldg 2022 Date: _____ Signature: _____
(915) 568-5544

Section VIII: Obtain Final Approval Signature:

Final Approval from O&M Division Chief Date: _____ Signature: _____
Bldg 777, Room 317 (915) 568-5233

FB FORM 1994-RR (DPW) 15-MAR-2010 *Previous editions of this form are obsolete*

APPENDIX HH

SUBMITTAL DISTRIBUTION MATRIX

Activity & Address	Drawing Size		Design Analysis	Specs	CD - D.A , specs .pdf & CADD, .dwg	Furniture, Furnishings & Equipment Submittal	Structural Interior Design Submittal
	Full	Half Size					
US Army Corps of Engineers ATTN: Frank Covington, PM CESWF-PM-J 819 Taylor Street Ft. Worth, TX 76102 817-338-8668	0	0	0	0	2	0	0
US Army Corps of Engineers ATTN: Resident Engineer Bldg , Office Street Address Ft. Bliss, TX 79916 915- -	0	4	4	4	4	2	2
Directorate of Public Works IMSW-BLS-DPW-MP ATTN: Andres Iglesias Bldg 777, Office 114 Pleasanton Rd. Ft. Bliss, TX 79916 915-568-5949	0	1	1	1	3	2	2
IMSW-BLS-Z ATTN: John Barrera Bldg 624 Pleasanton Ave. Ft. Bliss, TX 79916-6816 (915) 568-3908	0	1	0	1	1	0	0
Physical Security Office ATZC-PM ATTN: Thomas Cain Bldg 116, Pershing Road Ft. Bliss, TX 79916	0	1	1	1	1	0	0
DOIM ATTN: Thomas Hopkins Bldg 58, Doniphan Road Ft. Bliss, TX 79916 (915) 568-8194	0	1	1	1	1	0	0
FESD, DES ATTN: James L. Narlock Building 11211 Wright Street Ft. Bliss, TX 79916 (915) 744-9896	0	0	0	0	3	0	0
IMWE-BLS-PWM ATTN: Ricardo Cortez Bldg 777, Rm 319 Pleasanton Ave.Fort Bliss, TX 79916-6812 (915) 568-5201	0	3	1	1	7	0	0
Installation Safety Office ATZC-CSS Attn: Dennis I. Ostrander Bldg 515-B 1733 Pleasanton Road Ft. Bliss, TX 79916-6812	0	1	1	1	1	0	0
DPTMS, P&O (IOC) ATTN: Ron Wells AT/FP Antiterrorism Officer 2 Sheridan Road Fort Bliss, TX 79916 (915)569-8663	0	1	1	1	2	0	0

Activity & Address	Full	Half Size	Design Analysis	Specs	CD - D.A , specs .pdf & CADD,.dwg	Furniture, Furnishings & Equipment Submittal	Structural Interior Design Submittal
JLENS End User ATTN: Streeet Address Ft. Bliss, TX 915- -	0	2	0	0	3	0	0
THAAD End User Director, CTM Upper Tier ATTN: ATSA-TCM-UT Dan Hardwick / Ramiro Pinedo 12 Pershing Rd Ft. Bliss, TX 79916-3802 915-568-7242	0	2	0	0	3	0	0
Sustainment Brigade End User ATTN: Streeet Address Ft. Bliss, TX 915- -	0	2	0	0	3	0	0
Public Works Division IMA, SW Region ATTN: Greg Kish 2450 Stanley Road, Suite 101 Ft. Sam Houston, TX 78234-6102 210-295-2287	0	1	0	1	1	0	0
USAISEC-FDED ATTN: AMSEL-IE-DE-IN-OP George Gaffney 1435 Porter St, Suite 230 Fort Dietrick, MD 21702 301-619-6501	0	1	1	1	1	0	0
US Army Corps of Engineers ATTN: Phil Brinson CESAS-EN-DA 100 W. Oglethorpe Ave.Pleasanton Rd. Savannah, GA 31401-3640 912-652-5566	0	1	1	1	3	0	0
Jacobs ATTN: Cecil Penn 777 Main Street Ft Worth, TX 76102 817-735-7018	0	2	2	2	3	1	1
Huitt Zollars ATTN: Blanca Berumen 3131 McKinney Ave, Suite 600 Dallas, TX 75204-2489 214-871-3311	0	1	1	1	1	0	0

Activity & Address	Full	Half Size	Design Analysis	Specs	CD - D.A , specs .pdf & CADD,.dwg	Furniture, Furnishings & Equipment Submittal	Structural Interior Design Submittal
Jacobs-Huitt Zollars ATTN: Catherine Zultner P140A - Annex Corner of Velez St & Sapper St Ft. Bliss, TX 79906 214-708-2845	0	1	1	1	1	1	1

APPENDIX II

CONTRACTOR BAS TURNOVER CHECKLIST

Contractor BAS Turnover Checklist

The Building Automation System (BAS) consists of multiple buildings using LonWorks control systems with LNS databases. During the integration of each building to the BAS server the individual building databases will be merged into a larger LNS database and the field devices re-commissioned. Completing this process requires the items shown in the table below. For organized record keeping please submit all files on a single CD or DVD. The exception would be any licensed programming software which can be submitted as a separate CD or DVD.

Note: Once this turnover is complete and the integration process has started field modification may affect the integration. Refer to the “Guidelines for Warranty & Maintenance” for instructions on how to modify files on any building turned over to the CORPS & DPW. If integration has not been started prior to changes being made in the field then an updated CD/DVD must be turned over with the same information outlined in the following table.

REQUIREMENT	COMMENTS	TCC INITIALS	INTEG INITIALS
CD or DVD labeled and dated	Real building # such as 30200 not BuildingX		
Commissioned LNS Database	All LNS credits paid for by controls contractor		
All controllers and routers (except BPOC) should be online	The integrator will configure BPOC IP settings and connect it to the IP network.		
Controllers are programmed to allow monitoring and control from the front end using SNVTs or NCIs.	Network occupied command from BAS but unit programmed with a local backup schedule if comm. is lost longer than 15 – 60 minutes.		
	Software Network Emergency Shutdown command in addition to any local spec req		
	Network setpoint adjustment		
	Network monitoring of hardware I/O values		
	Network monitoring of software alarm points and calculated reset values such as the effective discharge air temp reset value.		

Contractor BAS Turnover Checklist

Provide all controller LonMark resource files	<ul style="list-style-type: none"> • XIF as a minimum • TYP and FPT files if UNVTs are used and a points list to indicate how UNVTs are used i.e. bit field 1 = fan status etc. 		
LNS plug-ins if applicable	Must provide a LNS plug-in if one exists		
Licensed programming tool if applicable	DPW may waive the requirement to provide a licensed copy of the programming tool for each project but waiver must be granted prior to document(s) turnover.		
All controller programming files for each programmable controller. For Example: Trane = RCF and TGP files JCI = GPI files TAC I/A series = Visio & Bin files	<ul style="list-style-type: none"> • Hardware I/O definition file(s) if applicable • Software I/O definition file(s) if applicable • Logic programming file(s) if applicable 		
Points list for all programmable controllers	Provide SNVT and LMO names for hardware and software points.		
Points list for all remote I/O modules	Provide SNVT and LMO names for hardware and software points on I/O devices.		
Points list for any application specific controller used for side loop control	Provide SNVT and LMO names for hardware and software points used for side loop control on an application specific controller.		

Temperature Controls Contractor Information

Company Name: _____

Contact Name: _____

Contact Phone Number: _____

APPENDIX JJ

ADDITIONAL ENERGY ENHANCEMENT CONSIDERATIONS

1. Optimize building orientation (East-West Axis with Passive Solar shading geometry)
2. Tight construction with Infiltration less than .15 cfm per square foot of exterior envelope area at 75 PA
3. Use minimum R/U values listed in Table 1 of the Building Envelope section of the Energy and Water Conservation Design Guide referred to above.
4. Design detailing to avoid thermal bridges that allow heat to bypass insulation
5. Windows: Triple-pane, Energy Star, with low-E coatings appropriate to climatic zone.
6. Lighting: lower lighting consumption to average 0.75W/ft² or less. To achieve this performance, consider the following:
 - a. Low maintenance, low wattage-per-lumen technologies, e.g. SSL/LED fixtures
 - b. Occupancy, Vacancy, and Daylighting sensors for active ambient light control
 - c. Increase vertical glazing by 50% over standard designs
 - d. Increase Skylight to Floor Area (SFA) fraction to 3% over corridors, admin areas and office areas
 - e. Use digital multi-zone lighting controls with individually addressable fixtures
7. 'Cool Roof' finishes where cooling load exceeds heating (e.g. Climate Zones 1-5)
8. Top Tier Energy Star or FEMP rated appliances and equipment
9. Demand/user controlled High Efficiency HVAC equipment per ASHRAE 189.1
10. Optimize HVAC zones with respect to user schedules and occupancy
11. Include Energy Recovery Ventilation (ERV) systems with >75% efficiency
12. Dedicated Outside Air System (DOAS) for ventilation with heat recovery for assembly and heat/fume generating activities
13. Indirect Evaporative Pre-Cooling (IEPC or IDEC) for Dry Climates (Climate Zones xB)
14. HVAC equipment efficiency ratings (e.g. COP) that exceed ASHRAE 189.1 (C) requirements
15. High Efficiency condensing boilers with >90% efficiency and/or incorporate Ground-Source Heat Pump technology
16. NEMA MG1 Premium Efficiency/ Electronically Commutated Motors (ECM) motors

17. Variable Air Volume (VAV) or hydronic distribution; consider:
 - a. radiant heating systems, especially in maintenance bays, and
 - b. “Radiant” cooling systems in ceilings
18. Measurement and Verification (M&V) systems
19. On-site Renewable Energy elements:
 - a. Transpired Solar Collectors in Climate Zones 2A to 8.
 - b. SSL/LED parking and street lighting; site-specific light distribution patterns
 - c. Prepackaged pole-mounted solar site lighting solutions
 - d. Include 30% demand solar water heating in areas where the average sun exposure is equal or greater than 4.0 kWh/m² per day according to the National Renewable Energy Lab (<http://www.nrel.gov/gis/solar.html>).
20. Maximum flow rates for plumbing fixtures per ASHRAE 189.1
 - a. Dual-flush toilets
21. Stormwater management: Meet local codes and Low Impact Development (LID) best practices.

SECTION 01 35 11.00 44

SPECIAL PROJECT PROCEDURES FOR FORT BLISS
09/2010

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.

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.2 (2003) Bored and Preamsembled Locks and Latches

ANSI/BHMA A156.3 (2008) Exit Devices

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-02 Shop Drawings

Hardware schedule; G

Submit a hardware schedule, similar to Door Hardware Institute's (DHI) "Vertical Hardware Schedule for Typical Openings", listing all items to be furnished.

Keying system

Electro-Mechanical Devices and Accessories; G

Detail drawings for hardware devices for computerized keying systems, magnetic cards, keyless push button access control systems, and other electrical hardware devices showing complete wiring and schematic diagrams and other details required to demonstrate proper function of units.

SD-03 Product Data

Door hardware manufacturer's descriptive data, technical literature, catalog cuts, installation instructions, manufacturer warranties, and spare parts data. Spare parts data for locksets, exit devices, closers, electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices, after approval of the detail drawings, and not later than 3 months prior to the date of beneficial occupancy. The data

shall include a complete list of parts and supplies, with current unit prices and source of supply.

SD-04 Samples

Locks and Latches; G.

Furnish samples of the locksets, cylinders, cores, and keys to be furnished this project. Notify the Contracting Officer and base personnel for a meeting demonstrating that the locksets to be furnished are fully compatible with the project requirements and, if applicable, the existing keying system. An existing base core and/or cylinder and key will be fitted to the sample lockset.

SD-10 Operation and Maintenance Data

Operation And Maintenance Manuals

Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides for electro-mechanical door devices shall be provided. The instructions for electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices shall include simplified diagrams as installed.

1.3 OUTAGE INFORMATION

a) Utilities: The Contractor shall coordinate all requests for utility outages or street closings with the Contracting Office in writing 14 days prior to date of requested outage. Water, gas and sewer outages shall be held to a maximum duration of 4 hours unless otherwise approved in writing. See environmental paragraphs for additional guidance. Electrical outages shall be have a maximum duration of 4 hours.

b) Street closing: 1 lane traffic shall be maintained at all times (except that a total closing may be allowed for specific 8-hour periods with DPW and PMO approval).

1.4 CLOSEOUT SUBMITTALS

1.4.1 As-Built Drawings

As-Built Drawings shall be in accordance with Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables included in Appendix A. Provide the following:

- 1 GIS copy (arcview 9.2 format) (at min. the site plan)
- 1 ACAD 2004 or later copy (file named by sht number)
- 1 PDF copy (file named by sht number)
- 1 hard copy (full-size sheets)

As built drawings shall show the following information: Title block on lower right hand Corner; the general depth range of each underground utility line shall be shown (i.e. 3' to 4' depth); the description of exterior utilities including the actual quantity, size, and material of utility lines; location of exterior utilities including actual measured horizontal distances from utilities to permanent facilities/features. These measurements shall be within an accuracy range of six inches and shall be

shown at sufficient points to permit easy location of utilities for future maintenance purposes.

Measurements shall be shown for all change of direction points and all surface or underground components such as valves, manholes, drip inlets, cleanouts, meters, etc. Backflow prevention assembly locations must be properly noted. Details on such assembly locations, unit details, testing, etc must be forwarded to the Directorate of Public Works. Show the location and description of any utility lines or other installations of the kind or description known to exist within the construction area.

1.4.2 Form DD1354 Submittals

Include in deliverables: DRAFT and INTERIM DD 1354s in accordance with SW Region (Ft Bliss) Matoc IDIQ for Const of Infrastructure SWMII UFC 1-300-08 CRITERIA FOR TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY. Include in the DD 1354s the useful life of the facility.

1.4.3 Operation And Maintenance Manuals

a. Provide six copies of operation and maintenance manuals for all mechanical and electrical systems, organized and indexed filed.

b. Provide six copies of maintenance instructions on any item that requires special care, such as a gymnasium wood floor.

c. Provide a complete set of O & M Manuals and red-lined as-built drawings at completion of first phase if project is done in phases.

1.5 GUIDANCE FOR CONSTRUCTION STORM WATER POLLUTION PREVENTION PLANS (SWP3'S) AND PERMITS

Fort Bliss Directorate of Public Works, Environmental Division

Spills - All potentially polluting material should be labeled and stored in original containers where possible and be sealed or covered to prevent contact with storm water or storm water runoff. MSDS's of all materials must be maintained on site. A list of these materials should also be included in the SWP3. All spills or releases of hazardous waste, materials, fuels, oils or lubricants should be reported to Fort Bliss Fire Department (915) 568-1117 or (915) 568-5283. The Fire Department will notify other Fort Bliss entities including Environmental Division which will notify regulatory authorities if reportable quantity thresholds are exceeded.

Storage Tanks - Storage of liquid materials, including fuels, requires impervious secondary containment equal to 110% of stored capacity. A spill response kit shall be maintained at each fuel storage and dispensing location. Drip pans or other temporary containments shall be used during fuel transfers to prevent leaks at the most vulnerable locations; for example hose couplings and beneath the nozzle at the point of transfer to the vehicle. Any rain water accumulated in secondary containments must be considered contaminated if oil or oil sheen is visible. Disposal of contaminated rain water must be coordinated with the installation the Petroleum Storage Tank Manager (915) 568-6959 or Storm Water Manager (915) 568-0794.

Disposing of hyper chlorinated water - During disinfection of newly installed waterlines, chlorinated water to be discharged to the environment (or storm water conveyance system) shall be neutralized to achieve a

maximum residual chlorine concentration of 4 parts per million, in accordance with AWWA standard C651.

Construction Water Service - The Fort Bliss Water Services Company ((915) 569-5360) shall designate a hydrant or stand pipe to assist contractors during construction. A water meter and an approved backflow prevention assembly shall be maintained at all times of operation at the hydrant or standpipe. The water fill area shall be designed and maintained to insure that water does not accumulate causing a vector attractant or erosion. All backflow prevention assemblies shall be tested for proper operation by a backflow prevention technician registered with the Cross-Connection Control Program Manager (CCCM). Contact the CCCM at (915) 569-5359 to schedule testing. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

Hazardous Waste - Construction Site Operators must contact the Environmental Division, Hazardous Waste Program Manager for installation policies and guidance on hazardous waste management prior to accumulation of any HW waste at their sites. The Construction Site Operator is responsible for complying with state/federal hazardous waste management regulations, installation permit provisions, and installation HW Management Plan and SOPs and must provide the HW Program Manager with their waste transporter and disposal facility EPA identification numbers.

Hazardous waste generated as result of construction or other activities on Fort Bliss property must be disposed of under authority of the Fort Bliss permit number and manifests must be signed by an authorized Fort Bliss Representative. Review and signature of the manifest must be scheduled with the Hazardous Waste Program Manager at (915) 569-6393 or (915) 568-7041.

Solid Waste / Recycling -The Fort Bliss landfill is only accessible to those contractors with a permit issued by the Directorate of Public Works, Building 777. All military construction, renovation and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition (C&D) waste by weight, from landfill disposal. Contract specifications will include submission of a contractor's C&D Waste Management Plan prior to the start of site clearance. All weight tickets for materials resold, recycled or reused will be reported to the Environmental Division, solid waste program manager.

Air / Dust Control - Water shall be applied at all construction/demolition sites to include unpaved roads for egress and ingress, staging and storage areas, stockpiles and debris piles, and parking lots for employees and workers. Dust shall be controlled during earth work, grading, and related activities that can create dust. All open-bed trucks shall have a cover or tarp to control dust when handling or hauling earth, aggregate or debris. Crushed rock, gravel or crushed asphalt can be used or applied on in-plant or on-site roads, staging areas, and or park areas to minimize water usage and control dust.

Waste Water - No foreign items, construction debris, chemicals, oils, etc., shall be introduced into the sanitary sewer collection system. Storm water runoff shall be directed away from the sanitary sewer collection system and storm water shall not be disposed into the sanitary collection system. State licensed temporary toilet facilities (i.e. Porta Potties) shall be utilized. There shall be no temporary toilet vaults or septic tanks installed without proper authorization from ENVIRONMENTAL DIVISION.

Document Submission Requirements - A copy of the completed SWP3 including planned start and stop dates, completed NOI and copy of actual construction general permit to should be provided to:

Directorate of Public Works
 Master Planning
 Attn: IMSW-BLS-PWM (Bldg. 777)
 Pleasonton & Chaffee Roads
 Fort Bliss, TX 79916
 (915) 568-2757, 5949, or 5933

The City of El Paso and Fort Bliss storm water conveyance systems are interconnected. As a result, a courtesy copy should also be provided for informational purposes to the:

City of El Paso,
 Kareem Dallo, P.E. or Ziad Al-Dasouqi, P.E.
 Development Services Department
 City Hall, 5th floor
 2-Civic Center Plaza
 El Paso TX 79901
 Off: (915) 541-4788

Additional Information - Question regarding storm water pollution prevention plans on Fort Bliss should be directed to Mr. Kelly Blough, Multimedia Compliance Branch, Construction Storm Water Program Manager, Environmental Division, Attn: IMWE-BLS-PWE (Bldg 622), Pleasonton & Taylor Roads, Fort Bliss, TX 79916, (915) 568-0794 (kelly.blough@us.army.mil) or Mr. Jack Lady (915) 568-0558 (jack.lady@us.army.mil).

Summary of Fort Bliss - Texas Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice to state not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to Texas Commission on Environmental Quality.

SWP3 = Storm Water Pollution Prevention Plan - Document following Texas Commission on Environmental Quality approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent - Texas Commission on Environmental Quality form that a construction site operator submits to the state in order to receive construction site permit coverage.

Summary of Fort Bliss - New Mexico Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice of intent not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to US Environmental Protection Agency Region VI.

SWP3 = Storm Water Pollution Prevention Plan - Document following USEPA region VI approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent - Federal form that a construction site operator submits to the USEPA Region VI in order to receive construction site permit coverage.

1.6 FIRE PREVENTION GUIDE

**FORT BLISS FIRE DEPARTMENT
FIRE PREVENTION GUIDE FOR CIVILIAN CONTRACTORS PREFORMING WORK ON FORT BLISS
(10 May, 1999)**

Fires during construction, alteration, or demolition operations are an ever-present threat. The fire potential is inherently greater during these operations than in the completed structure due to previous occupancy hazards and the presence of large quantities of combustible materials and debris, together with such ignition sources such as temporary heating devices, cutting/welding/plumbers torch operations, open fires and smoking. The threat of arson is also greater during construction and demolition operations due to the availability of combustible materials on site and open access.

Fires during construction, alteration, or demolition operations can be eliminated or controlled through the early planning, scheduling, and implementation of fire prevention measures, fire protection systems, rapid communications, and on-site security. An overall construction or demolition fire safety program shall be developed; essential items to be emphasized include:

- a. Good housekeeping.
- b. On-site security.

- c. Installation of new fire protection systems as construction progresses.
- d. Preservation of existing systems during demolition.
- e. Organization and training of an on-site fire brigade.
- f. A pre-fire plan developed with the fire department.
- g. Rapid communication.
- h. Consideration of special hazards resulting from previous occupancies.
- i. Protection of existing structures and equipment from exposure fires resulting from construction, alterations, and demolition operations.

A fire safety program shall be included in all construction, alteration, or demolition contracts. It is the right of the Fire Department to administer and enforce this program. Refer to NFPA 1 "Fire Prevention Code", Chapter 41 and NFPA 241 standard for "Safeguarding construction, alteration, and demolition operations", Chapter 1 through 10. These standards provide measures for preventing or minimizing fire damage during construction, alteration, and demolition operations. Contact the fire department for guidance. The unique and dangerous situations confronting fire fighters during such operations demand that a complete exchange of pertinent information be established and continued during the life of the project.

Per an 420-90, chapter 6, 6-4, " the installation Fire Chief or (designated representative) will monitor contractor operations on all maintenance and repair, construction, and self-help projects. The contracting officer representative (COR) will notify the contractor and request prompt corrective action when they find fire hazards, unsafe practices or noncompliance with specifications. The Fire Chief, if delegated this authority by the commander, may stop any operation or activity when there is imminent danger to life and property".

This Contractor Fire Prevention Brochure is designed to assist you in establishing fire procedures on Fort Bliss property. The unsafe practices listed herein are just a fraction of many hazardous situations that could occur in or around construction areas.

The most hazardous situations have been listed for ready references. The Fire Department solicits your help in preventing fires. We stand ready to assist you in any matter pertinent to fire prevention or safety. Feel free to call on us any time you have a problem or any situation that might lead to a problem. We are located in Building 11211, Biggs Army Airfield, Phone -568-8194/8195. If calling from a telephone with 568 or 569 prefix, dial 3 then the four -digit numbers. When calling from other prefixes, dial 568 plus the four-digit number.

EMERGENCY NUMBERS

FIRE OR MEDICAL EMERGENCY	565-4100
From 568 or 569 prefix	DIAL 117
MILITARY POLICE	568-2115
From 568 or 569 prefix	DIAL 118
AMBULANCE	569-2331
From 568 or 569 prefix	DIAL 116
STAFF DUTY OFFICER	568-1428 or 568-4233
From 568 or 569 prefix	DIAL 3-4233

Personnel reporting a fire will give the Fire Department Dispatcher the

following information:

- a. Building number or address of fire, including room number and/or location in building.
- b. Name of person reporting the fire.
- c. Type of fire (building, grass, electrical, etc.).
- d. Turn off switches to fans, appliances, ventilation systems, etc.
- e. Post someone outside the building area to direct the firefighters.
- f. Attempt to extinguish and contain fire if possible to prevent fire spread.

1) It is the contractors responsibility to provide extinguishers at the job site. The suitability, distribution, and maintenance of extinguishers shall be in accordance with NFPA-10, "Standards For Portable Fire Extinguishers".

NOTE: The Fire Department is available for advice and assistance on any matters pertaining to Fire Prevention and Protection.

Fire Department BUSINESS telephone number - 568-5283

Fire Department EMERGENCY telephone number - 565-4100

The following fire prevention practices are considered to be reasonable requirements for adherence by private contractors performing work on properties under jurisdiction of post commander.

1. Prior to performing "Hot Work" (welding, burning, lead melting, blow torches, tar pots etc.) or operating other flame producing devices, Contractor shall request a hazardous operation inspection from the Fire Department for each hazardous operation (568-5283).
2. Oil painting materials (paintbrushes, empty paint cans, rags, overalls, drop cloths, etc.) and flammable liquids shall be stored outside in a suitable locker or box located a safe distance from any structure.
3. Accumulation of trash, papers, shavings, sawdust, excelsior, boxes and other packing material shall be removed from building at close of work day and disposed in proper containers located away from the building. Areas outside of the building undergoing work shall be kept reasonably clean of trash, paper or other discarded combustibles.
4. Storage of lumber, roofing paper or other combustible supplies needed during construction shall be kept in a safe distance from the structures.
5. All portable electric devices (saws, sanders, compressors, extension cords or lights) shall be disconnected at close of each workday.
6. Contractors, when working in buildings or areas, shall require their

men to familiarize themselves with locations of nearest administration telephone and in case of FIRE dial- 565-4100.

7. Any fire, NO MATTER HOW SMALL, shall be reported to the Fire Department immediately, the telephone extension - 565-4100.

8. Fire hose or extinguishers in buildings shall not be removed from their locations or used for any purpose other than fire. Fire hydrants shall not be used without authorization from the Assistant Fire Chief of fire prevention; the telephone is 568-8194 or 568-8195. A clear space of 15 feet on both sides of fire hydrants shall be maintained at all times.

9. Responsibility of operation of all valves on water distribution system rests with the Water Plant, which provides personnel for operation of valves upon request.

10. Smoking in buildings undergoing work will be discontinued one-half hour before close of each workday. Smoking is strictly prohibited in or near areas where flammable liquids, highly combustible materials or explosives are stored, handled or processed. No smoking signs will be observed and restrictions complied with.

11. Prior to quitting time, a reliable person delegated by the Contractor will make a check of the building area to assure compliance with the above to insure that building and area are left in a fire safe condition.

12. Contractors will notify the Fire Department if roads, Fire lanes, etc. are to be blocked. Call 568-5283 or 568-8194/8195.

13. Contractor will not work on sprinkler or alarm systems, without approval of the Fire Department, CALL 568-5283 or 568-8194/8195.

14. The following is a check list of fire hazard control around construction areas:

- Careless smoking habits.
- Smoking near flammable liquids.
- Improper storage of flammable materials.
- Cleaning with flammables.
- Electric appliances and self-help wiring.

Curt J. Krieger
Fire Chief
Fire and Emergency Services
Division, DPWL

Receipt of Contractor's Fire Prevention Guide Acknowledgement

Date: _____

Name: _____

Work Site Number: _____

Company: _____

Telephone: _____

Fire Inspector: _____

Signature: _____

Telephone: _____

1.7 DOOR HARDWARE

Unless otherwise required by project requirements, hardware shall conform to the current ANSI/BHMA standards, grade 1. Locks, cylinders, and cores shall comply with ANSI/BHMA A156.13, Mortise Locks & Latches Series 1000, ANSI/BHMA A156.2 Bored and Preassembled Locks and Latches, and ANSI/BHMA A156.3 Exit Devices. Cylinders shall have key removable type cores. Cores shall have not less than seven pins. An extension of the existing keying system shall be provided. Cylinders and cores for locksets other than those for mechanical rooms and crawl spaces shall be manufactured by Best or Arrow to extend the existing keying system. Locksets for mechanical rooms and crawl spaces only shall be keyed to the existing Post utilities master keying system, consisting of Arrow cylinders, 1 1/4 inches, AR-1 keyway, without key removable cores. Disassembly of knob or lockset shall not be required to remove core from lockset. All locksets, exit devices, and padlocks shall accept same interchangeable cores.

a. Cores and cylinders shall fit locksets without the use of adaptors and without play. The key shall easily lock and unlock the lockset without binding or other difficulties. Control key shall easily remove and install cores.

b. Locks shall be keyed in sets or subsets in accordance with the approved hardware schedule. Furnish locks with the manufacturer's standard construction cores and key system. Send permanent cylinders, cores, keys, and the lock set-up code to the Contracting Officer by registered mail or other approved means.

c. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys.

d. All keys shall be marked with "U.S. GOVERNMENT - DO NOT DUPLICATE". Do not place room number on keys other than control/core keys. Stamp Master keys with building code and building number, and the letter "M" followed by appropriate number if applicable. Stamp control/core keys with building code and building number, and the letter "C".

e. All keys shall be stamped with 1/16" to 1/8" high characters.

f. Furnish keys to the Contracting Officer arranged in a container suitable for key control system storage in sets or subsets as scheduled.

g. Closers: BHMA A156.4, Surface type closers shall be Grade 1, Series C02000 Full Cover with options PT-4H, Size 1 or 2 through Size 6, and PT-4D with back check position valve. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, pivots, cement cases, and other features necessary for the particular application. Provide manufacturer's 10 year warranty.

(1) Closers for outswinging exterior doors shall have parallel arms or shall be top jamb mounted. Provide narrow projection closers for doors close to a wall so as not to strike the wall at the 90-degree open position.

(2) Closers on doors accessible to the physically handicapped shall have the closing force set for a push-pull of 2.27 kg (5 pounds) applied at the knob or handle for interior doors; for exterior doors, set to the minimum required to relatch the door.

h. Electro-Mechanical Devices (Locks, strikes, closers, holders, power assist and low energy power operators)

Electro-mechanical locks shall allow for locking or unlocking of doors from a remote location by means of push buttons, card reader, scanners, or other devices. Locks shall be fail safe mode (unlocked when power is off), or when required by project requirements, fail secured mode (exterior side only locked when power is off). Locks shall be mortise series conforming to BHMA A156.13 or bored series conforming to BHMA A156.2 with factory installed electric lock modification or manufactured electro-mechanical locks conforming to BHMA A156.13 or BHMA A156.2 test standards. In hazardous locations, products shall use safe power supplies or be pneumatic.

Electric strike with fail safe feature will not be used for fire doors as they will not meet positive latch requirements. Magnetic locks will fail safe on loss of electric power, and will not be used on fire doors. Magnetic locks will not be used as the only locking device on doors to secure areas. Power, wiring, transformers, converters, and wiring devices will be coordinated with the electrical drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

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

“ATTENTION”

YOUR CONTRACT REQUIRES THAT YOU HAVE AN ACCEPTABLE QUALITY CONTROL (*QC*) PLAN AND SAFETY PROGRAM **PRIOR TO START OF ANY CONSTRUCTION WORK**. THESE PLANS SHOULD BE SUBMITTED AS EARLY AS POSSIBLE TO ALLOW FOR MY REVIEW **AND PROBABLE RESUBMISSION** TO ADDRESS CLARIFICATIONS AND OMISSION, NEEDED FOR MY ACCEPTANCE. YOU WILL NOT BE ALLOWED TO START ANY WORK ON SITE WITHOUT ACCEPTABLE PROGRAMS. YOU ALSO ARE NOT ENTITLED TO ANY DELAY FOR THIS ACTION.

ENCLOSED TO THIS LETTER ARE EXAMPLES OF CQC AND SAFETY PLANS TO HELP YOU TO PREPARE YOURS. THESE SAMPLE PLANS ARE GENERIC AND TYPICAL OF THE **“MINIMUM”** REQUIREMENTS FOR A SMALL PROJECT (LESS THAN \$0.5 MILLION). FOR LARGER AND MORE COMPLEX PROJECTS, YOUR PLANS MUST CORRESPOND WITH ADDITIONAL DETAIL AND CORPORATE THOUGHT. I EXPECT YOUR OUTLINE AND PLANS OF **HOW YOU WILL IMPLEMENT AND ACHIEVE** CONTRACTOR QUALITY CONTROL, SAFETY AND CONTRACT COMPLIANCE.

RESIDENT ENGINEER

QUALITY CONTROL PROGRAM

CONTRACT NO. _____

I. STATEMENT

_____ (Contr) _____ will provide and maintain effective Quality Control Program as required by Contract Clause entitled Inspection of Construction and Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL [(DESIGN AND CONSTRUCTION)] and will assure that all supplies and services required under the Contract requirements, whether constructed or processed by _____ (Contr) _____, or procured from subcontractors or vendors. _____ (Contr) _____ will perform, or have performed, the inspections and tests required to substantiate that all supplies and services conform to the drawings and specifications and contract requirements, and shall also perform, or have performed, all inspections and tests otherwise required by the Contract, unless the required inspection and/or test is specifically designated to be performed by the Government.

II. ORGANIZATION

A. _____ (Contr) _____ will implement a Quality Control System by the establishment of a Quality Control Organization separate from the production or supervisory staff that reports directly to top management.¹ This organization shall consist of not less than ____ full-time Quality Control personnel who will be on the job site at all times work is in progress to ensure compliance with the Contract requirements. This organization shall be supplemented by additional Quality Control personnel as may be necessary. Mechanical and electrical personnel, either engineers or highly qualified technicians shall be provided during the testing, balancing, adjusting, and/or regulating of mechanical and electrical devices and/or systems. The Quality Control organization personnel shall be a part of _____ (Contr) _____ staff and not a member of the staff of a subcontractor performing the work. _____ (Contr) _____ recognizes that the Contracting Officer reserves the right to have replaced any member of the Quality Control staff who in the opinion of the Contracting Officer is not accomplishing their assigned duties. The inspection system will be documented as specified herein and will be available for review prior to the start of construction and throughout the life of the Contract. The Government will be notified in writing prior to any proposed change to _____ (Contr) _____ Quality Control Program and the proposed changes shall be subject to the Government's approval prior to implementation.

B. _____ (Contr) _____ organization chart is included in Appendix A.

C. _____ (Contr) _____ letters of direction to the Quality Control Representatives are included in Appendix B.

D. Qualifications/resumes of Quality Control Reps are included in Appendix C.

III. QUALITY CONTROL REPRESENTATIVES' DUTIES AND RESPONSIBILITIES

A. Perform, or cause to be performed, all daily inspections and tests of the scope and character necessary to achieve the quality of construction outlined in the plans and specifications for all work under the Contract performed on or off site.

B. Maintain the latest applicable drawings and specifications with amendments and/or approved modifications at the job site and assure that they are used for all shop drawings, fabrication, construction, inspections, and testing.

C. Maintain marked-up drawings at the site depicting as-built conditions in accordance with Section 01 33 00 SUBMITTAL PROCEDURES and the technical sections. The drawings shall be available for review by the Government at all times.

D. Prepare and maintain a submittal register, ENG Form 4288, for the duration of the Contract. A review of the register shall be performed at least every 30 days in conjunction with the scheduled dates on the NAS System and in relation to the actual work status and appropriate actions shall be undertaken should slippages or other changes so necessitate. A revised or updated submittal register shall be provided to the Government every 60 days.

E. Review all shop drawings and/or other submittals for compliance with the contract requirements prior to their transmission to the Government. The ENG Form 4025, which transmits the shop drawings or other items shall be certified in accordance with Contract Special Requirement Clause _____.

F. Responsibility for inspecting all work for compliance with the Corps of Engineers "Safety and Health Requirements Manual EM 385-1-1," and _____ (Contr) _____ approved Safety Program. All deficiencies and/or violations shall immediately be brought to the attention of _____ (Contr) _____ employees and/or subcontractors and corrected.

G. Maintain a current Inventory of Installed Property in accordance with the requirements of paragraph ____ of Section 01 78 02.00 10 CLOSEOUT SUB MITTALS.

H. Maintain a listing of required O&M Manuals and contractor instructional requirements with suspense/action dates.

I. Establish and maintain a deficiency notice and material deficiency list program and a tracking and/or suspense system to monitor and assure all inspection and testing activities and frequencies are in accordance with the contract requirements.

J. Initiate and transmit to the Government 60 days in advance of contract completion a complete and factual report of all remaining submittals, inspections, and tests required prior to acceptance of the work by the Government in accordance with the requirements of Section 01 45 04.00 10 QUALITY CONTROL.

K. Perform a completion inspection 14 days prior to the Government's prefinal inspection in accordance with the requirements of Section 01 45 04.00 10 QUALITY CONTROL

L. Attend and assist the Government at the prefinal inspection and the final acceptance inspection.

IV. METHODS OF INSPECTION

A. The Quality Control Representatives shall assure that no work proceeds until the appropriate inspection phase has been performed. A list of the expected major phases of work is included in Appendix G.

B. Preparatory Inspection shall be performed by the Quality Control Representatives prior to beginning any work on any definable segment of work. To include a review of contract requirements; a check to assure that all materials and/or equipment have been tested, submitted, and approved; a check to assure that provisions have been made to provide required control testing; examination of the work area to ascertain that all preliminary work has been completed; and a physical examination of materials and equipment to assure that they conform to approved shop drawings or submittal data and that all materials and/or equipment are on hand. As a part of this preparatory work, Contractor's Quality Control organization will review and certify all shop drawings, certificates, and other submittal data prior to submission to the Contracting Officer. Each submittal offered to the Contracting Officer will bear the date and the signature of a member of the Contractor's Quality Control organization indicating that he has reviewed the submittal and certified it to be in compliance with plans and specifications (or showing the required changes. The Contracting Officer's representative shall be notified a minimum of 72 hours prior to the beginning of the Preparatory Inspection.

C. Initial Inspection shall be performed by the Quality Control Representatives as soon as a representative segment of the particular item of work has been accomplished and to include examination of

the quality of workmanship and a review of control testing for compliance with contract requirements, use of defective or damaged materials, omissions, and dimensional requirements.

D. Follow-up Inspections shall be performed by the Quality Control Representatives daily or as frequently as necessary to assure continuing compliance with contract requirements, including control testing, until completion of the particular segment of work.

NOTE: The Quality Control Representative shall assure that all applicable persons attend the various phase inspections. The actual people who are to perform and/or supervise the work must be in attendance at the phase inspections for the system to work. Should different contractor/subcontractor personnel show up at the initial phase inspection than were in attendance at the preparatory phase inspection, the Quality Control Representative shall re-perform the preparatory phase inspection, along with the initial. If, during the follow-up phase the contractors/subcontractors' key personnel change, then the preparatory and initial phase inspections shall be reinstated and performed again prior to work proceeding.

E. Deficiencies in the work are _____ responsibility to identify and correct. To ensure that defective work is corrected and not built upon, a Deficiency Tracking System will be implemented. Any deficiencies identified in the work by any party to this Contract will either be corrected the same date or recorded by completing a Deficiency Notice Report. The report will be issued to the superintendent and a copy attached to the inspection report. The report number and submit will be entered onto the Master Deficiency List for tracking. The superintendent will be responsible for obtaining correction by the responsible party and will return the notice report upon correction with a description of the action taken and date completed. The Master Deficiency List will be updated accordingly. All deficiencies will be corrected prior to the final inspection. Copies of the above forms are in Appendix E.

F. Project safety and cleanup will be reviewed daily by the Quality Control staff. Each day's report will address specific safety actions taken or compliance obtained. The Deficiency Tracking System will be used to correct safety deficiencies, if applicable.

G. Additional information concerning the three-phase inspection system is included in Appendix D.

V. METHODS TESTING/CHECKING

A. _____ will employ the services of _____, as the program's testing laboratory. The laboratory shall meet the criteria detailed in the current editions of 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” and ASTM E 329, “Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.” The following tests and/or services will be performed by the designated testing laboratory:

(List or provide attachments of tests, etc.)

B. Quality Control of off-site fabrications shall be performed for the following items as indicated:

(List Items to be fabricated off-site and how CQ is to be maintained.)

C. Quality Control Testing and checking shall be performed by, or under the supervision of,

_____ Quality Control Representatives as follows:

(List, such as surveys/grade control, smoothness tests, form alignment and dimension checks, deflection tests for sewers, pressure tests for piping, etc.)

VI. AUTHORITIES/METHODS OF CORRECTION

A. List the specific authorities of the Quality Control Representatives.

B. List the chain of events, or sequences, to be followed for correcting deficiencies.

C. Discuss what actions are to be taken to prevent deficiencies from recurring (i.e., how they will be prevented in the future, etc.

VII. INSPECTION AND TESTING DOCUMENTATION

A. Daily records of all inspections and tests performed for each shift or subcontractor operation shall be signed by the Chief Quality Control Representative and the Superintendent and the original and one copy provided to the Government no later than the next working day.

B. Samples of reports, forms, etc., to be utilized are included as Appendix E.

C. The Daily Quality Control Report shall include as a minimum the following:

1. Identify the project.
2. Data on weather and any delay attributable to such weather.

3. The prime contractor and subcontractors working with labor count for each and their respective areas of responsibilities (including specific activities/work performed), a listing of construction equipment for each, and whether or not it was used on the report day.

4. Factual evidence that continuous Quality Control Inspection and tests have been performed, including but not limited to:

- a. Type and number of inspection or tests involved.
- b. Result of inspections or tests including all computations.
- c. Nature of defects.
- d. Causes for rejection.
- e. Safety inspections/violations.
- f. Proposed remedial action.
- g. Corrective actions taken.

5. The records shall cover both conforming and nonconforming work.

6. A statement that all supplies and materials incorporated into the work are in full compliance with the requirements of the Contract.

7. Appendix F contains more detailed guidance required for documentation.

Signature

Date

¹ If the Contract does not require a separate Quality Control Organization, this sentence should be altered according to the Contractor's proposed staffing.

APPENDIX D

The Three-Phase Control System:

1. Three basic facts should be established at the three-phase conferences:

a. That the feature of work is ready to begin. This involves determining the availability of labor, materials, and information regarding gas lines, underground cables, drainage, etc.

b. That there is agreement between the Government and the Contractor on what is to be accomplished. The definable features of work identified at the Mutual Understanding Conference must be addressed in sufficient detail to assure that there is no disagreement on workmanship requirements.

c. That all questions concerning contract requirements have been answered to the satisfaction of both the Government and the Contractor.

2. The Preparatory Phase:

a. This phase applies to preconstruction activities – those actions that are preformed before any physical work begins. Types of preparatory actions include:

- Physical checks of onsite material and equipment for contract compliance, and
- Approval of shop drawings, test reports, and mix designs

b. The QA Representative must conduct advance surveillance to make sure the Contractor has satisfied all preparatory requirements before beginning construction. Without exception, he must enforce the contract requirement that the Contractor complete a preparatory phase conference for each definable feature of work *before any construction activity begins*.

c. The agenda for Preparatory Phase meetings varies, depending on the specific requirements of each project and feature of work. The following areas, whiled not all-inclusive, are generally applicable to any project and should be considered;

(1) Examine carefully the contract plans and specifications for the particular feature of work. Assure that all parties have been provided with the most up-to-date plans and specifications, and that they fully understand all requirements.

(2) Assure that submittal requirements for the feature of work have been satisfied, fully. This will prevent delays that occur when it is discovered later that material, equipment, or samples were not submitted for approval or were disapproved.

(3) Establish the requirement for the contractor to note material deliveries and examinations on his quality control reports *at the time materials are delivered*. The reason for this is simple. Often, materials are delivered long before they are needed. When they are needed, it is sometimes discovered that they do not comply with contract requirements or approved shop drawings. This will cause delays while new items are located, purchased, shipped, and delivered to the work site. Requiring the contractor to examine goods when delivered will prevent delays.

(4) Assure that previous features of work have been completed in compliance with contract requirements. If the preliminary work has not been satisfactorily completed, the Contractor must not be allowed to proceed until corrections are made.

(5) Discuss how the new feature of work is to be completed. Assure that the Contractor knows how he is going to proceed, and that the procedures he intends to use will assure quality.

(6) Address specific safety matters that relate to the work to be performed.

(7) Determine that the Contractor is adequately prepared for required testing. Ascertain whether he will use an independent testing laboratory or will conduct the tests within his own organization, assure that his personnel are fully qualified and that the necessary equipment is available. Also, make sure that the procedure for reporting test results will be accurate, comprehensive, and timely.

(8) Identify the Contractor's main point of contact who has the responsibility to represent the Contractor and has been delegated authority to correct any problems.

3. The Initial Phase.

a. This phase is required at the beginning of the operation and intended to get the actual work properly underway. It is workmanship oriented, and is the point in the process where workmanship standards are established.

b. During this phase, any disagreements on contract requirements between the quality assurance representative and the Contractor should be identified and discussed, and a mutual understanding reached.

c. The initial phase is of such importance that if the Contractor should, at any time, change his onsite supervisor for a feature of work the Government should insist that he reconvene the initial phase conference. This is done to assure that all parties again have a clear understanding of require workmanship standards.

d. Topics the Contractor should address during his initial phase conference are:

(1) *The definition of full compliance.* This is addressed so that workers fully understand what is necessary to fulfill project requirements. Corps of Engineers specifications differ from those of other Government agencies and form the private sector. By defining full compliance, the Contractor is attuned to specific Corps requirements, and his efforts are aimed at meeting project specifications.

(2) *A check of all preliminary work.* This really constitutes a double check of the earlier stages, and helps to ensure that the Contractor is in full compliance with the Contract.

(3) *The standards of workmanship.* Specifications often contain subjective terms that are open to interpretation. At the initial phase conference, all such subjectivity must be translated into objective, measurable terms on which all parties agree. Any ambiguities must be settled during the initial phase before work begins.

(4) *Errors in the Contract.* Any contact errors identified should be addressed at once by issuance of a change order by the Government. Correcting errors quickly helps to reduce aggravation and can save money for both the Government and the Contractor.

(5) *Required time extensions.* Quick action is required in this area to keep the contract up-to-date.

(6) *Safety.* Safety matters relative to the specific work to be performed should be addressed in detail.

4. The Follow-up Phase. This is a continuous action throughout the entire time work is being performed and involves routine checks to ensure that previously established guidelines to assure contract compliance are being followed. If preceded by thorough Preparatory and Initial Phases, this phase is more effective and productive. This is true because, if it has already been determined that materials and equipment are in compliance with contract requirements, quality assurance personnel can concentrate on other aspects of the project and can accomplish more.

CONTRACT NO. _____

Report No. _____

Date: _____

CONCRETE PLACEMENT CARD

Location _____

Cubic Yards (Theoretical) _____ Cubic Yards (Actual) _____

*Aggregate stockpiles checked for frozen material Yes _____ No _____

Class of Concrete _____ PSI _____

Time: Start _____ Finish _____

Delays: From _____ to _____ Remarks _____

From _____ to _____ Remarks _____

From _____ to _____ Remarks _____

No. Workers _____ No. Finishers _____

* Subgrade Temperature _____

Begin Conc. Mix Temp. _____ End Conc. Mix Temp. _____

Begin Ambient Temp. _____ End Ambient Temp. _____

Slump and Air Specified _____

Slump and Air Actual _____ Time _____

_____ Time _____

_____ Time _____

Cylinder and/or Beams Identification # _____ Time _____ Truck # _____

Identification # _____ Time _____ Truck # _____

Identification # _____ Time _____ Truck # _____

Initial Cure (Type) _____

Initial Cure Medium in place (Time) _____

Remarks _____

Applicable only for cold weather concreting

Quality Control Representative

CONTRACT NO. _____

Report No. _____

Date: _____

CONCRETE PLACEMENT CARD

Location _____

* Auxiliary Heat Type _____

Date Checked _____ Time _____

Surface Check Dry _____ Moist _____ Action _____

Surface Temp High _____ * Low _____

Remarks _____

Date Checked _____ Time _____

Surface Check Dry _____ Moist _____ Action _____

Surface Temp High _____ * Low _____

Remarks _____

Date Checked _____ Time _____

Surface Check Dry _____ Moist _____ Action _____

Surface Temp High _____ * Low _____

Remarks _____

Date Checked _____ Time _____

Surface Check Dry _____ Moist _____ Action _____

Surface Temp High _____ * Low _____

Remarks _____

Date Checked _____ Time _____

Surface Check Dry _____ Moist _____ Action _____

Surface Temp High _____ * Low _____

Remarks _____

Applicable only for cold weather curing

Quality Control Representative

DEFICIENCY REPORT

REPORT NO. _____

DEFICIENCY ITEM _____

LOCATION _____

DEFICIENCY _____

DATE _____

QC ENGINEER _____

DEFICIENCY CANNOT BE CLEARED UNTIL REQUIRED CORRECTIVE ACTION TAKEN AND ITEM RE-INSPECED BY QUALITY CONTROL.

CORRECTIVE ACTION ACCOMPLISHED _____

DATE _____

BY _____

RE-INSPECTED BY QUALITY CONTROL _____

REMARKS _____

DATE _____

QC MANGER _____

APPENDIX F

DOCUMENTATION FOR QUALITY CONTROL REPORTS

a. Weather Delays

(1) The critical activity as shown on the NAS or schedule shall be stated on each report. Adverse weather days, including days impacted, will only be considered when work is prevented on the critical activity for 50 percent or more of the normal workday.

(2) If the Contract has various completion dates for different work items, each item shall be addressed separately.

(3) Documentation shall be reported for weekdays and weekends.

(4) Precipitation – State time it began, when it ended, accumulation, activities affected, and percent of normal workday affected.

(5) Days impacted by weather – State type of condition and from whence it occurred (i.e., wet conditions and/or mud from rain on _____, muddy conditions from freeze/thaw on _____, etc.). State what effect it impacted the crew/crews working on the critical activity in percent.

(6) Temperature limitations – If the specifications limit work on the critical activity by only allowing it to proceed above certain temperatures, you must state when the temperature rose to, or descended to, the specified temperature.

(7) Wind – State time it began to affect the critical work and when it stopped, rate (mph), and how it affected the critical activity (i.e., unsafe to install roofing panel, metal wall panels, etc.).

(8) Your Quality Control representative shall meet with the Corps Quality Assurance representative each day to specifically discuss weather delays. A consensus should be reached by the two representatives if at all possible. The time and place to settle weather delays is at the time of occurrence at the site.

b. Contractor's equipment mobilized or demobilized shall be documented on the report for the day it occurs.

c. Number and classification of contractor and subcontractor personnel.

d. Work performed.

(1) Each work activity for the prime and subcontractors must state exactly what work was performed, specifically where the work was performed (sta. to sta., Building # - Room #, etc.), and the time the work was performed (8:00 a.m. to 11:00 a.m., 9:00 a.m. to 4:00 p.m., etc.). In addition, if the prime or sub is working on more than one activity, the number of men and the type of equipment devoted to each crew shall be indicated.

(2) Subcontractor reports for work performed may be attached to the prime's report. If this method is selected, the QC representative is still responsible to assure all of the data required in b.(1) above is included in the report.

e. Results of surveillance, QC tests, and/or other QC activities.

(1) For each contractor and/or subcontractor activity, state specifically what test was performed, what inspection was performed or surveillance activity take, exactly where it was performed, and at what time. These actions shall be documented for each phase of inspection (i.e. , preparatory, initial, and follow-up).

(2) If deficiencies or failures are found, state exactly what they were and what corrective action is to be taken, including that to prevent future occurrence.

(3) Attach the original copy of all test results. The QC representative shall assure that the test results show the spec limits and that the exact test location is described.

(4) The QC representative is to document all of the above for prime and subcontractor work.

f. Materials and/or equipment

(1) Document on report on day of arrival.

(2) Document condition and compliance/noncompliance with specifications.

g. Off site surveillance – Document who performed, what was performed, when, and results.

h. Instructions received – Document exactly what was discussed or what instructions were received and who issued them.

i. Safety – Document specific details of instructions received and/or given and of actions taken.

j. Remarks – Visitors to site, other pertinent data, etc.

k. The Three Phase Control System (preparatory, initial, and follow-up) – The purpose of the three phase control system is to require planning and scheduling in advance to assure that the Contractor is prepared to start each new activity or feature of work. From reviewing preparatory and initial checklists attached to various QC reports, I get the distinct impression that most QC representatives are just going through the motions to satisfy the “paper” portion of the contract requirements. In addition to the items on the preparatory and initial checklist forms in the Contract, the following shall also be undertaken, discussed, and documented:

(1) A careful examination of the contract plans and specifications with all parties.

(2) A detailed inspection of the work that is to be built on.

(3) An in-depth discussion of what procedures will be used and how the new work will be performed. A complete discussion of common deficiencies for this type of work should also be a part of the record as well as how you plan to prevent their occurrence.

(4) Any disagreements on specification interpretations and directions received.

(5) Any conflicts noted in the plans or specifications and directions received.

(6) A discussion of “standards of workmanship” and “full compliance” with contract specification requirements.

(Sample of Typical Contractor Quality Control Report)

CONTRACTOR'S NAME
(Address)

DAILY CONSTRUCTION QUALITY CONTROL REPORT

(See QCS Software for this form)

Date: _____ Report No. _____

Contract No.: _____

Description and Location of work:

WEATHER: (Clear) (P. Cloudy) (Cloudy);
Temperature: _____ Min. _____ Max;
Rainfall _____ inches.

Contractor/Subcontractors and Area of Responsibility with Labor Count for Each

- a. _____
- b. _____
- c. _____
- d. _____

Equipment Data: (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used.)

1. Work Performed Today: (Indicate location and description of work performed. Refer to work performed by prime and/or subcontractors by letter in Table above. If no work is performed, report the reason.)

2. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken.)

- a. Preparatory Inspection: _____
- b. Initial Inspection: _____
- c. Follow-up Inspections: _____

3. Test Required by Plans and/or Specifications performed and Results of Tests:

4. Verbal Instructions Received: (List any instructions given by Government personnel on construction deficiencies, retesting required, etc., with action to be taken.)

5. Remarks: (Cover any conflicts in plans, specifications, or instructions or any delay to the job.)

6. Results of Safety Inspection: (Include safety violations and corrective actions taken.)

Contractor's Inspector _____

CONTRACTOR'S VERIFICATION: The above report is complete and correct and all material and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.

Contractor's Chief of Quality Control

**NOTE:
DO NOT LEAVE REPORT ITEMS BLANK**

Items 1. through 6. must be reported every day. If there is no other report on an item, enter the work "none" in the reporting space. Reports with items left blank will be returned as incomplete.

PREPARATORY INSPECTION CHECKLIST

(See QCS Software for this form)

Contract No. _____ Date: _____

Definable Feature: _____ Spec Section: _____

Gov't Rep Notified _____ Hours in Advance Yes _____ No _____

I. Personnel Present:

Name	Position	Company/Government
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

(List additional personnel on reverse side)

II. Submittals

1. Review submittals and/or submittal log 4288.

Have all submittals been approved? Yes _____ No _____

If no, what items have not been submitted?

- a. _____
- b. _____
- c. _____

2. Are all materials on hand? Yes _____ No _____

If no, what items are missing?

a. _____

b. _____

c. _____

3. Check approved submittals against delivered materials. (This should be done as material arrives.)

Comments _____

III. Material storage

Are materials stored properly? Yes _____ No _____

If No, what action is taken? _____

IV. Specifications

1. Review each paragraph of specifications.

2. Discuss procedure for accomplishing the work.

3. Clarify any differences.

V. Preliminary Work and Permits

Ensure preliminary work is correct and permits are on file.

If not, what action is taken? _____

VI. Testing

1. Identify test to be performed, frequency, and by whom.

2. When required?

3. Where required?

4. Reviewing Testing Plan.

5. Have test facilities been approved?

VII. Safety

1. Review applicable portion of EM 385-1-1.

2. Activity Hazard Analysis approved? Yes _____ No _____

VIII. Corps of Engineers comments during meeting.

CQC REP

INITIAL INSPECTION CHECKLIST

(See or QCS Software for this form)

Contract No. _____ Date: _____
Definable Feature: _____ Spec Section: _____
Gov't Rep Notified _____ Hours in Advance Yes _____ No _____

I. Personnel Present:

Name	Position	Company/Government
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

(List additional personnel on reverse side)

II. Identify full compliance with procedures identified at preparatory. Coordinate plans, specifications, and submittals.

Comments

_____ _____

III. Preliminary Work. Ensure preliminary work is complete and correct. If not, what action is taken?

IV. Establish Level of Workmanship.

- Where is work located? _____
- Is a sample panel required? Yes _____ No _____
- Will the initial work be considered as a sample? Yes _____ No _____

(If yes, maintain in present condition as long as possible.)

V. Resolve any differences.

Comments

VI. Check Safety

Review job conditions using EM 385-1-1 and job hazard analysis.

Comments



PIPING SYSTEM TEST REPORT

STRUCTURE OR BUILDING _____

CONTRACT NO. _____

DESCRIPTION OF SYSTEM OR PART OF SYSTEM TESTED: _____

DESCRIPTION OF TEST: _____

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME _____

TITLE _____

SIGNATURE _____

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF INSPECTOR _____

DATE _____

REMARKS: _____

OPERATION AND MAINTENANCE INSTRUCTIONS

CONTRACT NO. _____

DESCRIPTION _____

LOCATION _____

DATE _____

Operation and maintenance instructions were conducted for _____
(Type of Equipment) _____ required by
section _____, paragraph _____ on _____. (Date)

The following personnel were present:

Instructions were given by _____
(Contractor's Representative)

The personnel identified herein by their signatures certify that they have been instructed in the operation and maintenance of the above-mentioned equipment.

COMPACTION EQUIPMENT RECORD

Contract No.: _____

Project: _____

*Rubber-tired roller

- a. Make and model:
- b. Type:
- c. Tires:
 - (1) Number:
 - (2) Spacing:
 - (3) Size:
 - (4) Ply rating:
 - (5) Tire air pressure:
 - (6) Load per tire:
- d. Roller width:
 - (1) Rolling width:
 - (2) Overall width:
- e. Weight and Ballast:
 - (1) Empty:
 - (2) Ballast:
 - (3) Ballast Weight:
- f. Speed during Compaction:
 - (1) Specified:
 - (2) Actual:

Submitted by: _____

*Note: This form shall be completed in typewritten form for each different type of equipment and submitted along with the manufacturer's information and the Contractor's certification of compliance with the specifications.

COMPACTION EQUIPMENT RECORD

Contract No.: _____

Project: _____

*Tamping roller

a. Make and model:

b. Type:

c. Drums:

(1)

(2) Diameter:

(3) Length:

d. Tamping Feet:

(1) Base Area:

(2) Shape:

(3) Length:

(4) Number per drum:

(5) Number per row:

(6) Number of rows:

e. Weight and ballast:

(1) Empty:

(2) Ballast:

(3) Ballast weight:

f. Foot pressure:

g. Type of cleaners and frame:

(1) Cleaners:

(2) Frame:

h. Speed during Compaction:

(1) Specified:

(2) Actual:

Submitted by: _____

*Note: This form shall be completed in typewritten form for each different type of equipment and submitted along with the manufacturer's information and the Contractor's certification of compliance with the specifications.

SAFETY PROGRAM

Contract _____

1. Introduction – This project is for construction of (description) _____

_____ (contr) _____ plans to accomplish all work with its own crews except for the following operations which will be subcontracted:

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

2. The remaining work that _____(contr) _____ plans to perform includes the following operations:

- a. _____
- b. _____
- c. _____
- d. _____

3. _____(contr) _____ will comply with all provisions of the US Army Corps of Engineers Safety Manual EM 385-1-1, as currently revised and with OSHA regulations, throughout the course of this project. Base safety regulations pertaining to safety and fire protection will also be fully complied with.

4. Personnel – Our superintendent and Quality Control inspector will both be responsible for inspection of all construction activities and enforcement of this safety program. This includes all subcontractor activities and those of suppliers delivering on site.

5. Indoctrination – All personnel assigned to this project will first be indoctrinated towards job site safety, including employees of subcontractors. Indoctrination will consist of a briefing by the superintendent pertaining to the following:

- a. Alcohol/Drug Abuse Program
- b. Purpose of Safety Program
- c. Hazards Related to the Job Assignment
- d. First Aid and Emergency Facilities
- e. Reporting of Injuries and Safety Hazards
- f. Tool Box Safety Meetings
- g. Required Personal Protection Equipment

As part of the employees indoctrination he/she will be required to read and sign the letter in Appendix A outlining ____ (contr) _____ policy and goals towards implementing this program and having a safe project.

The employee will also be furnished a copy of ____ (contr) _____ policy letter of Alcohol/Drug abuse. Reference Appendix B. There will be no tolerance of any Alcohol/Drug abuse on this project. Any employee found under the influence of illegal drugs or who is abusing legal prescription or non-prescription drugs will be immediately removed from the project.

6. Emergency Plan – The following personnel are trained in CPR and First Aid training and a copy of their current cards is enclosed:

- a. _____
- b. _____
- c. _____

The following emergency phone numbers will be clearly posted on the bulletin board and in the project office:

- a. Ambulance _____
- b. Doctor _____
- c. Hospital _____
- d. Fire _____
- e. Police _____

In case of any emergency, our trained personnel will immediately stabilize the situation by rendering first aid and necessary action to prevent further damage or injury. A 16-Unit First Aid Kit will be maintained on site for emergency use and First Aid treatment. Depending upon the severity of injury, the employee will be transported by company vehicle or ambulance to the hospital. In case of any severe injury,, the ambulance service will be used. In case of death, back injury, or property damage exceeding \$50,000 the site will be preserved, except for emergency rescue, for investigation by the Government.

7. Personal Protection Equipment –

- a. This project is classified as “Hard Hat” area from start to finish. Signs will be posted to this effect.
- b. Protective footwear will be required for this project. As a minimum leather work shoes will be required. Steel toe work boots will be required for all personnel involved in handling material. Rubber boots will be used for concrete slab work and work in damp or muddy conditions. Clamp on toe guards or steel toe boots will be used by all operators of hand compactors. Insulated sole shoes and insulated pads will be used by electricians performing any hot work. Canvas shoes will be acceptable for any work activity.
- c. Protective eye glasses will be maintained at all work stations using saws, grinders, and chippers. Additional goggles will be stocked in the project office at all times and their use enforced when any activity is underway that could endanger the eyes. Welding mask use will be strictly enforced and screens will be maintained around all electrical current welding operations to shield other workers and passerbys.
- d. Leather gloves will be used to protect workers hand from abrasion, heat, and cuts.
- e. The use of seat belts will be enforced on all company vehicles and equipment. No equipment will be used without functioning seat belts being installed.
- f. Mandatory provisions for fall protection whenever workers can fall 6 ft. or more from their area of work, will be strictly enforced. Workers in such situations will be protected by scaffold railing or nets. When these types of protection are not practical, safety belts will be used. When safety belts are used for steel erection work (and elsewhere when applicable) double lanyards will be used to ensure the worker is always tied off when moving past columns and obstructions.
- g. Hearing protection, consisting of disposable ear plugs or muffs will be stocked in the project office and their use enforced in any work activity involving noise levels exceeding those permitted by OSHA. If dB testing equipment is not available and excessive noise levels are suspected, the use of protection will be required.

8. Sanitation Requirements – Peak employment for this project is expected to be _____ employees. This will require _____ sanitary toilets which will be provided on site and maintained. Drinking water will be provided by insulated container with disposable cups at each work station. Water will be replenished not less than daily. A trash receptacle for used cups will be furnished with each water container.

9. Housekeeping – All work areas will be kept adequately cleaned up to alleviate any hazard to workers. At the conclusion of each days work, ____#____ laborers will be assigned to pick up trash and debris and dispose of it in designated locations. Nails in boards will be removed or knocked over immediately. Trash and debris will not be allowed to accumulate on site. It will be hauled off at least weekly and more frequently if work progress requires. Blowing debris will not be permitted under any conditions. Subcontractors will be oriented upon arrival with respect to clean up requirements. Subcontractor work

areas that are not kept safe due to poor housekeeping will be instructed to cease work and will not be allowed to continue again until the situation is corrected.

10. Job Hazards Analysis – Prior to each major phase of work, a hazards analysis of unusual type hazards associated with the work will be prepared. This analysis will address hazards not covered by EM 385-1-1 or hazards that are unique to this project. Our proposed plan for protecting against these hazards will be prepared in advance of the Preparatory Inspection using the form in Appendix C. As part of the Preparatory Inspection, the Job Hazards Analysis will be reviewed and in its accepted form, made a part of this program.

11. Safety Inspections – Our supervisory and Quality Control personnel will continuously inspect all work for unsafe conditions and practices and upon discovery of any, take action to bring the work into compliance with this program. The results of these inspections and corrective actions will be recorded on each day's inspection report. Employees who fail to follow safe work practices or who purposely violate safe practices will be removed from the job. Depending upon the severity of the violation and upon previous work record, the employee may be temporarily suspended or dismissed. All equipment will be inspected upon arrival at the job site and prior to being put into service. The results of these inspections will be recorded on the sample form in Appendix D and maintained on file at the project office. The inspection will be conducted in accordance with EM 385-1-1. The inspections will be conducted by _____ (person) _____. All seat belts, guards, brakes, windshield glass, back up alarms, etc., will be in place and operable while the equipment is on site. Equipment that does not conform will be parked until repaired. Prior to any hoisting by crane equipment, a load test will be performed and recorded in accordance with EM 385-1-1. The load test will be re-performed if the crane is re-rigged in any manner. Our plan for Safe Clearance Procedures will be incorporated into our Job Hazards Analysis.

12. Accident Investigation – All accidents will be reported in accordance with Corps guidance outlined in Appendix E. This includes verbal and written reporting of first aid case injuries, injuries referred to a physician, disabling injuries, back injuries, fatality, or property damage in excess of \$2000. Man hour exposure will be reported monthly.

13. Safety Meetings – All workers, including subcontractors, will attend a tool box safety meeting each week. The meeting will be held on every _____ (day)_____ at _____(time)_____. A written report as shown in Appendix F will be completed for each meeting. A wide range of applicable topics will be discussed at these meetings. A copy of each report will be furnished to the Corps. Each month all supervisory and foreman personnel will participate in a Monthly Supervisory Safety Meeting as requested by the Resident Engineer.

14. Fire Prevention/Protection – A _____(type)_____ extinguisher will be maintained in the near vicinity of any fueling activities. All equipment will be fitted with _____(type)_____ extinguisher when put into use. A _____(type)_____ extinguisher will be maintained at the site of all welding or flame cutting operations. _____
 _____(other locations)_____

All extinguishers will be checked monthly for correct charge. _____
 _____(Continue for clearing operations, roofing, etc.)_____

15. Temporary Electrical – Appendix G shows our plan for temporary electrical service to the site. All wiring and equipment will be in accordance with NEC and EM 385-1-1. All electrical cords will be inspected not less than weekly for proper grounding and for wear. Worn cords or non-conforming cords will be immediately picked up and removed from the site. All circuits will be ground fault protected with breakers in the panel box. Cords will be protected from foot or equipment traffic and no cord will be allowed near any standing water. All power tools will be double insulated or grounded.

16. Plan for Temporary Facilities and Traffic Control – All temporary facilities will be inspected upon installation for safe access, electrical service, and flooring. Trailers will be anchored to the ground, (if this project involves hauling with heavy equipment and without established roads, insert haul road plan with sketch showing road sections, traffic direction, signal/flagman controls, and dust control).

17. (Additional safety planning specifically related to this Contract including)

- Blasting
- Respiratory Protection
- Clearing
- Hazardous/Toxic Waste Operations
- Demolition
- Asbestos
- Deep Trenching Operations
- Etc.

18. _____(contr)_____ will implement the above program during the construction of this project. The safety of all workers will be the principal concern during construction.

 Signature

APPENDIX A

Letter to new employee indoctrinating him/her to Contractor's Safety Program.

APPENDIX B

Letter to new employee indoctrinating him/her to Contractor's Alcohol/Drug Abuse Program.

CONTRACTOR JOB HAZARD ANALYSIS

Date _____

(EM 385-1-1)

Contract No. _____

Phase No. _____

Contractor _____

Location _____

ACTIVITY OPERATION	UNSAFE CONDITION, ACTION, or OTHER HAZARD	PREVENTIVE or CORRECTIVE ACTION THAT WILL BE TAKEN

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**SAFETY INSPECTION CHECKLIST
FOR OFF-HIGHWAY SELF-PROPELLED WORK MACHINES
AND MOTOR VEHICLES**

PROJECT _____

PRIME CONTRACTOR _____ CONTRACT NO. _____

FURNISHED AND OPERATED BY: _____ DATE OF INSPECTION _____

TYPE OF EQUIPMENT: _____

MAKE: _____ MODEL NO. _____ SERIAL NO. _____

INSPECTED BY: _____ TITLE: _____ EMPLOYER: _____

APPROVED BY: _____ TITLE: _____ EMPLOYER: _____

	YES	NO	N/A
1. Is required rollover protection provided? (18.B.20)			
a. Plate affixed to ROPS? _____ Number? _____			
b. Written certification attached to checklist?			
2. Is operator protected from elements, falling or flying objects, etc.? (18.B.11; 18.B.18; 18.B.19, 19.A.13)			
3. Is all glass in operator's compartment safety glass? (18.B.18; 19.A.15)			
4. Backup alarms where required? (18.B.01)			
5. Brakes in good condition? (18.A.21; 18.A.22; 19.A.04; 19.A.07; 19.A.08)			
6. Is emergency braking system capable of automatically stopping equipment? (18.A.21; 18.A.22; 19.A.07)			
7. Is a seatbelt provided for each person? (18.B.16; 18.B.20; 19.B.14)			
8. Motor vehicles equipped w/speedometer, fuel gauge, and horn? (19.A.09)			
9. Engine equipped with power starter? (19.A.23)			
10. Beds of dump trucks equipped with device for locking body in raised position? (19.A.20)			
11. Tires in good condition? (19.A.04)			
12. Are pulleys, belts, gears, chains, and other rip and shear points adequately guarded (18.B.03)			
13. Are fuel tanks located to prevent spills and overflows from hitting hot parts or electrical equipment? (18.B.05)			
14. Are fueling cans used with equipment approved safety type? (12.D.39)			
15. Windshield wipers in good condition? (18.A.29; 19.A.10)			
16. If operated in dark, equipped with headlights and taillights? (A9.A.06; 18.A.19)			
17. Equipped with functioning turn signals? (18.A.15; 19.A.06)			
18. Are platforms, steps, handrails, etc., provided for access? (18.B.08; 18.B.09)			
19. Are exhausts and discharges directed so as not to endanger workers or obstruct view of operator? (18.B.06; 19.A.25)			
20. Remarks: _____ _____ _____			

Equipment Type

1. Truck tractor – Without side boom. Used only for bulldozing, ripping, push loading, front-end loading, or pulling a drawbar load.
2. Pneumatic tired, self-propelled grader – With rigid or articulated frame.
3. Pneumatic tired, front-end loader – With rigid or articulated frame.
4. Pneumatic tired dozer – With rigid or articulated frame.
5. Pneumatic tired, two or four wheel tractor – With trailing scraper, water wagon, bottom dump wagon, side dump wagon, rear dump wagon, or towed fifth wheel attachment.
6. Pneumatic tired, off-highway, non-trailed hauling unit with rear or side dump body.
7. Four wheel drive, skid steer, front-end brake.
8. Wheeled type, industrial front-end loader.
9. Wheeled type, industrial forklift truck.
10. Asphalt spreader or paving machine.
11. Trenching machine – Bucket-ladder or rotary wheel excavator.
12. Motor vehicle – Crew bus, dump truck, concrete truck, general-purpose truck (State capacity, i.e. 2-1/2 ton, 5 ton, 10 ton, etc.)
13. Other – State type.

DATE: _____

SUBJECT: Tool Box Safety Meeting, Contract No. _____

1. A safety meeting was held today at the job site, subject Contract at _____ hrs.

2. Subjects discussed by Mr. _____ were as follows:

A. _____

B. _____

C. _____

D. _____

E. _____

3. Subjects discussed by the Corps of Engineers Quality Assurance Representative, Mr. _____, were as follows:

A. _____

B. _____

C. _____

4. Suggestions Made:

A. _____

B. _____

5. Persons Attending (total number):

A. Company _____ employees

B. Subcontractor _____ employees

C. Corps of Engineers _____ employees

Note: Copy to be attached with
Daily Inspection Report

Contractor's Quality Control Inspector

APPENDIX G

Temporary Electrical Plan with Sketch

SECTION 01 57 24.01 44

STORM WATER POLLUTION PREVENTION PLAN (TEXAS)
04/2010

PART 1 GENERAL

NOTES FOR DESIGNER OF DESIGN-BUILD CONTRACTOR: Prepare pre-construction operation specific SWPPP to be implemented at the job site by a designated and qualified representative.

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. When providing a resubmittal to address USACE review comments, the Contractor shall include annotated comment responses along with the resubmitted SWPPP (in its entirety). The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan (SWPPP or SWP3); G

The construction Contractor site specific SWPPP shall prevent erosion, sediment loss from the construction site, and erosion down gradient of the developed property. To the maximum extent possible, the SWPPP shall (a) limit the area of disturbance to minimize soil loss and prevent the discharge of water quality impaired water from the construction site and (b) incorporate staged stabilization measures as work progresses throughout the duration of the project. The Contractor shall use the current forms (e.g., NOI, NOT, NOC, etc.) required by the TXR150000 Construction General Permit issued by the Texas Commission on Environmental Quality (TCEQ). Additionally, the Contractor shall maintain compliance with the Construction General Permit at all times (even when the Construction General Permit is revised by the issuing agency).

The following summarizes some of the requirements that need to be implemented into the SWPPP as required by the TPDES TXR150000 Construction General Permit.

(1) The SWPPP shall comprise of three (3) major parts: (a) narrative, (b) drawings depicting structural and non-structural best management practices (BMPs), and (c) permit required documentation (attachments and worksheets) for record-keeping.

(2) The Contractor site specific SWPPP shall consider the phasing of project tasks with the timing of BMPs and construction activities. Additionally, the Contractor site specific SWPPP shall consider the diversion of storm water run-on onto the disturbed portions of the project site, including limiting the

area of exposed soil, and retention of sediments from escaping the exposed portion of the site.

(3) The contract drawings depict recommended or suggested BMP types and locations. Any additional BMPs or modifications to the BMPs throughout the project need to be depicted on the drawings included in the SWPPP as well as the text within the SWPPP.

(4) During construction (after USACE approval of construction operation SWPPP), SWPPP or BMP revision is required when site conditions change and when situations arise that may cause potential permit non-compliance. The SWPPP or BMP revision shall be initiated when requested by the Area Office Contracting Officer (AOCO) or as deemed necessary following an inspection conducted by the Contractor designated inspector.

(5) The NOI (if required to be prepared per the applicable state Construction Storm Water General Permit) shall be separately submitted to all required parties by the construction Contractor and the USACE (if deemed applicable) as co-operators of the construction site.

(6) The Contractor shall sign the Certification of SWPPP, the delegation letter of signatory authorization, the NOI (if required to be prepared per the applicable state Construction Storm Water General Permit), and the Notice of Termination (NOT) as required by the applicable Construction Storm Water permit.

(7) The SWPPP must contain a list of regulated materials and construction materials and products, their location, and methods of containment for each product.

(8) The SWPPP must contain a list of wastes, their location, and method of containment.

(9) The SWPPP shall implement procedures that prevent post construction erosion from occurring. Some examples include the use of Scour Stop or equal as velocity dissipators or the placement of composite fiber turf reinforcement mats at down gradient channels.

(10) The following shall be depicted in the SWPPP drawings.

(a) Location of fuel storage tank and/or fuel transfer points

(b) Location of the concrete wash-out pit

(c) Location of on-site or off-site approved construction support activities, including but not limited to Contractor laydown, storage, stockpile, borrow, spoil, parking areas and drainage features

(d) Location of batch plant (if applicable) and drainage features

(e) Location of the stabilized construction access

The following summarizes some of what is needed to be implemented into the SWPPP as required by the USACE.

(1) The SWPPP drawings shall be prepared on site grading plans. The drawings shall include four phases or stages of Best Management Practices (BMP) structures layout: (a) initial BMP layout at site prior to clearing and grubbing, (b) interim BMP layout during grading activities, (c) temporary stabilization method and locations, and (d) final stabilization method and locations of application. Notes on timing controls and activities shall be described on the SWPPP drawings.

(2) The SWPPP shall be prepared by a registered professional engineer, a Certified Professional in Erosion and Sediment Control (CPESC), or a licensed landscape architect who has experience with the applicable construction storm water permit as well as the use of sediment and erosion control best management practices (BMPs).

(3) The Contractor designated inspector and any person responsible for maintaining SWPPP compliance with the applicable storm water permit and permit required activities shall attend training on storm water erosion and sediment control compliance/inspections provided by the EPA, state, or vendors (e.g., www.ieca.org, www.teex.org, www.stormwatercenter.org, etc.). The inspector shall provide training certificates from accredited vendors confirming course completion. Documented experience that deals with maintaining compliance with the applicable Construction Storm Water Permit may be substituted for the above mentioned training. Documented experience must be attached to the SWPPP.

(4) The person responsible for maintaining the SWPPP shall provide briefing on the approved Construction Operation SWPPP to all on-site workers.

(5) The SWPPP shall not be submitted to the USACE unless it has been verified to meet the requirements of the applicable state Construction Storm Water Permit. Prior to submitting the Notice of Intent (NOI) (if required per the applicable state Construction Storm Water permit) to all required parties, the construction operation SWPPP shall be approved by the USACE.

(6) The SWPPP must contain the Material Safety Data Sheets (MSDS) for each material on-site or provide a reference in the SWPPP on where the sheets can be found at the project site.

(7) The SWPPP must contain a list and identify the location and method of containment for each type of waste that is to be recycled during the project.

(8) The following shall be depicted on the SWPPP drawings.

(a) A statement that verifies an emergency spill clean-up kit and spill containment device is at fuel transfer points at all times.

(b) A statement that verifies fuel tanks or fueling trucks have overfill protection devices.

(c) Construction details for all BMPs used on the construction site (e.g., BMPs for the fuel storage areas, concrete wash-out pit, borrow area, batch plant, stabilized construction access, etc.)

(9) Include a copy of this Section.

SD-11 Closeout Submittal

Notice of Termination; G; PER-EE

If a NOI has been submitted, a copy of the original Notice of Termination (NOT) shall be submitted to the regulatory agency and to all required parties. Prior to submittal of the NOT, Contractor shall inspect the finished site with the Area Office Contracting Officer (AOCO) and obtain photographs to prove establishment of final soil stabilization and removal of BMP controls. A copy of NOT and photographs shall be provided to PER-EE (ATTN: Kathy Mitchell) through the AOCO. The construction Contractor shall retain all documents pertaining to Construction Storm Water Permit for at least three (3) years after NOT submittal.

1.2 SUMMARY

Copies of the general permit for storm water discharges associated with construction activity and instructions are available at the following web site:

http://www.tceq.state.tx.us/nav/permits/sw_permits.html
(PERMIT NO. TXR 150000 for large or small construction site)

The Contractor shall verify that the most current forms (e.g., NOI, NOC, NOT, etc.) are submitted with the SWPPP.

The Contractor shall not commence soil disturbance until approval of the site specific SWPPP is obtained from the USACE along with the USACE SWPPP certification, USACE Construction Site Notice, and USACE NOI (if applicable). Additionally, all required waiting periods as described in the TXR150000 Construction General Permit must also be met before soil disturbing activities may begin.

There is no separate payment for work required in this Section.

1.2.1 Site Operators, Responsibilities, and Shared SWPPP

Both the U.S. Army Corps of Engineers (USACE) and the construction Contractor meet the definitions as operators for the construction activities and operate under a shared SWPPP that addresses the requirements of the TXR150000 Construction General Permit.

The USACE employs other operators and has ability to approve or disapprove changes to plans and specifications. When site conditions change, and the approved SWPPP does not meet storm water permit stipulations, USACE will request the construction Contractor evaluate the BMP control structures or non-structural practices. The day-to-day operator shall install additional structural and non-structural BMP for compliance with storm water permit. The USACE operates under the TXR150000 Construction General Permit as a Secondary Operator.

The Contractor has operational control over construction plans and specifications, including the ability to make modifications to plans and

specifications. In addition, the Contractor has day-to-day control of field activities ensuring compliance with storm water permit. The Contractor prepares the construction and operation specific SWPPP and is responsible to establish, inspect, maintain, and rectify the BMPs and perform SWPPP revisions, as well as document Storm Water permit implementation records for the duration of the contract. The Contractor operates under the TXR150000 Construction General Permit as a Primary Operator.

1.3 PROJECT IDENTIFICATION

PROJECT TITLE: [_____]

LOCATION: [_____], Texas

1.4 PROJECT DESCRIPTION

NOTES: Provide a brief description of project site and associated construction activities (i.e. clearing and grubbing; grading; concrete and asphalt pavement; fencing; landscaping; describe project location; necessary site work and utility service lines; and demolition, recycling and disposal of regulated substances, etc.). Reference Civil Design Analysis and drawings for site info. Identify the total project area (acres) for the proposed construction and the existing demolition sites (reference TPDES General Permit No. TXR 150000 for definition on total disturbed site). The total disturbed area includes number of acres where construction activities will occur, construction right-of-way, off-site material storage area, overburden and stockpiles of dirt, borrow area, spoil area, and laydown area. Construction support facilities are to be determined by the construction Contractor.

The scope of this project includes construction of new [_____], [storm sewer,] [sanitary sewer,] [[_____],] [parking lots,] [access drives,] [sidewalks,] [lighting,] [security fence,] [communication system,] and[[_____],]. [In addition, this project shall include demolition of [_____] at [_____].] The total project area of the new construction site includes [off-site material storage,] [overburden and stockpiled material,] [borrow areas,] is roughly [_____] acres. [The total project area of the remote demolition site is roughly [_____] acres]. The total disturbed area [including the new construction and remote demolition sites] in this contract is roughly [_____].

1.5 BID OPTIONS AND PROJECT PHASING

There are [no] Bid Options for this project. [They are:

[_____]
[_____]]

[Project Phasing Activities include:

[_____]
[_____]]

1.6 STANDARD INDUSTRIAL CLASSIFICATION (SIC)

NOTES: SIC codes are obtained from the Standard Industrial Classification Manual published by Office of Management and Budget

(OMB). For construction activity permit, the primary and sometimes the secondary codes will be for the construction activity. The second through the fourth codes will generally relate to the ultimate use of the project. Use one (1) to maximum of four (4) codes as needed to adequately describe the project.

[1521 General Contractors - Single Family Houses]

[1522 - General Contractors - Residential Buildings, other than Single Family (i.e., barracks)]

[1541 - General Contractors -Industrial Buildings and Warehouses]

[1542 - General Contractors - Non-Residential Building, other than Industrial Buildings and Warehouses (i.e., administrative buildings)]

[1611 - Highways and Street Construction, Except Elevated Highways]

[1623 - Water, Sewer, Pipeline, and Communications and Power Line Construction]

[1629 - Heavy Construction, Not Elsewhere Classified (i.e., athletic fields, cofferdams, dikes, boat docks, railroads, reservoirs, water or sewage treatment plant)]

[1771 - Concrete Work (includes asphalt; i.e., access drives and parking lots, culvert construction)]

[1794 - Excavation Work (include trenching and earth moving)]

[4581 - Airports, Flying Fields, and Airport Terminal Services]

[7033 - Recreational Vehicle Parks and Campsites]

[7538 - General Automotive Repair Shops]

[7699 - Repair Shops and Related Services, Not Elsewhere Classified (i.e., military equipment repair, machinery cleaning)]

[7999 - Amusement and Recreation Services, Not Elsewhere Classified (i.e., beaches, fishing piers, picnic grounds)]

[8062- General Medical and Surgical Hospitals]

[9711 - National Security (a general category for military facilities)]

1.7 LOCATION

NOTES: Provide a narrative of the project location, including street names or easily recognized landmarks. As a minimum, include the following: (1) project site street name and boundary streets, (2) latitude and longitude of the project center to the nearest 15 seconds, or (3) quarter, section, township, and range in which the project is located. Describe all disturbed areas, and off-site support functions and locations for proposed facilities and remote demolition sites.

The new facility project site is within the city boundary of [City name]

and is in [COUNTY name]. The project site is bounded by [name all adjacent streets]. The new facility project center is located approximately at [__] degrees [__] minutes [__] seconds latitude, [__] degrees [__] minutes [__] seconds longitude. The physical address for the new facility is [__]. The demolition site is bounded by [__]. [The demolition site project center is approximately at [__] latitude and [__] longitude. The physical address of the demolition site is [____].] [The project borrow and material disposal area is within the project boundary.] [The project borrow area is off-site at LAT [____] and LONG [____]. The project disposal area is off-site at LAT [____] and [____] LONG.]

1.8 RECEIVING WATERS

NOTES: *Identify the body of water that receives site runoff. If it is a tributary to a major river, identify both the tributary and the river. If runoff is collected by a storm drainage system, identify the operator of the system (i.e., the name of the military installation or municipality, the creek adjacent or on site, MS4, the ultimate receiving water body, etc.)*

The storm runoff from the new facility site flows [direction] [into new storm drain] [by sheet flow], then flows [direction] to [name of Creek] ultimately to [name of River] [name of Basin]. [The storm runoff from the demolition site flows [direction] [to storm drain] [by sheet flow], then flows [direction] to [____].]

PART 2 SITE DESCRIPTION

2.1 EXISTING CONDITIONS

NOTES: *Describe current site conditions. Include information on drainage patterns and runoff coefficients. Also discuss the design storm frequencies used for runoff volume calculations. If the site is located adjacent to an existing industrial facility or in a community greater than 100,000 people, records of storm water quality near your site may be available. Include storm water quality records for the site (if it is available).*

The site generally slopes from [north] [northwest] [northeast] [west] [east] [southwest] [southeast] [__] to [north] [northwest] [northeast] [west] [east] [southwest] [southeast] [__] with an average slope of [__] percent. There are currently [no] [an existing] underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from [__] to [__]. Ten-year storm frequency and [__] minutes duration with [____] inches per hour intensity was used for the design of the storm drainage system. [There are currently [no] [an existing] underground storm drainage facilities at the demolition site. The demolition site generally slopes from [east] [south] to [north] [west] with an average slope of [] percent.]

2.2 FINAL CONDITIONS

NOTES: *Describe site conditions and drainage upon completion of construction activities. Include estimates of future runoff coefficients. Describe features of the storm water system and storm water management (i.e., erosion control and velocity dissipation devices).*

Grades at the new facility site will not change significantly and is roughly about [_____] percent from [north] [northwest] [northeast] [_____] to [_____]. Completed facility site drainage will flow [into a new underground drainage system] [by sheet flow]. The grades surrounding the building is approximately [_____] percent grade. The new project site will have a [building,] [access roads,] [service drives,] [_____] , [landscaping] [and turfing]. Estimated future runoff coefficients vary from [_____] to [_____].

2.3 CONSTRUCTION ACTIVITIES

The Contractor shall establish storm water BMP control structures prior to conducting site disturbing activities. The Contractor shall maintain temporary and permanent site stabilization at each portion of site.

The Contractor shall maintain a record of the START date of major construction site activities (i.e., clearing and grubbing, grading, trenching and excavation, dirt moving, etc.), the STOP date when construction activities cease on a portion of the site, and the START date of stabilization measures (such as sod, seeding with native seed, vegetative buffer strips, erosion control compost, turf reinforcement mat, SCOUR STOP, etc.). See SECTION 01 57 25.00 44 SWPP PLAN INSPECTION AND MAINTENANCE REPORT FORM for an example of a grading and stabilization log sheet.

2.4 SOILS DATA

The SWPPP narrative shall provide soils information of the proposed construction site. Possible sources of information are project soil reports, USDA soil survey data, and other published sources. Information can be found at <http://websoilsurvey.nrcs.usda.gov/>.

2.5 STORM WATER POLLUTION PREVENTION DRAWINGS

Each SWPPP drawing shall have a specific sheet number and title.

The following describes the items that need to be identified in the drawings of the SWPPP as required by the TPDES TXR150000 Construction General Permit.

(a) Existing site features and BMPs -- name of receiving waters (e.g., lake, stream, creek, river, unnamed tributary of named receiving stream, etc.), project site storm water discharge locations, existing storm grates, outfall protection devices, and BMPs.

(b) Interim grading site drainage features and BMPs -- slopes with rough grading, limit of soil disturbance area, outline of areas not to be disturbed (e.g., vegetative buffer zones, cultural resources, wetlands, and areas of environmental concern), new storm grates, new drainage outfalls, and BMPs.

(c) Areas to receive temporary stabilization. Methods of stabilization shall be identified along with the applicable specification for the stabilization (e.g., native seed mix at a certain application rate in lbs/sq-ft, etc.).

(d) Areas to receive final stabilization. Methods of stabilization shall be identified along with the applicable specification for the stabilization (e.g., native seed mix at a certain application rate in lbs/sq-ft).

(e) On-site and off-site material borrow areas, clean dirt disposal areas, and BMPs. Stabilized access roads, construction support activities and laydown areas (equipment, staging, parking, and storage areas) along with the BMPs.

(f) Concrete or asphalt batch plant and BMP (if applicable).

The following describes the items that need to be identified in the drawings of the SWPPP as required by the USACE.

(a) BMP construction details for all erosion control and stabilization and sediment control BMPs(e.g., BMPs for the fuel storage areas, concrete wash-out pit, borrow area, batch plant, stabilized construction access, seeding type, silt fence, etc.)

(b) EROSION AND SEDIMENT CONTROL PLAN I (demolition site)

(c) EROSION AND SEDIMENT CONTROL PLAN II(existing site conditions depicting run-on flow diversion BMPs and run-off BMPs)

(d) EROSION AND SEDIMENT CONTROL PLAN III(interim site grading conditions depicting run-off BMP, swales BMP, storm grates BMP, and temporary stabilization areas & method specification)

(e) EROSION AND SEDIMENT CONTROL PLAN IV(complete site grading conditions depicting run-off BMPs, swales BMPs, storm grates BMPs, and final stabilization areas and method specification)

(f) Notes on timing of controls of activities

PART 3 BEST MANAGEMENT PRACTICES (BMPs)-EROSION AND SEDIMENT CONTROLS

3.1 TEMPORARY STABILIZATION

Stabilization measures shall be in conformance with Part III.F.2.b.iii of the TXR150000 Construction General Permit.

The Contractor shall provide all necessary labor, services, equipment, materials (e.g., fertilizer) to obtain, transport, apply, and maintain the temporary stabilized area until final stabilization is performed.

Some examples of acceptable methods for temporary stabilization include water sprinkling with environmental sustainable soil binders (e.g., products produced by Soilworks, LLC, DirtGlue Enterprises, SoilLok, or similar) or anchored straw mulching (typically applied at 2 tons per acre). The construction SWPPP may specify other forms of temporary stabilization methods that are industry accepted and are applicable for the project site conditions.

3.2 PERMANENT STABILIZATION

Stabilization measures shall be in conformance with Part III.F.2.b.iii and iv of the TXR150000 Construction General Permit.

The Contractor designated inspector shall inspect the site with the USACE AOCO to ensure final stabilization is established. Final stabilization is defined as described in Part I.B of the TXR150000 Construction General Permit. If final stabilization is unsatisfactory, additional measures

shall be required by the USACE AOCO. If applicable, additional seeding shall be performed after temporary removal of the erosion control blankets and subsequent replacement of blankets after such activities are completed. If applicable, the Contractor's SWPPP shall specify the native seed mix species and application rate (lbs/sq-ft). Some examples of acceptable methods for permanent stabilization includes sodding, pavement, and rock blankets.

3.3 SEDIMENT BASIN

NOTE: Where attainable, the TPDES regulation requires a temporary sediment basin for sites where 10 acres or more are disturbed at one time. Requirements for a sediment basin are found on Part III.F.2(c) of the TXR150000 Construction General Permit.

The design-bid-build Contractor shall design the sediment pond in the design-bid build contract. The design-build contractor shall design the sediment pond in the design-build contract.

If the construction sediment pond will be re-graded for finished site storm water detention, the designer shall need to use TR-55 NRCS small watershed handbook or some other hydrograph routing based method. The rational method is only acceptable to size the construction sediment pond and it is not acceptable to size for finished site storm water management because it only provides peak flow rate.

The TPDES Storm Water Discharge General Permit requires a temporary sediment basin for sites where 10 acres or more are disturbed at one time. [If the disturbed site drains to a common location, a sediment pond or trap shall be constructed as initial grading activity. The pond shall be prepared by the site designer and it shall include layout and construction details.] [The runoff from the site does not drain to a common collection point; therefore, a temporary sediment basin is not required.] [A series of smaller sediment basins are constructed to provide for temporary sediment control is depicted on the grading plan.] [A series of smaller sediment basins are not attainable, therefore effective sediment controls (i.e. vegetative strips and silt fences) are established on all the down slope areas of the disturbed site perimeter to control sediment in runoff.] [A construction sediment basin is not attainable because [____]] [Temporary sediment pond receives final grade as a permanent sediment pond to manage storm runoff at the finished site.] [A temporary sediment basin is not required because construction activities at each portion of the disturbed site is less than 10 acres.]. The following elements are required if a sediment pond is constructed as an initial site activity: The slopes of sediment pond shall be stabilized with an effective form of temporary/permanent stabilization (as applicable). The storm water shall be allowed to settle after each rainfall event before dewatering in accordance with the applicable Construction General Permit.

3.4 STRUCTURAL CONTROLS

See SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL.

3.5 NON-STRUCTURAL CONTROLS

The Contractor (and the subcontractors) shall be responsible for eliminating pollutants in storm runoff from the project site. The Contractor (and subcontractors) shall be responsible for utilizing non-structural BMPs to minimize storm water pollution. Some examples of non-structural BMP include:

- Construction Practices
- Material Management
- Waste Management
- Vehicle and Equipment Management
- Employee and Subcontractor Training
- Storm Water Pollution Prevention Plan Maintenance

3.5.1 Construction Practices

Dewatering Operations: The Contractor (and subcontractor) shall prevent discharge of sediment by methods of sediment control, containment, and disposal. In project areas suspected of potential toxic or petroleum products contamination, the water shall be tested to determine method of disposal.

Paving Operations: The Contractor (and subcontractor) shall avoid discharge of pollutants to storm drains by avoiding asphalt and concrete paving in wet weather or anticipation of such event, storing material in covered containers, covering and berming storage areas, establish control structures, cover on-site storm grates, and worker and subcontractor training.

Structure Construction and Painting: The Contractor (and subcontractor) shall prevent pollutants in storm runoff by covering, or berming material storage areas, keeping job site clean and orderly, using safer alternate products, stabilizing adjacent disturbed areas, storing material in secondary containment, protecting on-site storm drains, establish control structures, and perform worker and subcontractor training.

Solid Waste Materials: Trash and uncontaminated construction debris shall be placed in appropriate covered waste containers. Waste containers shall be emptied regularly and shall not be allowed to overflow. The disposal area of excavated material from project construction shall not be utilized for waste disposal. Routine janitorial service shall be provided for all construction buildings and surrounding grounds. No construction waste materials, including concrete, shall be buried or otherwise disposed of on-site. The Contractor shall brief all on site personnel on good house-keeping and waste minimization.

Stockpiles: Material shall have a storm water perimeter control devices established at a minimum distance of 10 feet from the toe of the stockpile. Materials excavated from utility trenching shall be protected from up gradient storm run-on.

3.5.2 Material Management

Material Delivery and Storage Practice: The Contractor (and subcontractor) shall prevent or reduce discharge of pollutants to storm water by minimizing the on-site storage of hazardous and toxic (HT) materials, storing HT in clearly labeled, corrosion-resistant containers with

secondary containment at designated areas approved by the COR, conducting frequent inspection, keeping current inventory of construction materials on site and training of workers and subcontractor.

Material Use and Inventory: Common on-site materials are pesticides and herbicides, fertilizers, detergents, concrete material, petroleum-based products, fertilizers, tar, asphalt, steel reinforcing bars, other hazardous chemicals such as acid, lime, solvents, curing compounds, sealants, paints, glues, fertilizers, etc. The Contractor (and subcontractor) shall use less hazardous, alternate or environmental friendly material, if available. The Contractor shall have (1) a list of construction materials used on site, (2) a list of materials and associated potential pollutants, and (3) method of storage and containment in the Contractor operation specific SWPPP.

Spill Prevention and Control: The Contractor (and subcontractor) shall store HT material in covered containers and inside a fenced area, have the temporary fuel storage tank bermed or contained to meet applicable Fire Code, place readily accessible spill clean-up materials, have protocol for immediate work stoppage, notification, clean-up, labeling, storage and packaging, transportation, disposal, record-keeping, closure activities, and provide training to workers and subcontractor for response to spills.

3.5.3 Waste Management

Solid Waste: Solid waste materials (e.g., grout, mortar or uncontaminated debris) shall be placed in covered containers. Trees and shrubs from site clearing shall be shredded and used as mulching material after site stabilization. Packaging materials such as wood, plastic, and paper shall be recycled to the maximum extent possible and not disposed of in a landfill. It is a requirement to perform recycling (see SECTION 01 74 19). The Contractor shall designate waste containers for segregating waste (municipal, metal, aluminum, plastic, wood pallet, packaging, glass, etc.) Dry paint cans shall be recycled. The Contractor shall designate waste disposal area, have a routine janitorial service for all structures and surrounding grounds, and have a routine schedule to service waste containers. The disposal area of excavated material from project construction shall not be utilized for solid or refuse waste disposal. Personnel on the job site shall be briefed on minimizing disposal to landfill by waste segregation and recycling.

Hazardous and Toxic Waste: All excess on-site material such as paints, solvents, petroleum products (e.g., fuel, oil, and grease, etc.), herbicides, pesticides, acids for cleaning masonry, concrete curing compounds, sealants, paint strippers, wastes from oil-based paint, and glues can become HT waste. Containers of excess material shall be labeled and managed according to the labels and as recommended by the product manufacturers. If there are no instruction provided, the Contractor shall turn in contained waste to the installation DRMO, the local household hazardous waste drop-off, or recycling program.

NOTE: DELETE IF REGULATED MATERIAL ABATEMENT IS NOT APPLICABLE TO THE PROJECT.

Demolition: [Buildings to be demolished under this Contract shall require removal of the following regulated materials: [mercury fluorescent lights], [PCB or TCB/DEPH ballasts], [items containing ozone depleting chemicals], [mercury bulb thermostats], [items containing lead-based paint or pipe joints], [and] [asbestos-containing building material] [items containing

CFC] [_____] .] [Asbestos-containing materials shall be handled and disposed of in accordance with Section 02 82 14.00 10 ASBESTOS HAZARD CONTROL ACTIVITIES prior to building demolition.] [Lead hazard control activities shall be performed in accordance with Section [02 83 19.00 10 LEAD BASED PAINT HAZARD ABATEMENT, TARGET HOUSING & CHILD OCCUPIED FACILITIES] [02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS] [02 83 13.00 20 LEAD IN CONSTRUCTION].] [Other regulated materials shall be removed and managed in accordance with Section 02 84 00.00 44 REMOVAL, RECYCLING, AND DISPOSAL OF REGULATED MATERIAL.]

Contaminated Soil: If suspicious of soil contamination during soil moving activities, the Contractor (and subcontractor) shall stop work, notify COR, and establish containment to prevent soil transport or runoff from that location. For removal of contaminated soil, a WORK PLAN shall be prepared for COR approval prior to handling and management of the material. The WORK PLAN shall at least include the following: containment, sampling & analyses, notification to regulatory agencies, transportation, worker safety, training & environmental monitoring, disposal, and documentation and record-keeping.

Construction and Concrete Waste: Construction waste or surplus materials, demolition building debris, scrap metal, rubber, plastic, glass, concrete, and masonry products shall be segregated and recycled to minimize landfill disposal. No construction waste shall be buried or disposed of on-site. Concrete waste shall be controlled and minimized by appropriate storage methods for dry and wet materials, and control the amount of concrete and cement mixed on site. Sweepings from exposed aggregate concrete shall be collected and returned to aggregate stockpile and they shall not be washed into streets or storm drains. Concrete wastewater from wash pit is not permitted to discharge as storm runoff. See SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL for additional concrete wash-out requirements. After project completion, the Contractor shall contain wastewater, clean the basin, test and dispose of wastewater and sediment in accordance with applicable regulations and to the satisfaction of the USACE AOCO. The Contractor is responsible for all fees, levies, and disposal cost and shall provide a treatment facility signed delivery ticket.

Sanitary/Septic Waste: On-site sanitary facilities shall be established at a convenient location. Facility location, design, maintenance, and waste collection practices shall be approved by COR and are in accordance with local regulations. The Contractor (and subcontractor) shall have a routine schedule for waste pump out by a licensed hauler. Septic waste treatment system shall have a pre-construction permit from the local health regulating agency and have contract service with a licensed company. Temporary sanitary facilities discharging to sanitary sewer system shall be approved by the operator of the system and properly connected to avoid illicit discharges. Wastewater from water-based paint shall not be discharged as sanitary waste.

Building Exterior Cleaning or High-pressure Wash: Storm drains shall be protected by approved storm water control device. Wash onto dirt area, spade in, settle solids in pit, collect (mop up) and discharge to sanitary sewer (with approval from sewer operator). If the exterior paint contains lead exceeding the levels stated in the Consumer Safety Standard, mercury or mildewcide, the wash water shall be collected and disposed of as regulated material that will require sampling data for disposal to permitted facility.

Street/Pavement Cleaning: Water used for this activity shall be minimized

and sediment basin shall be used to contain wastewater. At completion of construction, the silt shall be removed and disposed of in accordance with applicable regulations, and water from the basin shall be pumped to a sanitary sewer with written approval from the COR.

Dechlorination of Wastewater from Disinfection of New Drinking Water System: Reference SECTION 33 11 00 WATER DISTRIBUTION.

Care of Storm Water from Excavated Areas: Storm water trapped in excavated areas shall be lifted or pumped into a temporary bermed sediment basin or equal measure(s) for sediments removal. The filtered water shall runoff as sheet flow from the sediment removal area. The sediment removal area shall have the maximum separation distance possible from the site drainage outfall.

3.5.4 Dust Control

See SECTION 01 56 00.00 44 DUST CONTROL.

3.5.5 Vehicle and Equipment Management

Off-site Vehicle Tracking: The Contractor is required to keep vehicles from tracking soils from the project, borrow, and disposal sites. Temporary parking area(s) to be used 30 calendar days or more for the Contractor's equipment or personal vehicles shall be paved with temporary asphalt. The temporary parking areas shall be removed by the Contractor upon project completion and restored to the satisfaction of the COR.

Vehicle and Equipment Cleaning: Washing shall be performed off site at a commercial washing facility that has an oil/water separator as pre-treatment before connection to municipal sewer system. No vehicle washing is allowed on site, unless washing involves the rinsing of a concrete truck and wastewater is trapped in a washout pit with secondary containment.

Vehicle and Equipment Fueling: Fueling shall be off-site unless a written approval is obtained. If fueling on-site is approved, it shall be at least 150 feet from drainage courses. The Contractor shall provide a construction detail to depict best management practices for fuel storage and fuel transfer/dispensing areas. Fueling operations shall avoid topping of fuel tank, and avoid mobile fueling of mobile construction equipment. Fueling locations shall use impervious secondary containment (i.e., a liquid-tight berm and an impermeable liner). The containment capacity of the bermed area shall provide at least 110 percent (%) of the stored fluid.

It is necessary to have a clean-up kit and containment bloom (or absorbent material) available at all times for immediate clean-up during fueling. No petroleum fuel, oil or lubricants or products tanks are allowed on-site unless is pre-approved in writing. Emergency cut-off valve and or overflow protection device is required on fuel transfer equipment. The temporary fuel containers placed on-site shall meet the industrial standard, labeled and stored in accordance with applicable Federal, state, and local Fire codes.

In case of spill of hazardous, toxic, and radiological waste (HTRW), the Contractor shall stop work, contain spill, notify the AOCO and Safety Office, and execute spill control per the SPILL CONTROL PLAN as required in specification SECTION

[01 57 20.00 10] [01 57 20.15 10] [01 57 20.16 10] [01 57 20.17 10] [01 57 20.19 10]

ENVIRONMENTAL PROTECTION. Spill control, response, notification, clean-up, restoration, reporting, record-keeping, etc. shall be in accordance with 40 CFR 110 and 40 CFR 112, other applicable Federal, state, and local regulations, and to the satisfaction of the AOCO.

Vehicle and Equipment Maintenance: Outdoor vehicle or equipment maintenance is a significant potential source of storm water pollution. Activities often include engine repair, changing fluids, etc. Such activities shall be prohibited at the job site. The construction Contractor shall verify proofs on routine maintenance of construction equipment and vehicles before bringing them to the job site.

Vehicle and Equipment Parking: Vehicle or equipment shall be regularly inspected for leaks and schedule routine maintenance to reduce the potential for leaks. If leaks are observed at the job site, such vehicle or equipment shall be repaired immediately or removed from the site.

3.5.6 Employee and Subcontractor Training

The Contractor is responsible for providing training for all workers (including the subcontractor) on the job site. The objectives in training are to provide a clear concept of activities or problems that generate pollutants to storm water, identify solutions (BMPs), promote ownership of the problems and solutions, and integrate feedback into training and BMP implementation. A certificate to verify completion of training shall be signed by all trained personnel and retained in the SWPPP.

3.5.7 Storm Water Pollution Prevention Plan Maintenance

The USACE approved SWPPP shall be readily available to inspector either from the USACE or regulatory agency. The USACE approved BMPs and SWPPP shall be revised at no cost by the construction Contractor when there are changes in site conditions, sequence of construction and operation, when sediments escape from the job site, or as dictated by the results of inspections. The BMPs and SWPPP shall be updated by the construction Contractor upon request of the USACE AOCO.

PART 4 STORM WATER MANAGEMENT AND PERMANENT CONTROLS

NOTE: The number and headings of these subsections will vary significantly from project to project. Use as many subsections as necessary to adequately describe erosion and sediment controls for the completed project site. While designing the site layout and grading plans, the design engineer should include features that will limit erosion and control sedimentation once project construction has been completed. Permanent structures may include curbs and gutters, storm drains, drainage ditches, culverts, pavement slopes, etc. Indicate storm frequencies and durations used for design purposes. Subsections may include, but are not limited to: RUNOFF COMPUTATIONS, STORM DRAINAGE SYSTEM, VEGETATIVE BUFFER STRIPS, DRAINAGE SWALES AND DITCHES, DRAINAGE CULVERTS and all measures discussed in SECTION 01 57 23 STORM WATER POLLUTION PREVENTION MEASURES. All sites for new construction and demolition shall be separately addressed. Units of measure used shall match the construction project.

The SWPPP designer shall determine if there are concerns

associated with the discharges from sources other than storm water. The SWPPP designer shall consult with the construction Contractor to determine concrete washout pit capacity at the job site to provide total containment of concrete detention and the designed storm event.

4.1 RUNOFF COMPUTATIONS

The storm drainage design is based on a [10][__]-year storm frequency and [10][__]-minutes duration with [___] inch per hour rainfall intensity.

4.2 SURFACE DISCHARGE QUALITY

The wastewater from concrete washing activity is prohibited from discharging as surface runoff. See Part 3.6.5 of SECTION [01 57 20.00 10] [01 57 20.15 10] [01 57 20.16 10] [01 57 20.17 10] [01 57 20.19 10] ENVIRONMENTAL PROTECTION.

4.3 PERMANENT EROSION CONTROL STRUCTURES AND STORM WATER TREATMENT UNIT

Permanent drainage structures, including [concrete curbs and gutters,] [storm drainage system,] [concrete pavement,] [asphalt pavement,] [drainage swale,] [drainage ditch,] [turfing,] [vegetative strip,] [concrete culvert,] [pipe culvert,] will provide erosion control at the project site.

[Storm water treatment unit shall has a stainless steel expanded screen opening of at least 4700 microns (4.7 mm or 0.185 inches) to remove sediment.]

4.4 OUTLET PROTECTION OR OUTFALL VELOCITY DISSIPATION DEVICES

NOTE: *Identify velocity dissipation or outlet protection device to provide non-erosive flow conditions at the point of surface drainage discharge. New construction and demolition sites shall be addressed separately.*

The outlet protection or outfall dissipation device shall provide non-erosive flow conditions at the point of surface water discharge to the ditch or swale and downstream of the outfall or channel. [The proposed storm drain shall be discharged into [[flow channel] [x-inches diameter storm drain pipe] .] The outfall impact locations are protected by [e.g., SCOUR STOP or equal]. The drainage channels are protected by [e.g., seeding on prepared soil surface with ECC and overlay with composite turf reinforcement mats] [composite turf reinforcement mats overlay on solid sod] .

PART 5 TIMING OF CONTROLS AND ACTIVITIES

NOTE: *Discuss the sequence of major construction activities and how the related pollution prevention measures will be implemented. Identify situations which are critical to successful construction and pollution prevention, but will not limit the Contractor's ability to determine construction phasing schedule. NOTES of Timing of Controls and Activities specific for each project shall be depicted on SWPPP drawings.*

The general Contractor shall discuss timing (sequence) of controls and construction activities to minimize soil loss from exposed areas in the construction operation SWPPP.

The following list provides a general example of the Timing of Controls and Activities.

- Minimize area of disturbance,
- Preserve existing vegetation at the downgradient portion of the site, do not disturb ground cover until it is necessary to proceed with field work,
- Install stabilized construction access,
- Install BMPs at contractor staging, stockpiles, storage, parking, borrow areas, and stockpiles (on-site and off-site locations), concrete washout pit, fuel storage/transfer area, etc.,
- Install BMP at existing storm grates (e.g., curb inlets surface inlets, manholes, catch basins, etc.),
- Install flow diversion dike and stabilize. Construct sediment trap at the downgradient end of the dike,
- Track weather and protect exposed areas with erosion control measures before anticipated storms arrive.
- Construct outfall, install BMPs at initial impact location, and stabilize flow channel prior to clearing upper watershed,
- Stage construction to the maximum extent possible by disturbing, protecting, and then stabilizing one side of river bank before disturbing the opposite side,
- Stabilize flow channel,
- Clear site for sediment pond (if applicable) and utilize sediment pond skimmer to control overflow,
- Stabilize pond slopes,
- Develop run-on BMP devices and protect loose soil areas,
- Start grading up gradient of site and stabilize disturbed areas,
- Avoid disturbing downslope areas of site until up-gradient disturbed areas are stabilized,
- Delay construction of infiltration measures until the end of project when drainage areas are stabilized,
- Install BMP protections at new storm grates (e.g., curb inlets surface inlets, manholes, catch basins, etc.),
- Protect excavated materials by installing BMP perimeter controls to protect materials from run-on and run-off
- Stabilize stockpiles and install BMPs at least 10 feet from the toe of the material,
- Backfill utility trenches in a timely manner to minimize erosion and soil loss,

- Monitor weather reports to schedule paving (asphalt or concrete), concrete saw cutting, foundation work, dust control, seeding or any activities that will impact run-off,
- Inspect and maintain BMP control structures,
- Evaluate BMP and revise BMP when site conditions or activities change. Assess non-storm water discharges. Maintain Construction General Permit and USACE required field records and training logs,
- Monitor discharge from concrete batch plant (if applicable),
- Maintain stabilized areas until final project acceptance (i.e., watering, fertilize, mow, additional seeding, etc.),
- Verify final stabilization of disturbed areas with AOCO representative. See definition in PART 2.3,
- Remove sediment and BMP control structures once disturbed areas are permanently stabilized and accepted by AOCO. Obtain photographs of site to prove establishment of stabilization and removal of all BMP controls,
- File the Contractor NOT. Provide a copy of NOT through AOCO to PER-EE.

PART 6 COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

NOTE: Army Regulation 200-1 requires that all Department of Defense installations and Contractors to comply with Federal environmental protection statutes, which includes a provision to observe State, and local environmental regulations.

The SWP3 shall identify the document prepared for compliance with the National Environmental Policy Act (NEPA) of 1969, as amended. It shall discuss impact on endangered and threatened species and their (critical) habitats, archeological, cultural and historical resources and properties, wetlands, floodplains, environmental contamination and compliance issue, water resources, ecological resource, land use, noise, air quality. The installation environmental office is responsible to prepare the NEPA document at the project pre-design stage. The Contractor shall request name NEPA compliance document (Record of Environmental Consideration, Environmental Impact Statement, Environmental Assessment), date of signature for findings (Record of Decision or Findings of No Significant Impact), and include information to PART 7.

In compliance with the Clean Water Act, Section 402, a construction site of 0.4 hectare (1 acre) in size, or larger, is required to obtain a National Pollutant Discharge Elimination System (NPDES) from EPA TPDES General Permit for Storm Water Discharges from Construction Activities.

Section 404 of the Clean Water Act (CWA) stipulates discharge of dredge and fill material with jurisdictional Waters of the United States. The civil engineer and environmental planner shall evaluate the proposed site compliance with CWA Section 404. For

The proposed site shall be reviewed if it crosses drainage water ways or watersheds (dry creeks and streams could be Waters of U.S.) that are contributing to the Waters of United States. The review process sometimes involved wetland delineation to identify existing national permit coverage or issuance of a Clean Water Act Section 404 Permit. The permit or a permit coverage verification memorandum could require compensatory mitigation. The compensatory mitigation shall become the initial part of construction activity. The construction Contractor shall not start soil disturbing activities until the required compensatory mitigation is implemented or the soil disturbing activities are covered under existing national permit.

The civil engineer and environmental planner shall evaluate the proposed site compliance with Clean Water Act, Section 10, the Rivers & Harbor Act of 1899.

Section 401 of the Clean Water Act stipulates the on-site sewerage discharge. If an on-site sewerage system is required, the Contractor shall prepare drawings and mark-up specifications, obtain a pre-construction permit from the state, regional Environmental Quality Office, or County Health Department. The Contractor shall contact installation Environmental Office for application of on-site sewerage system pre-construction permit.

The Contractor shall resolve all permit compliance issues prior to disturbing soil.

In compliance with the National Environmental Policy Act of 1969, as amended, the [Environmental Assessment] [Environmental Impact Statement] entitled [_____] dated [_____] has been prepared and the memorandum was signed on [_____] .] [Record of Environmental Consideration (REC) dated [_____] has been prepared for this proposed action.] [The [EA] {EIS} [REC] indicates the proposed action is [_____] .] [The proposed action has [_____] impact on endangered and threatened species and their critical habitats.] [The attached letter dated [_____] with US Fish and Wildlife Service has determined the following protection measures:[_____] .] [The proposed action has [_____] impact on cultural and historical properties, the memorandum dated [_____] from SHPO verified this resolution.] [The proposed action has [_____] impact on noise.] [The proposed project site [_____] encroaches upon floodplains and wetlands.] [The proposed action [_____] impact air quality.] [The proposed site has [_____] environmental compliance issues and an environmental baseline study (EBS) was prepared on [_____] . The EBS indicated that [_____] .] [This facility will have an on-site sewerage treatment system and the Contractor shall obtain a pre-construction permit prior to start work.] [The Contractor shall not start field work until [the Clean Water Act Section 10] [and] [Section 404] issues are resolved and a permit is issued or the construction activity is covered under a nationwide permit and a verification memorandum, dated [_____] is completed by the the Permit Section, Regulatory Branch, US Army Corps of Engineers.] [In compliance with the Clean Water Act permit issued on [_____] , the Contractor shall furnished work as required for the compensatory mitigation as stipulated by the permit.] In compliance with Clean Water Act, Section 402, the Contractor and the subcontractor shall conform with all applicable TPDES General Permit stipulations to discharge storm water during construction. [The Contractor shall furnish water well development certification in accordance with state and local regulations]. In addition, the Contractor (including the subcontractor) shall comply with the Government approved

Contractor's operation specific Storm Water Pollution Prevention Plan, BMP, and contract requirements as stated in this section. The Contractor (and the subcontractor shall comply with all applicable Federal, state, and local hazardous, toxic, radiological (HTR) waste, municipal waste, sanitary and septic waste disposal regulations.

PART 7 MAINTENANCE AND INSPECTION PROCEDURES AND QUALIFICATION OF DESIGNATED INSPECTOR

The Contractor shall designate an inspector on site to ensure Storm Water Permit compliance and perform SWPPP quality control. All BMPs and control structures shall be inspected according to the requirements of Part III.F.7 of the TXR150000 Construction General Permit. The inspector shall inspect adjacent areas daily for direct clean-up of waste materials, debris, and fugitive sediment that are blown or washed off-site.

All protective measures used and identified in the SWPPP must have maintenance performed in conformance with Part III.F.6 of the TXR150000 Construction General Permit.

The designated SWPPP inspector is responsible for maintaining the SWPPP throughout the term of permit coverage in accordance with the TXR150000 Construction General Permit (i.e., Part III.7(d) and (e)). All deficiencies shall be corrected and recorded. An example of a form to record this information can be found in SECTION 01 57 25.00 44 SWPP PLAN INSPECTION AND MAINTENANCE REPORT FORM. A copy of each inspection report form shall also be provided to the AOCO.

PART 8 PROHIBITION ON NON-STORM WATER DISCHARGES

In accordance with the Part II.A.3 of the TXR150000 Construction General Permit, non-storm water discharges are prohibited during construction of the project, except for the non-storm water discharges listed below. The following list of non-storm water discharges from active construction sites are allowed and is developed based on the above guideline.

- (a) discharges from fire fighting activities
- (b) uncontaminated fire hydrant flushings
- (c) water from the routine external washing of vehicles, the external portion of buildings or structures, and pavement, where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless spilled materials have been removed; and if local, state, or federal regulations are applicable, the materials are removed according to those regulations), and where the purpose is to remove mud, dirt, or dust
- (d) uncontaminated water used for dust control
- (e) potable water sources including waterline flushings (excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharge are not expected to adversely affect aquatic life)
- (f) uncontaminated air conditioning condensate
- (g) uncontaminated ground water or spring water, including foundation or footing drains where flows are not contaminated with industrial materials such as solvents
- (h) lawn watering and similar irrigation

The Contractor designated Storm Water Inspector shall perform routine inspection to ensure only allowable non-storm water discharges are occurring.

PART 9 CONTRACTOR COMPLIANCE AND CERTIFICATION

The construction Contractor shall use this Section as guidance on how to prepare a construction SWPPP that includes narrative, drawings (see PART 2.5 in this Section), and required worksheets. Prior to submitting the NOI (if required to be prepared per the applicable state Construction Storm Water General Permit) to the regulatory agency and all other required parties, the Contractor shall submit the operation and field specific SWPPP with a prepared and signed NOI attached for USACE review and approval. Additionally, a prepared Primary Operator Construction Site Notice shall also be prepared and submitted along with the SWPPP.

The construction Contractor and sub-contractor shall each prepare a SWPPP CERTIFICATION. The SWPPP CERTIFICATION assures responsibility and compliance with the permitted discharges of storm water during construction. As such, the SWPPP submitted for USACE review and approval shall have a SWPPP CERTIFICATION prepared and signed by the appropriate approval authority. The USACE sharing the approved SWPPP shall prepare a SWPPP CERTIFICATION and a Secondary Operator Construction Site Notice. All SWPPP certifications and site notices shall be included and retained in the SWPPP.

9.1 CONSTRUCTION SWPPP GUIDELINES

An adequate construction SWPPP includes a narrative, drawings, and required worksheets.

The narrative is a written statement to explain and justify the pollution prevention decisions made for a particular project. The narrative shall contain concise information about existing site conditions, construction phasing, BMP practices, construction schedule, and the performance the BMPs are expected to achieve, and actions to be taken if the performance goals are not achieved, and other pertinent items that may not be contained on the drawings.

The narrative shall identify all operators (see PART 1.3 in this Section).

The site grading plans provide a baseline to assist in the preparation of the SWPPP drawings. The drawings shall layout various BMP types, locations, and methods of stabilization in accordance with Part III.F.1(g) of the TXR150000 Construction General Permit and Part 2.5 of this Section.

The SWPPP shall also address the following.

- Describe the location, size, and characteristics of any wetlands, streams, or lakes that are adjacent or in close proximity to the site, and/or will receive discharges from disturbed areas of the project. Also delineate areas with high erosion potential including steep slopes. List Threatened and Endangered Species and Critical Habitats. List Cultural and Historical Resources.
- Clean Water Act Section 404 Memo or Permit Stipulations
- Septic System Permit
- Water well Permit
- Identify if concrete/asphalt plant is at site (A batch plant may require coverage of an industrial operation permit)

- Spill Prevention and Control Measures per state or EPA and local requirements
- Spill Response

The general construction Contractor shall file a NOI as the primary operator of the construction site. Submitting by electronic means is the most efficient process for filing an NOI, and therefore recommended. However, the physical address for NOI submission and payment can be found on the NOI form.

9.1.1 On-Site Construction Document, Signage, And Record-Keeping

A copy of each of the following shall be maintained in the USACE approved SWPPP in accordance with the TXR150000 Construction General Permit.

- TPDES TXR 150000 general construction storm water permit,
- Primary Operator (Contractor) Construction Site Notice,
- Contractor NOI,
- Contractor Certification of SWPPP,
- Contractor Signatory Delegation Letter,
- Contractor BMP Inspection and Maintenance Report,
- Qualification documents (e.g., training certificates) for Contractor personnel that maintain any part of the SWPPP,
- Contractor log for recording Major Construction Activities and Subsequent Stabilization Practices,
- Contractor log for describing construction materials stored on-site, their potential pollutants, and method of containment,
- Contractor log for describing waste materials stored on-site and method of storage,
- Contractor's anticipated construction timeline schedule (that includes anticipated dates for soil disturbance),
- Contractor SWPPP training log (if batch plant operation is being conducted),
- Contractor NOT (once the project is complete and the NOT is submitted),
- Contractor Concrete or Asphalt Batch Plant sampling records (if batch plant operation is being conducted),
- USACE Certification of SWPPP,
- USACE NOI (if applicable),
- Secondary Operator (USACE) Construction Site Notice,

- Contractor and the USACE (if applicable) storm water discharge permits after receipt from the regulatory agency.

A copy of each of the following shall be maintained in accordance with USACE requirements.

- Contractor NOT (append a blank form in the SWPPP to be completed once project is finished and approved by the USACE AOCO),
- Contractor SWPPP Revision Log,
- The SWPPP shall contain label tabs or similar to clearly identify each item/section of the SWPPP,
- The SWPPP shall be retained at the project site at all times,
- A spill response action guide (i.e., TCEQ issued RG-285 and installation guide),
- Contractor SWPPP/BMP training log,
- Certification or Notification for a Drinking Water Well and/or Septic Sanitary Sewer System (if applicable).

The Contractor shall post the following near the main entrance of each construction access point.

- Primary Operator (Contractor) Construction Site Notice,
- Secondary Operator (USACE) Construction Site Notice,
- NOI (Contractor),
- NOI (USACE, if applicable),
- Contractor Storm Water Permit authorization letter,
- USACE Storm Water Permit authorization letter (if applicable).

All records pertaining to the Storm Water Permit for discharging water associated with construction site activities shall be maintained, by the construction Contractor, for a minimum of three (3) years from the date that a Notice of Termination (NOT) is submitted to the regulatory agency. See Part VI of the TXR150000 Construction General Permit.

9.1.2 Storm Water Discharge General Permit Fees And Fines For Non-Compliance

The Contractor shall be responsible for the initial Contractor storm water discharge permit NOI fee and any subsequent annual permit fees during construction (if required per the applicable state Construction Storm Water General Permit). In addition, if a batch plant is on-site, the Contractor is responsible to obtain samples of surface water discharged at the batch plant. A water sample for water quality analysis shall be analyzed by a state accredited laboratory and data shall be submitted to the regulatory agency for the batch plant operation as required by applicable permit regulations.

Any fines levied by regulatory agency regarding non-compliance with TPDES TXR150000 Construction General Permit shall be the Contractor's responsibility.

9.1.3 Regulatory Inspector Visits

If the regulatory agency inspector visits the job site, the workers shall

notify the Contractor Designated Storm Water Inspector immediately. The Contractor's Designated Inspector shall contact the USACE AOCO immediately and both of them shall accompany the regulatory agency inspector to walk the construction site. The Contractor's Designated Inspector shall brief workers daily on the BMP and the SWPPP, logistics of a regulatory agency inspector site visit, and avoid having an unattended regulatory agency inspector on the job site. The Designated Inspector shall assign a responsible person in his/her absence to oversight the logistic of regulatory agency inspector site visit.

9.2 NOTICE OF TERMINATION (NOT)/COMPLETION REPORT

Notice of Termination (NOT) is applicable for construction activities that submit an NOI. If applicable, the regulatory agency will automatically send the annual storm water permit payment notice if a NOT is not received in the data base before a set date each year. The Contractor is responsible to pay any annual fee on a construction storm water discharge permit.

At establishment of final stabilization, the Contractor shall have USACE AOCO approve the project's final stabilization as well as remove sediment and BMP sediment controls, obtain pictures of the permanently stabilized site and removal of BMP controls, and written approval from USACE AOCO. The Contractor shall prepare a NOT and submit his/her own NOT to the appropriate regulatory agency and any other applicable contacts (i.e., MS4s, cities identified in the SWPPP, etc.). The Contractor shall provide two (2) copies of the filed NOT and site photos to the USACE AOCO. The AOCO shall retain a copy of the NOT as project closure documentation and forward the other copy of NOT and photos to CESWF-PER-EE.

For all other construction activities (i.e., ones that do not require a filing of an NOT), the Contractor shall file the proper documentation to the regulatory agency and any other applicable contact (i.e., MS4s, cities identified in the SWPPP, etc.) as described in the TXR150000 Construction General Permit. A copy of this document submittal shall be provided to the USACE AOCO. The AOCO shall retain a copy of the documents sent to the regulatory agency and other applicable contacts as project closure documentation and forward a copy of all the documents and photos to CESWF-PER-EE.

The Contractor is responsible for fines due to non-compliance with closure documentation for the construction activity storm water discharge permit.

9.3 NOTIFICATION TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

NOTE: Modify this paragraph to fit the project's location. Include the appropriate MS4 contact information and delete the ones that do not apply.

A copy of NOI (for large construction site), a copy of the Notice of Change (NOC; if changes occurred after initial NOI is sent to the regulatory agency), and NOT shall be sent by the Contractor to all MS4s and any other applicable contacts (i.e., cities referred to in the SWPPP, etc.).

For small construction activities, the Contractor shall notify the MS4s and any other applicable contacts (i.e., cities referred to in the SWPPP, etc.) in the project area by submitting of a copy of the Small Construction Site Notice.

[**NOTES: Determine the MS4 notification requirement with user's environmental office. Delete if not applicable to the project site.**

The MS4 person of contact (POC), mailing address, and phone for this project is [_____].]

[**NOTES: MS4 notification for construction activities located at Ft. Bliss, TX. A copy of the completed SWPPP with all the proper documents shall be provided to contacts listed below. Delete if not applicable to the project site.**

Directorate of of Public Works
Master Planning
Attn: IMSW-BLS-PWM (Bldg. 777)
Pleasanton and Chaffee Roads
Fort Bliss, TX 79916
915-568-2757, 5949, or 5933

Kareem Dallo, P.E. or
Ziad Al-Dasouqi, P.E.
Development Services Department
City Hall, 5th Floor
2-Civic Center Plaza
El Paso, TX 79901
915-541-4788

[**NOTES: MS4 notification for construction activities located at Fort Hood. Delete if it is not applicable to the project site.**

III Corps & Fort Hood
Attn: AFZF-PW-ENV (Riki Young)
Fort Hood, TX 76544-5028
254-287-6499]

[**NOTES: MS4 notification for construction activities located within the City of San Antonio, Texas. Delete if it is not applicable to the project site.**

Mr. Phil Handley
Construction Compliance Supervisor
210-233-3564 (office phone)
210-233-4536 (fax number)
Philip.Handley@saws.org

Mailing address:
San Antonio Water System
2800 U.S. Highway 281 North
San Antonio, Texas 78212
Attn: Phil Handley

]

-- End of Section --

SECTION 01 57 25.00 44

SWPP PLAN INSPECTION AND MAINTENANCE REPORT FORM
06/2009

PART 1 GENERAL

The form identified below provides a baseline for an inspection report form that can be used while conducting SWPP Plan site inspections. Inspection reports must be prepared and documented in accordance with the applicable Construction Storm Water Permit (i.e., Part III.F.7 of the Texas TXR150000 Construction General Permit, Part IV.D.4 of the Louisiana LAR100000 Construction General Permit, Part III.D of the Louisiana LAR200000 Construction General Permit, and Part 4 of the NPDES General Permit for Storm Discharges from Construction Activities). The form provided below may not be applicable to all states and therefore needs to be verified by the Contractor that it is in compliance with the applicable construction general permit.

1.1 SWPP PLAN INSPECTION REPORT FORM

The following inspection is being performed in compliance with the applicable state's General Permit or the EPA NPDES permit, whichever is applicable, relating to discharges from construction activities (for the State of Texas it is Section F.8 of the TCEQ General Permit No. TXR150000; for the State of Louisiana it is LPDES Permit # LAR 100000 (LARGE construction activity) or LPDES Permit # 200000 (SMALL construction activity)).

STORM WATER PERMIT #: _____
PROJECT NAME: _____
PURPOSE OF INSPECTION: _____
INSPECTOR: _____ DATE: _____
_____ DAYS SINCE LAST RAINFALL ON: _____
AMOUNT OF LAST RAINFALL: _____ INCHES
() ONSITE RAIN GAGE () METEOROLOGICAL TOWER AT: _____
IS A CONSTRUCTION SITE NOTICE POSTED: _____
IF YES, LOCATION: _____
IS PERMIT ATTACHED TO PLAN: _____
IS PLAN CERTIFIED IN ACCORDANCE WITH REGULATIONS: _____

STABILIZATION CONTROL SECTION

For each area of the construction project, use this chart to track the dates of soil disturbing activity, identify stabilization measures, and monitor their effectiveness. Discharge locations should be inspected to check the effectiveness of these erosion control measures.

AREA	DATE LAST DISTURBED	DATE OF NEXT DISTURBANCE	STABILIZED (Y/N/TEMP)	STABILIZED WITH	CONDITION, COMMENTS
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

COMMENTS / STABILIZATION REQUIRED (if appropriate): _____

STRUCTURAL CONTROLS SECTION

Use this table to document the effectiveness of each structural control, such as silt fences, berms, riprap, etc. Copy this sheet as required. Discharge locations should be inspected to check the effectiveness of these erosion control measures. See the Installation's Storm Water/Surface Water Pollution Prevention Best Management Practices Guidance Document for correct installation/maintenance methods.

TYPE	LOCATION	INSTALLED CORRECTLY?	EVIDENCE OF EROSION?	MAINTENANCE REQUIRED
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

COMMENTS: _____

MATERIAL STORAGE AREAS

EVIDENCE OR POTENTIAL FOR POLLUTANTS ENTERING THE DRAINAGE SYSTEM: _____

OTHER COMMENTS: _____

NON STORM WATER AND NON STRUCTURAL BMP CONTROLS

The following non-storm water discharges from active construction sites are allowed.

- discharges from fire fighting activities,
- uncontaminated fire hydrants flushing,
- water from the routine external washing of vehicles, the external portion of buildings or structures, and pavement, where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless spilled materials have been removed; and if local, state, or federal regulations are applicable, the materials are removed according to those regulations), and where the purpose is to remove mud, dirt, or dust,
- uncontaminated water used for dust control,
- potable water sources including waterline flushings (excluding discharges of hypochlorinated water, unless the water is first dechlorinated and discharge are not expected to adversely affect aquatic life),
- uncontaminated air conditioning condensate,
- uncontaminated ground water or spring water, including foundation or footing drains where flows are not contaminated with industrial materials such as solvents,
- and lawn watering and similar irrigation

PROHIBIT DISCHARGING NEW WATER LINE DISINFECTION WASTEWATER AND CONCRETE WASHOUT PIT WASTEWATER. NEUTRALIZE CHLORINE RESIDUAL IN DISINFECTION WASTEWATER TO 4 PPM PER AWWA C651 AND METERED TO SANITARY SEWER OR DISCHARGE TO SEDIMENT POND. EVAPORATE WASHOUT PIT AND RECYCLE CONCRETE.

LOCATIONS WHERE VEHICLES ENTER OR EXIT SITE

EVIDENCE OF OFFSITE SEDIMENT TRACKING: _____

METHOD TO CORRECT _____
DATE COMPLETE _____

OFFSITE DISCHARGES

EVIDENCE OF SEDIMENT OR OTHER POLLUTANTS LEAVING SITE: () YES () NO
IF YES, LOCATION: _____
METHOD TO CORRECT _____
DATE COMPLETE _____

STORM WATER POLLUTION PREVENTION PLAN REVISION

If this inspection has revealed any issues that require an update to the SWPP Plan, include them here.

CHANGES REQUIRED TO THE SWPP PLAN (if appropriate): _____

REASONS FOR CHANGES (if appropriate): _____

LIST ANY ADDITIONAL LOCATIONS WHERE BMPs ARE NEEDED: _____

LIST ANY INCIDENTS OF NONCOMPLIANCE WITH SWPP PLAN AND NECESSARY MODIFICATIONS TO SWPP PLAN: _____

IS FACILITY IN COMPLIANCE WITH SWPP PLAN AND PERMIT? _____

If yes, this inspection must be properly signed and certified that the facility is in compliance.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name Signature Title Date

-- End of Section --