SECTION 02200

SITE WORK DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 STAGING AND CONTRACTORS ACCESS

1.1.1 Staging Areas

Contractor staging and storage area shall be located on the site.

1.1.2 Contractors Access Route

The Contractor access route to the project location shall be from 6th Avenue through the Aspen gate, west on Steamboat Avenue to the site. Contractor's parking area(s) shall be located along and on either side of the unpaved extension of Steamboat Avenue. See sheet C1 for more details and Section 01500 for additional security requirements. The Contractor shall maintain parking area(s) such that no mud or dirt is tracked onto the paved streets on base.

1.2 DEMOLITION

1.2.1 General

All unsatisfactory excavated materials and construction debris shall be disposed of outside Government-controlled lands in accordance with federal, state, and local regulations. Small buried concrete footings and/or large chimney foundations may be encountered and require removal. An existing row of trees (maximum size of approximately 150 mm in diameter) along Steamboat Avenue on the north end of the site shall be removed.

1.2.2 Utilities

Existing abandonned buried utility lines may be found within the project site and, if so, shall be located and removed prior to construction.

1.2.3 Pavements

There is no existing pavement on the project site.

1.3 NEW CONSTRUCTION

1.3.1 Field Survey

The contractor is responsible for providing and verifying the accuracy of a new field topographic survey prior to design and construction activities. The survey shall show existing utility layout and invert information, sewer and utility manhole data, pavement types, powerline pole class and weight, number and size of transformers, and number of conductors on each pole as well as site topographic elevations.

1.3.2 Base Supplies and Warehouse Building

The limits of the project site are Powderhorn Drive to the east, Steamboat Avenue on the north and the storm drainage detention basin to the southwest. The detention basin shall not be altered or impacted by this project in any way. The new base supplies and warehouse building shall be oriented with the long axis in the east-west direction for optimum solar exposure. The loading docks shall be located on the west end of the south side of the facility.

1.3.3 Exterior Construction

Concrete pavement shall be provided adjacent to the docks and shall extend out a minimum distance of 6 000 mm from the dock. An additional minimum distance of 20 000 mm of asphalt pavement shall be provided south of the dock and shall extend from at least the west end of the dock east to at least the east side of the drive-thru bay. A two-way access drive with a minimum width of 7 500 mm shall be provided to connect this paved area to Powderhorn Drive. 15 000 mm radii shall be provided off of Powderhorn Drive and at other locations as required to permit vehicle manuevering. The paved area shall be configured with a turnaround at the southwest corner to allow for adequate manuevering of 40-foot semi-trailers to and from the dock. Six P.O.V. parking spaces, including 1 handicapped space, shall be provided near the administrative area at the east end of the building with access from the south paved area and Powderhorn Drive. Concrete wheelstops and painted stripes shall be provided for each parking space. A 1 800 mm wide sidewalk shall be provided from the parking area to the personnel entrance. A concrete dumpster pad, sized for a 30 cubic yard dumpster, will be provided convenient to the east end of the dock . The first 4 500 mm of pavement in front of the dumpster pad shall be concrete. Another two-way asphalt access drive, with a minimum width of 7 500 mm, will be required to connect the north end of the drive-thru bay to Steamboat Avenue for flatbed delivery vehicles. 15 000 mm radii shall be provided off of Steamboat Avenue. Steamboat Avenue will be upgraded from gravel to asphalt pavement from Powderhorn Drive to the end of the west radius of the new access drive. This portion of the road shall match in width the paved portion of Steamboat Avenue east of Powderhorn Drive. No new fencing will be required for this facility.

1.4 EARTHWORK

Borrow material shall be obtained from sources outside the limits of Buckley Air National Guard Base. Surplus satisfactory excavated material may be disposed of on base at a location to be provided to the Contractor by ADF personnel once the volume is determined. The Contractor shall keep the waste area in a neatly graded and well drained condition at all times.

1.5 PAVEMENTS

A Geotechnical/Soils Investigation and Report shall be prepared by the Contractor's Consultant. The Consultant shall be a professional registered engineer liscensed in the area of soils and structural design of pavements. The investigation shall be of sufficient scope to accurately assess subsurface conditions relative to pavement design and construction and will include soil borings and soil testing. The report shall assess all elements of required structural thickness, materials, and anticipated traffic loadings including frequencies. Pavement recommendations including jointing and reinforcing of concrete and frost considerations shall be in accordance with TM 5-822-5. Drainage of base courses shall be accomplished in accordance with TM 5-820-2 and ETL 1110-3-435. In addition, the following minimum pavement requirements shall be met which consider only a moderate number of passes of forklifts of less than 6 800 kg (15,000 lbs) total operational (loaded) weight.

1.5.1 Concrete Pavement

The loading dock approach and dumpster pad approach shall conform to the following minimum pavement section:

175 mm Portland Cement Concrete with 13M (#4) bars spaced 300 mm o.c.e.w.
150 mm Drainage Layer (RDM)
200 mm Crushed Aggregate Base Course (Non-Frost-Susceptible) compacted to at least 95 % ASTM D 1557 Density
Filter Fabric or Separation Layer
150 mm Subgrade compacted to at least 90 percent maximum density

1.5.2 Asphalt Pavement

The access drives and vehicle manuevering area shall conform to the following minimum pavement section:

75 mm Bituminous Surface Course
Bituminous Prime Coat
450 mm Crushed Aggregate Base Course (Non-Frost-Susceptible) compacted to at least 100 percent maximum ASTM D 1557 Density
150 mm Drainage Layer (RDM)
Filter Fabric or Separation Layer
150 mm Subgrade compacted to at least 90 percent maximum ASTM D 1557 Density

1.5.3 Curb and Gutter. N/A.

1.5.4 Concrete Sidewalks

Provide the following minimum section:

100 mm Portland Cement Concrete
100 mm Subbase Course compacted to at least 100 percent maximum density
300 mm Subgrade compacted to at least 95 percent maximum density

Sidewalks shall conform to the material and construction requirements specified in Section 608 "Sidewalks and Bikeways" of the Colorado State Highway Specifications.

1.5.5 Concrete Dumpster Pad

Provide the following minimum section:

125 mm Portland Cement Concrete with 10M (#3) bars at 300 mm o.c.e.w.
100 mm Subbase Course compacted to at least 100 percent maximum density
300 mm Subgrade compacted to at least 95 percent maximum density

1.5.6 Materials

1.5.6.1 Portland Cement Concrete

Portland Cement Concrete shall conform to the requirements of Fort Worth District Guide FW-02516.

1.5.6.2 Bituminous Surface Course

Bituminous Surface Course shall conform to the requirements of CEGS-02556.

1.5.6.3 Bituminous Prime Coat

Bituminous Prime Coat shall conform to the requirements CEGS-02559.

1.5.6.4 Crushed Aggregate Base Course

Crushed Aggregate Base Course shall conform to the requirements of CEGS 02241, further edited for Non-Frost-Susceptibility (less than 5% passing the #200 sieve).

1.5.6.5 Subbase Course

Subbase Course shall conform to the requirements of CEGS-02234.

1.5.6.6 Drainage Layer

Drainage Layer shall conform to the requirements of CEGS-02243 utilizing Rapid Draining Material (RDM).

1.6 GRADING AND DRAINAGE

Provide positive drainage for all areas. Grades in turfed areas adjacent to the building shall be set 300 mm below the finished floor elevation and shall slope away from the building at a minimum slope of 5 percent for the first 3 000 mm. Grades in paved areas adjacent to the building shall be set 200 mm below the finished floor elevation. Grades in the P.O.V. parking area shall be a maximum of 1.5 percent in the direction of parking and 8 percent maximum perpendicular to the direction of parking. The pavement adjacent to the dock shall be depressed 1168 mm below the top of the dock.

The dock approach shall have a maximum slope of 10 percent. The new paved portion of Steamboat Avenue shall match the existing road in cross slope. The new access drives and remaining paved areas shall have maximum slopes of 6 percent in any direction. Grade changes in excess of 1 percent in the new paved road or access drives shall be accomplished by means of vertical curves. All new paved areas shall have a minimum slope of 1 percent in the direction of drainage. Sidewalks shall have a transverse grade of 2 percent and a maximum desirable longitudinal grade of 5 percent. The walks and ramps shall meet the handicapped requirements of the Uniform Federal Accessibility Standards. Special attention shall be given to sidewalks on the north side of the building to ensure a freeze/thaw cycle does not result in the formation of ice on the walk. Ice on walks should be a safety consideration for all areas. Turfed swales shall have preferred minimum longitudinal slopes of 0.5 percent and an absolute minimum grade of 0.3 percent. All other turfed areas shall have minimum slopes of 2 percent and maximum slopes of 25 percent. All unpaved and disturbed areas within the limits of grading shall be reseeded to native grasses. There is no landscaping required for this facility.

1.6.1 Storm Drainage System

Storm drainage design shall be calculated using the rational formula, Q=C(I-F)A, for a ten-year storm frequency. The minimum velocity of flow in conduits during a design storm shall be 0.75 meters per second. Flow from the roof drain systems, if required, shall be onto splashblocks in turfed areas. Generally, all storm drainage shall be surface drainage routed to the storm drainage detention basin located along the southwest boundary of the site. However, the depressed pavement adjacent to the dock shall be drained by a trench drain which will be connected to a headwall by an underground storm drain line. Concentrated flow in asphalt areas should be avoided if possible. If it becomes necessary, provide concrete paving in the swale flowline and erosion protection in the turfed areas adjacent to the pavement.

1.6.1.1 Pipe Materials

Pipe for culverts and storm drains shall be of the following materials and conform to the specified standards:

Reinforced Concrete Pipe: ASTM C 76
Reinforced Concrete Arch Culvert and Storm Drain Pipe: ASTM C 506
Reinforced Concrete Elliptical Culvert and Storm Drain Pipe: ASTM C 507
PVC Pipe: ASTM D 3034, Type PSM
Corrugated PE Pipe: AASHTO M 294, Type S

Storm drain manholes, if required, shall conform to the requirements of Section 02605 Manholes and Covers as provided in Attachment 5.

1.6.1.2 All pipe for culverts and storm drains shall have a minimum cover of 600 mm and shall be designed to withstand both dead loads and H-20 or HS-20 highway live loads.

1.6.1.3 The minimum size of pipe used for underground storm drain lines shall be 300 mm (12-inch) inside diameter. The minimum size of pipe used for culverts shall be 375 mm (15-inch) inside diameter for culverts less than 9 000 mm long and 450 mm (18-inch) inside diameter for longer pipes. Concrete headwalls shall be provided for all culverts. If outfall velocities at headwalls exceed non-erosive values, erosion protection shall be provided. The preferred minimum gradient of culverts and storm drain pipes shall be 0.5 percent with an absolute minimum of 0.3 percent.

1.7 COMPOSITE UTILITIES

Known existing utilities are shown on sheet C1. The new domestic water line, fire water line and gas line shall be connected to existing lines north of Steamboat Avenue. The new domestic water line shall be connected to a tee on an existing 200 mm (8-inch) ductile iron main approximately 276 000 mm east of Powderhorn Drive. The new fire water line shall be connected to an existing 300 mm (12-inch) PVC line approximately 304 000 mm east of Powderhorn Drive. The new gas line shall be connected to an existing 100 mm (4-inch) steel main approximately 308 000 mm east of Powderhorn Drive. The new utility corridor shall remain on the north side of Steamboat Avenue and turn south to the site across the gravel portion of Steamboat Avenue west of Powderhorn Drive. The new domestic water line shall form a new loop with the other end connected to an existing 300 mm (12-inch) ductile iron line located approximately 270 000 mm south of the site under Powderhorn Drive near the main entrance to the ADF. The new utility corridor shall be on the west side of Powderhorn Drive. The new sanitary sewer line shall be connected to an existing 460 mm (18-inch) line which runs along the north side of Steamboat Avenue. Underground utilities shall be identified by permanent on-grade utility markers which indicate the type of service and depth of burial. Markers shall be located a maximum of 30 000 mm apart on straight runs and at every change in direction. Markers shall consist of a stamped or engraved brass plate embedded in concrete. Refer to UTILITY MARKER DETAIL located in Attachment 5. The new gas line, fire supply line, domestic water line and all fire hydrant lines shall be metered.

1.7.1 Cathodic Protection

Corrosion protection shall be provided for all buried ferrous piping, fittings, valves, and other water line appurtances. Corrosion protection shall consist of a cathodic protection system. See Section 02800 ELECTRICAL DESIGN REQUIREMENTS, paragraph 1.9, Cathodic Protection System, for more details.

1.7.2 Water Lines

All water lines shall comply with applicable federal, state and local standards.

1.7.2.1 Design Requirements

The Contractor shall design and provide all facilities required to deliver water to the project. Connection to the existing water distribution system shall be made without interruption to service. The domestic demand shall be designed in accordance with the Uniform Plumbing Code.

1.7.2.2 Water Distribution and Service Lines

1.7.2.2.1 Flow Requirements

Water must be supplied by mains of appropriate capacity to provide all flows at adequate pressure to meet all requirements of the new Base Supplies and Warehouse building. The Contractor shall provide all design calculations.

1.7.2.2.2 Service Connections

A maximum velocity of 3 meters per second shall be used.

1.7.2.2.3 Dewatering, Hydrostatic Testing, and Flushing of Lines

The Contractor shall be responsible for implementing the terms and requirements of Section 01430 ENVIRONMENT PROTECTION for hydrostatic testing, and flushing of lines after disinfection.

1.7.2.2.4 Shutoff Valve

Curb stops are prohibited. The building shall be provided with a separate service and main shutoff valve, readily accessible to maintenance and emergency personnel. Shutoff valves in walks are prohibited.

1.7.2.3 Dedicated Fire Water Lines

A new dedicated fire water line shall be connected to the existing 300 mm (12-inch) PVC fire line shown on sheet C1 and shall be used only for the building sprinkler fire protection system. A post indicator valve shall be installed on the fire water line in accordance with NFPA 24. Guard posts shall be provided for protection if the valve is subject to vehicular damage.

1.7.2.3.1 Fire Flow Data

For determination and documentation of fire protection, the Contractor shall provide all available fire flow data for the new Base Supply and Warehouse building, including the static pressures, residual pressures and flowrates. The Contractor is responsible for conducting pressure and flow rate tests required for fire protection design. The Contractor shall coordinate with the Buckley Air National Guard Base fire department and the ADF/CE prior to conducting such tests.

1.7.2.3.2 Fire Hydrants

Hydrants shall conform to AWWA C502, Dry-Barrel Fire Hydrants. Valves shall conform to AWWA standard C500, Gate Valves for Water and Sewerage Systems. All new fire hydrants shall be connected to the domestic water lines and not to the dedicated fire protection line. Fire hydrants shall be compatible with those presently in use at the installation(Waterous WB-67/100), with similar pump and hose connections. Fire hydrant spacing shall be no greater than 150 000 mm apart and accessible by paved roads. In addition, hydrants shall be located so that all parts of the Base Supply and Warehouse facility can be reached by hose lines not over 90 000 mm long. Hydrant laterals shall be 150 mm (6-inch) minimum size, shall not exceed 15 000 mm in length, and shall have an underground shutoff valve. The valve box on each lateral line shall be located within 3 000 mm of the hydrant and shall be located to avoid obstruction by parked vehicles. Guard posts shall be provided for protection where hydrant locations are subject to vehicular damage. Hydrants shall not be located closer than 12 000 mm to the building. Hydrants shall be located approximately 2 000 mm from the edge of paved roads. The tops of hydrants shall not be higher than 600 mm above the ground with the center of the lowest outlet not less than 450 mm above the ground. The pumper nozzle shall face the nearest roadway.

1.7.2.4 Sprinkler Irrigation Systems. N/A.

1.7.3 Wastewater

All wastewater lines shall be expected to comply with applicable Federal, State and Local standards.

1.7.3.1 Design Criteria

The sewage system shall be designed and constructed in accordance with the Uniform Plumbing Code, TM 5-814-1, and base requirements. The Contractor shall field verify the sanitary sewer system capacity to ensure that it will be adequate for the flows generated by the new facility. Exterior building service lines shall be 150 mm (6-inch) minimum diameter. A cleanout shall be provided at the 1 500 mm line and additional cleanouts, if required, shall be spaced no more than 45 000 mm apart. Curved sewer lines are prohibited. Pipes shall be designed to provide a minimum velocity of 0.6 meters per second using Mannings equation. Force mains, if required, shall be sized to minimize pumping head, with a velocity of 0.9 to 1.5 meters per second. The Contractor shall provide all design calculations.

1.7.3.2 Manholes

Manholes are required at all changes of direction, slope and size of sewer lines. A manhole shall be provided where the new building service line connects to the existing sewer main. Manholes shall be spaced not more than 120 000 mm apart. Avoid placing manholes where the tops will be submerged or subject to surface water inflow. Where the invert of the inlet pipe would be more than 450 mm above the manhole floor, a drop connection shall

be provided. See Section 02605 Manholes and Covers as provided in Attachment 5 for additional requirements.

1.7.4 Gas Distribution System

See Section 02600 MECHANICAL DESIGN REQUIREMENTS, paragraph 1.6, EXTERIOR GAS DISTRIBUTION SYSTEM, for instructions and engineering information relating to the design of the exterior gas distribution system.

1.8 EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITES SYSTEMS

1.8.1 Trenches

Jacking and boring shall be required when an underground utility line crosses under a paved road or a fence (see Section 02800 ELECTRICAL DESIGN REQUIREMENTS, paragraph 1.2.6). Sewer and water lines shall be placed in separate trenches. The trenches shall maintain a minimum horizontal separation of 3 000 mm and the bottom of the water line shall be at least 300 mm above the top of the sewer. Sewer lines crossing above potable water lines shall maintain a vertical separation of 600 mm or must be constructed of suitable pressure pipe or fully encased in concrete for a distance of 3 000 mm on each side of the crossing.

1.8.2 Trench Excavation

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Determination of the need for and design of shoring for trench walls greater than 900 mm high shall be in accordance with 29 CFR 1926.652 in order to protect employees who may be exposed to cave-in. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. All utility lines shall be laid on either undisturbed soil base or that the trench is over-excavated and bedded according to City of Aurora specifications.

1.8.3 Cover

Water lines shall have a minimum of 1 500 mm of cover. For fire protection lines, an additional 150 mm of cover is required. Sanitary sewer lines shall be located at a depth greater than the frost penetration. Minimum cover for sewer lines shall be 900 mm in areas subject to vehicular loads and 600 mm in all other areas. If the minimum cover can not be met, the length of pipe shall be concrete encased with a minimum 75 mm thickness of concrete.

1.9 EXTERIOR GAS DISTRIBUTION SYSTEM

This section contains instructions and engineering requirements relating to the design of the exterior natural gas distribution system, including the building gas service line and gas service regulator assembly. The gas distribution system shall be designed in accordance with ANSI Z223.1, the Uniform Plumbing Code, Chapter 12, Section 1231N, and NFPA-54, and shall meet the safety requirements of ANSI B31.8.

1.9.1 Existing Service Relocation. N/A.

1.9.2 Service Line

The Base Supply and Warehouse gas service line shall extend from the existing gas main point of connection to and including the building gas service regulator and meter set assembly which shall be located in an accessible location ouside the mechanical room. The service line point of connection to the existing gas main and the routing of the service line to the new facility shall be as described in paragraph 1.7 COMPOSITE UTILITIES of this section. A new shutoff plug valve and box shall be provided on the new service line near the point of connection with the existing gas main and shall be conveniently located outside of any traffic area. The service line shall be buried at least 450 mm below the ground surface, shall not be laid in the same trench with other utilities, and shall be above other utilities whenever they cross. The service line shall not be laid under paved streets, access drives or any location subject to vehicular loading whenever possible. Where it is unavoidable to locate the line in such locations, the lines shall be protected by suitable encasement or by burying to a depth to provide at least 1 200 mm of cover over the top of the pipe.

1.9.2.1 Service Line Sizing

The size of the service line shall be sufficient to supply the demand without excessive pressure drop and shall not be less than 25 mm (1-inch) in size.

1.9.2.2 Service Line Materials

All underground service lines shall be polyethylene or fiberglass and all aboveground lines shall be steel.

1.9.2.3 Service Line Marker

Underground service lines shall be indentified by a permanent on-grade utility marker which shall indicate the type of service and depth of burial. Markers shall be located a maximum of 30 000 mm apart on straight runs and at every change in direction. Markers in high traffic areas shall be protected from physical damage. Markers shall consist of a stamped or engraved brass name plate embedded in concrete.

1.9.2.4 Service Line Protection

A #12 or larger copper tracer wire shall be installed with and attached to all underground non-metallic gas lines and shall terminate above ground at one end. In addition, yellow plastic warning tape with black lettering shall be installed in the trench above the gas pipe.

1.9.3 Cathodic Protection

Cathodic protection shall be provided for the metallic piping and fittings required for the transition between the underground pipe and the aboveground metallic pipe. Corrosion protection for valves and other gas line

appurtances shall consist of a cathodic protection system. Design of the cathodic protection system shall be in accordance with Section 02800, ELECTRICAL DESIGN REQUIREMENTS, paragraph 1.9, Cathodic Protection System.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 02300

ARCHITECTURAL BUILDING REQUIREMENTS

PART 1 GENERAL

1.1 FUNCTIONAL PLAN REQUIREMENTS

1.1.1 Building Description

a. The Base Supplies and Equipment Warehouse (BSW), consisting of warehouse and administrative areas, will have an east-west orientation on the site. The administration area shall be a "lean-to" attachment to the warehouse. The location of interior walls, doors, windows, and built-in components shall be as indicated and specified.

b. Total within exterior wall area to be provided shall be a minimum of 3 716 square meters. Layout as per enclosed floor plan.

c. Building height limitation is 1 691 meters mean height above sea level.

d. All dimensions shown are minimum dimensions which may be increased to accommodate specific building materials, systems, components or modules.

1.1.2 Design Criteria

The following standards, in addition to those references listed elsewhere in this solicitation, shall apply to technical features of design and construction of this facility. Unless otherwise specified, standards shall be the current issue in effect at the time of issuance of this solicitation. When conflict exists between standards and a specific requirement contained herein, the more stringent requirement shall govern. No attempt has been made to list all applicable codes and standards; therefore, where a particular design aspect is not covered by any of the codes or standards listed, nor by the requirements specified herein, the Contractor shall be guided by other nationally recognized and accepted codes or standards which do apply. The "authority having jurisdiction," as cited in standards, shall be the Contracting Officer.

a. Uniform Building Code - 1994 Edition
b. HQUSACE AEI Manual - 1994 Edition
c. Uniform Federal Accessibility Standards (Federal Standard 795 (1988))
d. Americans with Disabilities Act
e. NFPA 101 - Life Safety Code - 1994 Edition
f. NFPA 80 - Fire, Doors and Windows
g. NFPA 70 - National Electrical Code
h. NFPA 10 - Portable Extinguishers
i. Military Handbook 1008B - 1994 edition
j. Air National Guard Design Policy
l. Buckley Air National Guard (BANG) Base Comprehensive Plan

m. Agency regulations associated with the BANG and the Aerospace Data Facility (ADF)

Design will be reviewed by the Base Civil Engineer for conformance to the Base Comprehensive Plan which is held by the BANG Base Civil Engineer, and together with the Det 3 SMC/CE, for impact of changes to the Community Plans (i.e., new building footprint, new utility runs, new roads, etc.).

1.1.3 Warehouse Activities

Warehouse activities are listed below. Area sizes in square meters are minimum sizes:

a.	Conventional Pallet Storage Racks Area:	120 square meters. Will consist of conventional pallet storage racks (not included in contract).
b.	Bulk Paper Storage:	195 square meters. Movable storage racks horizontally stacked.
c.	Caged Storage:	300 square meters. Conventional pallet storage racks contained in a wire mesh secured partition within the general warehouse.
d.	Staging Area:	535 square meters. General purpose area for staging, repair and assembly of warehouse stock.
e.	Forklift Battery Charge Station:	To be determined by Contractor's design team in consultation with BSW personnel for best location inside the warehouse.
f.	Delivery Drive-Thru:	One bay of the warehouse will be dedicated to a “drive-thru” area that will allow large delivery vehicles (flatbeds) into the facility. This area will have a overhead crane for material handling. See floor plan and paragraph FUNCTIONAL AND TECHNICAL REQUIREMENTS.
g.	Covered Loading Dock	81 square meters.

1.1.4 Warehouse Content

The warehouse content will consist of the following:

- Computer disk drives
- Testing & measuring equipment
- Electronic gear
- AC fans, electric motors, etc.

- Furniture
- File cabinets
- Modular furniture
- Cabling
- Some combustible materials stored in boxes
- Chemicals for photo lab processing
- Office supplies
- Paper products
- Palletized boxes (i.e. Xerox and computer paper)
- Wood containers

1.1.5 Administrative Activities

The administrative activities will be grouped together, consisting of the areas listed below. Area sizes are minimum:

a.	Office	57 square meters, with covered entry. Entry cover shall define entry and be a part of the architectural design.
b.	Main Entrance	The BSW main entrance shall be the exterior entrance to the office.
c.	Secure Storage	42 square meters. Provide one double personnel door.
d.	Utility Room	27 square meters. Access to the Utility (Mechanical/Electrical) Room will be via an interior door.
e.	Toilet Rooms	8 square meters for each, Women's and Men's.
f.	Janitor's Closet	5 square meters.

1.1.6 Other Building or Project Dimensions

a. Height of warehouse: Interior clear height, full building width, shall be 6 700 mm.

b. Dock height: See Section 02200 SITE WORK DESIGN REQUIREMENTS.

c. Dumpster pad size and location: See Section 02200 SITE WORK DESIGN REQUIREMENTS.

d. Provide a normal aisle width configuration for the storage racks and materials handling equipment which will be provided by the user after completion of the project. Normal aisle spacing is 3 650 mm.

e. Paper storage racks: Paper can be stored 3 pallets high. Paper pallets cannot be stored double stacked.

f. Storage Shelving Racks: 4 500 mm to top rack level.

1.2 DESIRED IMAGE AND ARCHITECTURAL COMPATIBILITY

a. Building to fit site and surrounding building environment.

b. One story building.

c. A pre-engineered metal building or metal siding of any kind will not be acceptable for this building.

d. The use of natural daylighting is desirable. The use of skylights is not encouraged, however, the use of roof or exterior wall clerestory areas (i.e. translucent panels, not transparent) is acceptable. Windows shall be installed on the exterior walls of the office only.

e. Exterior and Interior Finishes

(1) Exterior color schemes shall be compatible with Buckley ANGB Master Plan and the finish of the Aerospace Data Facility (ADF). See Attachment 6, PHOTOGRAPHS.

(2) Exterior finish shall be single-wythe, split-faced concrete masonry units (cmu) with moisture barrier on the inside surface. Masonry units shall be all the same type, load-bearing or non-load-bearing (not a mixture) to maintain color consistency throughout all units. Most buildings on base use split-face cmu ("cinnamon tan" color with matching grout). The new design will use this color. See Building 600, Medical Training Facility, as an example of this finish and color; see Attachment 6, PHOTOGRAPHS.

(3) A sloping metal roof (standing seam) with a minimum 75 mm per meter (1 inch per foot) slope is preferred. However, a metal fascia (vertical extension of the roof material) will not be allowed.

(4) See Section 02400 INTERIOR DESIGN REQUIREMENTS for interior finishes. See adjacent buildings for examples.

1.3 TYPE AND METHOD OF CONSTRUCTION

1.3.1 Type of Construction

a. Facility shall be designed as permanent construction. Military Handbook 1190 defines permanent construction as buildings and facilities designed and constructed to serve a life expectancy of more than 25 years, should be energy efficient, and should have finishes, materials, and systems selected for low maintenance and low life-cycle cost.

b. In accordance with Military Handbook 1008B, the new building shall be limited to noncombustible construction (UBC Type I or II).

1.3.2 Building Occupancy

In accordance with NFPA 101, the warehouse portion of the building shall be classified as Storage Occupancy and the administrative portion classified as New Business Occupancy. Means of egress, protection features, and building services shall conform to these occupancy classifications.

1.3.3 Method of Construction

a. Wood of any kind, is not permitted for framing and other structural elements.

b. Light gage steel studs and framing will not be allowed for exterior walls.

c. Walls, floors, and roofing system shall be permanently constructed and attached to each other.

d. Methods, materials, and systems shall be of a quality that requires little or no maintenance.

1.4 ECONOMY OF BUILDING CONSTRUCTION, OPERATION, AND MAINTENANCE: LIFE-CYCLE COST EFFECTIVENESS

1.4.1 Economy

All materials shall be readily available within the local area, as shall the building trades required to construct the project.

No special or unique forms of construction shall be used and skilled workers within the area shall be familiar with the proper methods required to build this facility.

1.4.2 Operation and Maintenance

Minimal operations and maintenance of building is required, therefore use materials which resist soiling and are easily cleaned.

1.5 COMPOSITION OF MASSES AND SPACES AND ARCHITECTURAL DETAILS TO REFLECT THE DESIRED IMAGE, AND THE SCALE AND NATURE OF THE ACTIVITIES INVOLVED

Features of scale such as horizontal banding through reveals, scoring, changes in texture, and materials shall match those of Aerospace Data Facility.

1.6 FUNCTIONAL AND TECHNICAL REQUIREMENTS

1.6.1 Occupational Safety and Health

Building design shall comply with the most stringent requirements of either AFOSH Air Force Occcupational Safety and Health or OSHA Occupational Safety and Health Standards criteria for all items which must be included in the design to ensure safety compliance.

1.6.2 Handicapped Accessibility

Facility shall be handicapped accessible, except for the Utility Room and loading dock area, in conformance with the requirements of the Uniform Federal Accessibility Standards (UFAS) (Federal Standard 795) and American with Disabilities Act (ADA). In situations where conflicts exist between UFAS and ADA requirements, the more stringent requirements shall govern.

1.6.3 Sound and Vibration Control

Specific acoustical noise reduction and sound transmission requirements are not required.

1.6.4 Physical Security

Provide interior cameras for the Secure Storage Room and intrusion detection switches on Secure Storage door. See Section 02800 ELECTRICAL DESIGN REQUIREMENTS.

1.6.5 Equipment and Furnishings

Equipment and furnishings shall be complete with necessary brackets, fittings, and hardware. The Contractor shall take measurements at the building and shall be responsible for the proper fitting and installation of the equipment. Equipment includes:

a. Electric overhead bridge crane: 4.5 metric ton (5 ton) capacity with a hook height of 5 670 mm.

b. Service sink in the Janitor Closet.

c. Electric water cooler

d. Loading dock levelers (4)

e. Dock bumpers, full length of dock.

1.6.6 Signage

a. Provide one sign per building. Sign message will be provided by Contracting Officer.

b. Colors

Exterior signs, except those related to safety or national standards, shall have 3M's Brown #3279 R/S high intensity sheeting background and 3M's White #3290 R/S Engineer grade.

Exception: Signs relating to safety and governed by National standards, such as traffic control signs governed by the Manual of Uniform Traffic Control Devices and signs governed by OSHA. Examples include regulatory and warning traffic control signs (speed limit signs, stop signs, etc.) and hazard/danger signs required by OSHA.

All Signs regardless of color shall be of the required size, attractive, well maintained, and professional in appearance.

c. Directional and Street Name Signs

Directional and street name signs shall be brown and white reflective material. 3M's high intensity brown sheeting and 3M's engineer grade white is the standard.

1.7 DESIGN OBJECTIVES AND PROVISIONS

1.7.1 Protective Building Zones

Building construction shall conform to fire resistance requirements, allowable floor areas, building height limitations, and building separation distance requirements of the Uniform Building Code (UBC). Building construction related to egress and safety to life shall comply with NFPA 101 and NFPA 80. Conflicts between the UBC and NFPA 101 related to fire resistance rating shall conform to NFPA 101 and applicable criteria contained herein.

1.7.2 Space Layout Compatible With Modular Support Systems

1.7.2.1 Masonry Module

Concrete masonry unit walls used in this building shall be developed on a standard masonry module to reduce the number of cut blocks.

1.7.3 Type of Construction Materials, Architectural Systems, and Finishes

1.7.3.1 Thermal Moisture and Protection

Insulate walls and roof to meet U-values of 0.20 watt per metre kelvin (0.12 Btu/hr/sf/ºF) for exterior walls and 0.05 watt per metre kelvin (0.03 Btu/hr/sf/ºF) for the roof, based on 6,239 Heating Degree Days.

1.7.3.2 Roofs

a. Standing seam metal roof, built-up roofing, modified bitumen roof, or EPDM elastomeric membrane roof are all acceptable. The critical aspect of the roofing membrane shall be low and easy maintenance. See paragraph DESIRED IMAGE AND ARCHITECTURAL COMPATIBILITY.

b. Standing seam metal roofing shall conform to requirements specified in Corps of Engineers Guide Specification CEGS-07416 STANDING SEAM METAL ROOF SYSTEM (SSMRS). See Division 3, Attachment 3 STANDING SEAM METAL ROOFING GUIDE SPECIFICATION.

c. Roof slope shall be 75 mm per meter minimum, and drain to exterior roof gutters and downspouts. Direct downspouts away from driveways and sidewalks to prevent icing hazards.

(1) Primary roof slope shall be accomplished by sloping of the structural roof framing members.

(2) Secondary roof slopes shall be accomplished by crickets, tapered edge strips, and sloped insulation.

d. Roof system shall provide insulation on top of the roof deck.

e. Roof system shall provide a 10-year minimum warranty, except for Built Up Roofing which shall have a 20-year manufacturer's warranty and Standing Seam Metal Roofing. 20-year built-up roofing warranty shall conform to the requirements in Division 3 Attachment 5 MISCELLANEOUS. See Division 3 Attachment 2 STANDING SEAM METAL ROOF GUIDE SPECIFICATION for the warranty requirements for Standing Seam Metal Roofing.

f. Roof system shall include a vapor retarder membrane. This shall not be achieved by the steel roof deck.

g. Roof system shall have Factory Mutual rated Class I-90 and have a U.L. Class A classification.

h. Provide access to roof by an exterior permanent steel ladder on the east side of the building near the Utility Room. Roof scuttles are not allowed. Ground access to ladder shall not be readily accessible to passers-by.

i. Integrate and coordinate Lightning Protection with the roofing type, detailing, and installation so as not to jeopordize in any way the roof warranty.

1.7.3.3 Exterior Walls and Finish Materials

a. Color and material finish selections will be Government Approval (GA) items when the Contractor develops the submittal register and during shop drawing submittal process.

b. See paragraph DESIRED IMAGE AND ARCHITECTURAL COMPATIBILITY.

c. Exposed exterior cmu units other than split-faced units are not acceptable.

d. Metal wall panels and fascia are not acceptable.

e. Perimeter insulation shall be provided on all exterior walls to below design frost depth.

f. A vapor retarder membrane shall be secured to the interior (warm) side of all exterior walls from the floor slab to the underside of the roof vapor retarder membrane.

g. At exterior doors, exterior ramps shall be even with the floor slab and reach finish grade. Exterior ramps shall be concrete.

1.7.3.4 Interior Walls

a. Color and material finish selections will be Government Approval (GA) items when the Contractor develops the submittal register and during shop drawing submittal process.

b. Interior walls shall be permanent construction (no demountable partitions).

c. Interior walls shall meet the specified sound attenuation and fire rating requirements.

d. Steel studs shall be sized according to the wall heights required.

e. Interior walls of Utility Room, Secure Storage, and Office shall be concrete masonry units.

f. Secure Storage, Utility, and Toilet room walls shall extend to underside of structure above.

g. Interior walls requiring fire and sound ratings or other walls extending to the underside of the roof structure shall be designed and constructed in accordance with UL and approved and tested systems. Wall classifications and testing agency or manufacturer's design numbers shall be indicated on the construction drawings. These walls shall also have provisions for structural deflection of the roof structure above.

h. Interior permanent walls which intersect trench ducts and that are required to provide vertical chases shall be designed to accommodate cable trays, conduit, etc. Access panels to vertical chases shall be provided.

1.7.3.5 Interior Wall Finishes

a. See Section 02400 INTERIOR DESIGN REQUIREMENTS.

b. Walls with ceramic tile wainscot finishes shall conform to the Tile Council of America's Handbook For Ceramic Tile Installation. Walls above wainscots shall be painted.

c. Toilet Rooms and Janitor Closet shall receive a 950 mm high ceramic tile wainscot with an accent color band at the top.

1.7.3.6 Floors

a. Structural interior floors shall be concrete slabs. See Section 02500 STRUCTURAL DESIGN REQUIREMENTS.

b. Exterior door stoops shall be structural concrete.

c. Clean and seal exposed concrete floors with a concrete hardener for durability and minimization of dust.

d. Base material on walls shall be compatible with the floor finish provided (i.e. resilient base for concrete floors, ceramic base for floors with ceramic tile).

1.7.3.7 Ceilings

a. Toilet rooms, janitor's closet, and ceilings where moisture will potentially be present shall be provided with painted gypsum wallboard.

b. Suspended architectural acoustical tile ceilings are allowed in spaces such as corridors where access to above ceiling equipment may be required.

c. Ceiling Heights

(1) Ceiling heights shall facilitate movement of equipment throughout the facility. Coordinate door heights.

(2) Ceilings in Office and Toilet Rooms shall be 2 400 mm high minimum.

1.7.3.8 Doors

a. Doors in fire rated walls shall be rated according to the walls in which they occur.

b. Exterior and interior personnel doors:

(1) Hollow metal steel doors, SDI 100, Type III

(2) Minimum 1.6 mm (16 gage) face sheets in 1.6 mm (16 gage) pressed steel door frames.

(3) Exposed door hinges shall have tamperproof hardware with non-removable pins.

(4) Size: 900 mm by 2100 mm by 44 mm thick minimum, except size doors for adequate movement of equipment, computers, and personnel.

(5) Fire doors: conform to NFPA 101 and NFPA 80.

(6) Doors for the Utility Room shall be sized to accommodate the largest item of mechanical or electrical equipment that may be removed or installed in the room.

(7) Insulate exterior doors and interior doors accessing the warehouse (i.e. Office, Secure Storage, Restroom/Utility area) to meet an R-value of 5.78 watt per metre kelvin (10 Btu/hr/sf/ºF) to prevent moisture buildup on the inside surface when the outside of the door is subjected to cold temperatures.

(8) Equip Secure Storage doors with Balanced Magnetic Door Switch (BMS). See Section 02800 ELECTRICAL DESIGN REQUIREMENTS for additional security requirements for doors.

c. Exterior overhead coiling doors shall be overhead coiling doors, insulated, with a minimum R-value of 5.78 watt per metre kelvin (10 Btu/hr/sf/ºF) when calculated in accordance with ASHRAE-03. Doors shall be electrically operated. Provide padlock hasps for each door. Drive-thru doors shall be 4 000 mm wide by 5 670 mm high in size. All other doors, whose width is shown on the floor plan, shall be 3 048 mm high.

1.7.3.9 Door Hardware and Keying

a. Doors shall be equipped with the proper hardware to meet all specified and operational requirements.

b. Locksets, Latchsets, and Exit Devices

(1) ANSI/BHMA A156.12, Series 4000, grade 1 and ANSI/BHMA A156.3, grade 1. Locksets and exit devices shall have non-interchangeable cores.

(2) Schedule:

Exterior, Office, and Utility doors: BHMA type F81
Secure Storage door: BHMA type F95, with 25 mm throw for dead bolt.
Warehouse doors: Exit devices
Janitor, Vestibule, and Toilet Rooms: BHMA type F75

c. Hinges and closers shall be Grade 1.

d. Finish of all hardware shall be satin bronze, ANSI/BHMA A156.18, Finish Code 612. All strikes shall match hardware.

e. Keying System

Locks, exit devices, and special key hardware shall be keyed to the ADF Compound master key system which is manufactured by Arrow Lock Corp., of Brooklyn, N.Y. Lock cores installed in the ADF system are Arrow L671E: L Bow, 6 pin, with "A" keyway, non-interchangeable. All cores shall be 0 bitted to manufacturer's specifications).

1.7.3.10 Windows

a. Windows shall have 25 mm insulating glass in thermally broken --- aluminum frames. U-value shall not be more than 1.05 watt per metre kelvin (0.61 Btu/hr/sf/ºF).

b. Window frames shall be anodized aluminum, dark brown.

c. Glass shall be blue-tinted, similar to Vivacor V55-08 in color.

1.7.3.11 Toilet Rooms

All fixtures and accessories shall be handicapped accessible. The numbers of fixtures shall be:

Men:	1	Water closet	Women:	1	Water closet
	1	Urinal		1	Lavatory
	1	Lavatory		1	Paper Towel Dispenser
	1	Paper Towel Dispenser		1	Toilet Paper Dispenser
	1	Toilet Paper Dispenser		1	Soap Dispenser
	1	Soap Dispenser			

1.7.3.12 Miscellaneous

Detailing and construction phasing of louvers, motorized dampers, and ductwork shall be coordinated.

1.8 QUALITY ASSURANCE REQUIREMENTS

1.8.1 Concrete

a. Concrete shall conform to ASTM C 94; type - optional. Structural concrete for all work shall have a 28-day compressive strength of 21 MPa (3000 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. See Section 02500 STRUCTURAL DESIGN REQUIREMENTS.

b. All concrete shall contain from 4 to 7 percent total air.

c. Concrete may contain other admixtures, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, providing the concrete has been designed for their use and they are indicated in the Design Analysis.

d. Slump shall be within the following limits:

Structural Element	*Slump in millimeters Minimum	Maximum
Walls, columns and beams	50	100
Foundation walls, substructure walls, footings, pavement, and slabs	25	75
Any structural concrete approved for placement by pumping	None	150

*Where use of superplasticizers are approved to produce flowing concrete these slump requirements do not apply.

e. Perimeter insulation shall be polystyrene, polyurethane containing a minimum of 9 percent recovered material in the polyurethane portion or cellular glass.

f. Reinforcement

Bar reinforcement shall be deformed, Grade 40 or Grade 60 billet steel conforming to ASTM A 615M (A615). Mesh reinforcement shall be welded steel wire fabric with wires at right angles to each other.

g. Vapor Barrier

Vapor barrier shall be polyethylene sheeting with a minimum thickness of 0.152 mm (6 mils) or other equivalent material having a vapor permeance rating not exceeding 28.6 nanograms per Pascal per second per square meter (0.5 perms).

h. Water shall be potable.

i. Slabs shall receive a steel trowel finish.

j. Concrete floor hardener shall be colorless, containing zinc silicofluoride, magnesium silicofluoride, or sodium silicofluoride. Apply in accordance with the manufacturer's instructions. During application, area should be well ventilated. Precautions shall be taken when applying silicofluorides due to the toxicity of the salts. Any compound that contacts glass or aluminum should be immediately removed with clear water.

1.8.2 Sample Panels

After material samples are approved and prior to starting masonry work, construct a sample panel for each type and color of masonry required. Sample panels shall not be built in or be part of the structure, but shall be located where directed.

Panels shall be L-shaped or otherwise configured to represent all of the wall elements, including corner and joints. Panels shall be of the size necessary to demonstrate the acceptable level of workmanship for each type of masonry represented on the project. The minimum size of a straight panel or a leg of an L-shaped panel shall be 2.5 m by 1.2 m.

Panels shall show full color range, texture, and bond pattern of the masonry work; mortar joint tooling; grouting of reinforced vertical cores, collar joints, bond beams, and lintels; positioning, securing, and lapping of reinforcing steel; positioning and lapping of joint reinforcement (including prefabricated corners); anchors; wall ties; CMU control joints; grout color; insulation; flashing; weepholes; and sealer if applicable.

Panels shall be built on a properly designed concrete foundation. Cleaning of masonry work shall be demonstrated during the construction of the panels.

The completed panels shall be used as the standard of workmanship for the type of construction represented. Masonry work shall not commence until the

sample panel for that type of masonry construction has been completed and approved. Panels shall be protected from the weather and construction operations until the masonry work has been completed and approved. After completion of the work, the sample panels, including all foundation concrete, shall become the property of the Contractor and shall be removed from the construction site.

1.8.3 Masonry

Concrete masonry units (cmu): ASTM C 90, Type I, Lightweight or Medium weight. Cement shall have a low alkali content and be of one brand. Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work. In exposed interior masonry surfaces, units having a bullnose shall be used for vertical external corners except at door, window, and louver jambs. Radius of the bullnose shall be 25 mm (1 inch). Units used in exposed masonry surfaces in any one building shall have a uniform fine to medium texture and a uniform color.

(1) Split-faced units shall be integrally colored during manufacture; color shall match Valley Block number 174 Cinnamon Tan.

(2) Grout color shall be Soloman Grinding #32X Golden Brown or Threewitt-Cooper #32Q Golden Brown*:

*Explanation: Soloman grinding Services (SGS) Golden Brown #32X formula as follows:

32A = full color
32H = 1/2 32A color
32X = 1/2 32H or 1/4 32A color.

When a small amount of grout Color is needed for a project Soloman Grinding Services will not provide anything but 32A. Threewitt-Cooper orders 32A and then quarters it themselves calling it 32Q. Therefore 32Q equals 1/2 32H.

1.8.4 Metals

1.8.5 Wood and Plastics

1.8.6 Thermal and Moisture Protection

Insulation shall contain the highest practicable percentage of recovered material which has been recovered or diverted from solid waste, but not including material reused in a manufacturing process. Where two materials have the same price and performance, the one containing the higher recovered material content shall be provided.

1.8.7 Doors and Windows

a. Hollow metal steel doors and frames, including installation, shall conform to Steel Door Institute (SDI) requirements in SDI-100, Standard Steel Doors and Frames (1991); SDI-106, Standard Door Type Nomenclature,

(1991); and SDI-107, Hardware on Steel Doors (Reinforcement - Application)(1984).

b. Fire rated door assemblies shall conform to NFPA 80 and bear the listing identification label of a nationally recognized testing laboratory qualified to perform tests of fire door assemblies in accordance with ASTM E 152 and having a listing for the tested assemblies. Doors exceeding the sizes for which listing label service is offered shall be in accordance with ASTM E 152. Listing identification labels shall be constructed and permanently applied by a method which results in their destruction should they be removed.

c. Hinges, locksets, closers, and other hardware shall conform to NFPA 80.

d. After installation, hardware and perimeter seals shall be adjusted for proper operation and weathertightness as applicable.

e. Overhead Coiling Doors: Overhead rolling doors shall be spring counterbalanced, rolling type, with interlocking slats, complete with guides, fastenings, hood, brackets, and operating mechanisms, and shall be designed to operate through a minimum of 50,000 cycles. Insulation shall be completely enclosed within metal facings. In addition to endlocks, exterior doors shall designed for the design wind load and have the manufacturer's standard windlocks as required to withstand the wind load. Windlocks shall prevent the curtain from leaving guides because of deflection from specified wind pressure. The bottom edge of electric power operated doors shall have an electric or pneumatic sensing edge that will immediately reverse the door movement upon contact with an obstruction and cause the door to return to its full open position.

f. Hardware

(1) Hardware shall conform to the following ANSI/Builders Hardware Manufacturers Association (BHMA) and Door and Hardware Institute (DHI) publications:

BHMA-01:	(Effective thru Jun 1993) Directory of Certified Locks & Latches
BHMA-02	(Effective thru Jul 1993) Directory of Certified Door Closers
BHMA A156.1	(1988) Butts and Hinges
BHMA A156.2	(1989) Bored and Preassembled Locks and Latches
BHMA A156.3	(1989) Exit Devices
BHMA A156.4	(1986) Door Controls - Closers
BHMA A156.5	(1992) Auxiliary Locks & Associated Products
BHMA A156.6	(1986) Architectural Door Trim
BHMA A156.7	(1988) Template Hinge Dimensions
BHMA A156.8	(1988) Door Controls - Overhead Holders
BHMA A156.16	(1989) Auxiliary Hardware
BHMA A156.18	(1987) Materials and Finishes
BHMA A156.21	(1989) Thresholds

DHI-02	(1986) Installation Guide for Doors and Hardware
DHI-03	(1989) Keying Systems and Nomenclature
DHI-04	(1976) Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames
DHI-05	(1990) Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames

(2) Keying System: Provide an extension of the existing ADF keying system as specified in paragraph DESIGN OBJECTIVES AND PROVISIONS. Provide a construction master keying system. Change keys for locks shall be stamped with change number and the inscription "U.S. Property - Do Not Duplicate." Furnish 2 change keys each lock and 2 Master keys per set, arranged in a container for key control system storage in sets. Furnish 5 construction keys during construction.

(3) Lock Trim: Lock trim for locksets, latchsets, and exit devices shall be cast, forged, or heavy wrought construction of commercial plain design. In addition to meeting the test requirement of BHMA A156.2 or BHMA A156.13, knobs, roses, and escutcheons shall be 1.27 mm thick, if unreinforced. If reinforced, the outer shell shall be 0.89 mm thick and the combined thickness shall be 1.78 mm except that knob shanks shall be 1.52 mm thick.

g. Windows

Aluminum windows, consisting of complete units including sash, glass, frame, weatherstripping, and hardware, shall conform to AAMA 101. Windows shall be double-glazed and shall have a minimum condensation resistance factor of 52 when tested in accordance with AAMA 1503.1.

1.8.8 Finishes

1.8.8.1 Gypsum Wallboard

Gypsum wallboard shall not be less than 16 mm thick.

1.8.8.2 Resilient Flooring

Install in accordance with manufacturer's instructions. From the time of laying until acceptance, flooring shall be protected from damage. Flooring which becomes damaged, loose, broken, or curled shall be removed and replaced.

1.8.8.2.1 Vinyl-Composition Tile

Vinyl-composition tile shall conform to ASTM F 1066, Class 2 (through pattern tile), Composition 1, asbestos-free, and shall be 300 mm square and 3.2 mm thick. Tile shall have the color and pattern uniformly distributed throughout the thickness of the tile. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.

1.8.8.2.2 Resilient Base

Base shall rubber or vinyl, coved. Base shall be 101.6 mm (4 inches) high and a minimum 3 mm thick, with preformed outside corners.

1.8.8.2.3 Edge Strip

Provide edge strips at locations where flooring termination is higher than the adjacent finished flooring, except at doorways where thresholds are provided. Edge strip shall be vinyl, 25 mm wide, and of thickness to match the flooring.

1.8.8.3 Wall Ceramic Tile

Tile shall be standard grade conforming to ANSI A137.1. Tile shall be impact resistant with a minimum breaking strength for wall tile of 41 kg in accordance with ASTM C 648. Tile for cold climate projects shall be rated frost resistant by the manufacturer as determined by ASTM C 1026. Water absorption shall be 0.5 maximum percent in accordance with ASTM C 373. Glazed wall tile and trim shall be cushion edged with bright glaze.

1.8.8.4 Acoustical Ceilings

Acoustical tile ceiling panels shall be at least 16 mm thick mineral fiber material.

1.8.8.5 Painting

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall be an approved first-line proprietary paint material.

1.8.8.5.1 Mildewcide and Insecticide

Paint specified for all coats applied to fabrics and vapor barrier jackets over insulation and on surfaces in areas of high humidity shall contain a mildewcide that will not adversely affect the color, texture, or durability of the coating. The mildewcide shall be incorporated into the paint by the manufacturer and shall attain a surface disfigurement rating of 8 or greater when tested in accordance with ASTM D 3273 and evaluated in accordance with ASTM D 3274. Mercurial mildewcide shall not be used in interior paint. Insecticides shall not be used in paint.

1.8.8.5.2 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content (calculated as lead metal) shall not be used.

1.8.8.5.3 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

1.8.8.5.4 Volatile Organic Compound (VOC) Content

Paints shall comply with applicable state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to the restrictions of the local air pollution control authority.

1.8.8.5.5 Application

Painting practices shall comply with applicable state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

1.8.8.5.6 Pipe Color Code Marking

See Attachment 5 MISCELLANEOUS.

1.8.8.5.7 Surfaces and Type of Paints

EXTERIOR SURFACES

Concrete, unless otherwise specified	2 coats of exterior acrylic emulsion (latex) paint.
Stucco	2 coats of exterior acrylic emulsion (latex) paint.
Wood, unless otherwise specified	Primer and 2 coats of exterior acrylic emulsion (latex) paint.
Ferrous metal unless otherwise specified	SSPC Paint 25 primer and 2 coats of Gloss Alkyd, Low VOC Content Enamel
Galvanized metal	3 coats of exterior acrylic emulsion (latex) paint.

INTERIOR SURFACES

Plaster, gypsum board, concrete, and concrete masonry units not requiring	2 coats of interior latex paint, gloss. Concrete masonry units shall be given a primer coat of latex block filler.

a smooth finish, unless otherwise specified	
Concrete masonry units, unless otherwise specified	Primer coat of latex block filler and 2 coats of Epoxy Coating (Two Component) for Interior Use on Metal, Wood, Wallboard, Painted Surfaces Concrete and Masonry
Plaster and gypsum board in toilet rooms, unless otherwise specified	1 coat of Interior Latex Base Primer, White (for Gypsum Wallboard, or Plaster) and 1 coat of Gloss Alkyd Enamel
Ferrous metal factory-primed mechanical and electrical equipment	2 coats of Gloss Alkyd, Low VOC Content Enamel
Galvanized, unless otherwise specified	1 coat of and 2 coats of paint to match adjacent areas
Wood, unless otherwise specified	1 coat of Interior Latex Base Primer, White (for Gypsum Wallboard, or Plaster) and 1 coat of interior latex paint, gloss
Metal: Convector enclosures, electrical conduit runs, metallic tubing, uninsulated ducts and pipes, pipe hangers, louvers, grilles, and air outlets in areas having painted adjacent surfaces.	Primer and 2 coats of Gloss Alkyd, Low VOC Content Enamel. Primer for ferrous metal and galvanized: Zinc Dust, Zinc Oxide and Phenolic Varnish Paint primer Primer (SSPC Paint 5 (1991)) Primer for aluminum: Zinc-Molybdate, Alkyd Type Primer Paint
Oil-based caulking compound	1 coat of aluminum paint (primer) and 1 coat of paint, same as adjacent areas

1.8.9 Specialties

1.8.9.1 Interior Signage

Interior plaque signs shall be a modular type signage system, fabricated of Type ES laminated thermosetting plastic suitable for engraving or acrylic plastic conforming to ANSI Z97.1, with modular changeable message strips. Individual 1.6 mm thick message strips shall permit removal, change, and reinsertion. Corners of signs shall be rounded, minimum 10 mm radius. Signs shall be complete with lettering, framing as detailed, and related components for a complete installation. Signs shall be the standard product

of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate signs that have been in satisfactory use at least 2 years prior to bid opening. Signs shall comply with the FED-STD 795 and ADA.

1.8.10 Equipment

1.8.10.1 Dock Bumpers

Reinforced rubber pads laminated between structural steel angles and secured with 19 mm steel tie rods.

1.8.10.2 Loading Dock Levelers

Loading dock levelers shall be permanent, mechanical type which are manually released at dock leveler and raises by spring action and is lowered by walk-on of dock operator. Minimum dynamic loading capacity shall be 11 332 kg (25,000 pounds). When not in use and in the cross traffic position, loading dock leveler area shall be level with the surrounding loading area.

Provide a truck restraint system which shall be coordinated with the dock leveler to lock truck or trailer into position during loading and for overnight security. A visual signal shall be incorporated to inform dock operator and driver of locked or unlocked status.

a. Operating Range

The outer end of each loading dock leveler shall be adjustable in height, providing a board whose incline can be adjusted to suit the height of truck and trailer beds. Each board end shall have a minimum of 610 mm of vertical adjustment. Height adjustments shall be divided 305 mm above and 305 mm below the dock level to provide coverage between 760 mm (30 inches) and 1370 mm (54 inches) above grade.

b. Lip Extension

Each loading dock leveler shall include provisions so that its end lip may be extended from a retracted position to an extended position beyond the forward edge of the platform bumpers to rest on the bed of a truck or trailer not less than 305 mm (12 inches). Lip extension shall be 406 mm (16 inches).

c. Tilt Allowance

Each loading dock leveler shall provide automatic compensation, with board loaded, for out-of-level truck bed condition (difference in elevation from side to side at the rear of the truck bed) of up to 102 mm (4 inches) over the width of the board.

d. Load Compensation

Each loading dock leveler shall be constructed to provide automatic compensation (automatic float), with board loaded or unloaded, for the loading and unloading of the motor vehicle. When the end lip is extended so as to rest on the bed of a truck or trailer, the end lip shall automatically

adjust up or down with the movement of the truck or trailer bed resulting from the compression of the truck or trailer springs.

e. Automatic Safety Device

An automatic safety device shall be provided to prevent a drop of more than 102 mm (4 inches) at the outer end of the board should the truck or trailer be moved away leaving the board unsupported. This safety device shall be effective with any load on the board up to the fully dynamic rated capacity of the loading dock leveler.

1.8.10.3 Overhead Bridge Crane

The crane shall be designed and constructed to Crane Manufacturers Association of America publication CMAA 70 Service requirements for operation in indoor, nonhazardous environment. The rated capacity of the crane shall be 4.5 tons (metric). The lower load block and hook shall not be considered part of the rated capacity.

1.8.10.4 See paragraph FUNCTIONAL AND TECHNICAL REQUIREMENTS.

1.8.11 Furnishings

1.8.11.1 Horizontal Blinds.

Provide blinds on office windows. Horizontal blinds shall have 25.4 mm slats, and be capable of nominally 180 degree partial tilting operation and full-height raising. Blinds shall be inside mounted.

1.8.12 Special Construction (Not Applicable)

1.8.13 Conveying Systems (Not Applicable)

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 02400

INTERIOR DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 FUNCTIONAL AND TECHNICAL REQUIREMENTS

Interior wall finishes shall be high quality, low maintenance finishes suitable for a warehouse environment.

1.2 FINISHES

1.2.1 Room Finish Schedule

1.2.1.1 Warehouse Area

Ceiling: Exposed
Walls: Painted
Floors: Exposed concrete

1.2.1.2 Secure Storage

Ceiling: Gypsum wallboard, painted
Walls: CMU, painted
Floors: Exposed concrete

1.2.1.3 Utility

Ceiling: Exposed
Walls: Painted
Floors: Exposed concrete

1.2.1.4 Janitor

Ceiling: Gypsum wallboard, painted
Walls: Ceramic tile wainscot, wall surface above to be painted
Floors: Exposed concrete

1.2.1.5 Toilet Rooms

Ceiling: Gypsum wallboard, painted
Walls: Ceramic tile wainscot, wall surface above to be painted
Floors: Vinyl composition tile

1.2.1.6 Office

Ceiling: acoustical tile ceiling
Walls: Painted
Floors: Vinyl composition tile

1.2.2 Surfaces

Utility Room shall not have finished ceiling unless required by NFPA 101 and other applicable fire codes.

All spaces shall receive a painted finish unless otherwise specified.

All exposed to view surfaces shall be painted.

1.2.3 Furnishings (Not Applicable)

1.3 COLOR, TEXTURE, AND PATTERN

The finish selection shall provide an aesthetically pleasing, comfortable, and functional working environment for the inhabitants of the facility. Finishes shall be selected to coordinate with the building's color scheme.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 02500

STRUCTURAL DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 PROJECT DESCRIPTION AND REQUIREMENTS

The Base Supplies and Equipment (BSE) Warehouse will be a one story steel framed building with exterior wall options of concrete masonry units or precast concrete wall panels. The building will include a drive through bay with a 4.5 metric ton (5 ton) bridge crane. The complete building structural design shall be performed by a registered professional engineer.

1.1.1 Height Limitations

Refer to Architectural Requirements for building height limitations.

1.1.2 Bridge crane hook height

Refer to Architectural Requirements for the minimum bridge crane hook height.

1.1.3 Interior Columns

For economy, one row of interior columns is shown on the floor plan and will be spaced in accordance with the storage rack spacing. The spacing shown can be altered as long as the columns are centered in a storage rack and do not affect fork lift traffic lanes. The final spacing of the storage racks will be coordinated with the user.

1.2 DESIGN CRITERIA

The design publications listed below shall be used as sources of criteria for structural design. Where two or more publications address the same criteria, the more stringent will govern. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in other nationally recognized codes, standards, and specifications.

1.2.1 American Society of Civil Engineers (ASCE) Publication

ASCE 7-95	Minimum Design Loads for Buildings and Other Structures

1.2.2 Uniform Building Code (UBC) Publication

UBC "Structural Engineering Design Provisions," International Conference of Building Officials, 1994 edition.

1.2.3 American Concrete Institute Publication

ACI 318-95 (Rev 1992)	Building Code Requirements for Reinforced Concrete
ACI 530-92	Building Code Requirements for Masonry Structures and Commentary

1.2.4 American Institute of Steel Construction Publication

Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design (ASD) (June 1, 1989)

1.2.5 Steel Deck Institute (SDI) Publications

Diaphragm Design Manual (2nd Edition, 1987)

Design Manual for Composite Decks, Form Decks and Roof Decks and Cellular Metal Floor Deck with Electrical Distribution (Pub No. 28)

1.2.6 Steel Joist Institute (SJI) Publications

Standard Specifications, Load Tables and Weight Tables for Steel Joists & Joist Girders (1992)

1.2.7 American Iron and Steel Institute (AISI) Publications

Light Gage Cold-Formed Steel Design Manuals (latest edition)

1.3 STRUCTURAL LOADING CRITERIA

Structural loading criteria shall be developed for the BSE Warehouse using the criteria sources listed above and following the procedures indicated below. The warehouse shall be classified as a Category I facility for calculation of wind, snow and earthquake loads.

1.3.1 Roof Live Loads

1.3.1.1 Snow Load

A minimum roof snow load of 1.44 kN/sqm (30 psf) shall be used for the design of the BSE Warehouse. Where applicable, additional snow drift loads shall be calculated in accordance with ASCE 7-95 using a ground snow load of 0.72 kN/sqm (15 psf).

1.3.1.2 Rain Loads

Rain loads shall be considered in accordance with ASCE 7-95.

1.3.2 Floor Live Loads

Minimum uniformly distributed floor live loads shall be as listed below:

AREA	LIVE LOAD (PSF)
Warehouse Floor/Fork Lift	76 kN (17K) total/38 kN (8.6K) cap
Drive through Bay	HS 20 Wheel Load
Minimum uniform floor load	11.97 kN/sqm (250 psf)

1.3.3 Wind Loads

Wind loads shall be calculated in accordance with the procedures outlined in ASCE 7-95 using Exposure "C" and the Basic Wind Speed of 136 km/hr (85 mph). Wind loads for both the main wind-force resisting system and for components and cladding shall be considered.

1.3.4 Seismic Loads

The Warehouse is located in Seismic Zone 1 and shall be designed to withstand seismic loading in accordance with ASCE 7-95 and the Uniform Building Code.

1.3.5 Dead Loads

Minimum design dead loads for common building materials shall be obtained from ASCE 7-95. Equipment loads and loads for materials not listed in that publication can be obtained from other recognized sources.

1.3.6 Bridge Crane

The building framing system will be designed for a 4.5 metric ton (5 ton) bridge crane in the area shown on the floor plan.

1.3.7 Lateral Partition Loads

The minimum design wind pressure on interior partitions shall be 0.24 kN/sqm (5 psf) normal to the partition. All interior partitions will be laterally braced.

1.3.8 Design Temperatures

Design differential temperatures shall be a minimum 10 degrees C (50 degrees F) for thermal analysis of framing systems.

1.3.9 Deflections

Roof framing deflections shall be limited to a maximum of L/240 for any load combinations. Bridge crane runway girders shall be limited to a live load deflection of L/800.

1.4 ROOF SYSTEM AND DESIGN

The roof slope shall be as indicated in the Architectural Requirements. The primary roof slope shall be accomplished by sloping the structural framing members. Coordinate with Architectural. The design of roof framing members shall include consideration of any concentrated loads from suspended mechanical and electrical equipment including cable trays and HVAC units. The location and magnitude of suspended equipment loads shall be closely coordinated with the Mechanical and Electrical engineers.

1.4.1 Steel Joists and Joist Girders

The design and selection of steel joists and joist girders shall be governed by the Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders. The net wind uplift requirements shall be clearly delineated on the drawings or within the specifications. Joists requiring special design to resist wind uplift, non-uniform loads or slopes exceeding SJI standards shall be designated as such on the drawings and the required design loads provided. Joist end supports and anchorage to resist uplift shall be designed to accommodate the applied forces, including those resulting from wind and seismic activity. Longspan or Deep Longspan Joists with top chords pitched two ways from center may be utilized by clearly delineating the design loads on the drawings.

1.4.2 Steel Decking

The design and selection of steel deck, including minimum section properties, shall be in accordance with the provisions of the Steel Deck Institute (SDI) Design Manual. Where the steel deck is designed to function as a shear diaphragm, the design shall be in accordance with the provisions of the Steel Deck Institute (SDI) Diaphragm Design Manual.

1.5 STRUCTURAL FRAMING SYSTEM AND DESIGN

1.5.1 Framing System

A steel framing system shall be used for the structural design of the BSE Warehouse. However, a pre-engineered metal building will not be acceptable. The design will utilize interior columns as shown on the floor plan. The framing system will meet all aforementioned project requirements and the requirements listed below.

1.5.2 Exterior Wall Options

For the exterior walls, the Contractor shall have the option of using non-load bearing concrete masonry units or load bearing or non-load bearing tilt-up precast concrete wall panels. Cold-formed light-gage framing (i.e. steel studs) will not be allowed for exterior wall framing.

1.5.3 Structural Steel

1.5.3.1 Design

Structural steel shall be designed in accordance with AISC Specification for Structural Steel Buildings - ASD. All structural steel members shall be designed by the structural engineer to support all applicable loads. Structural drawings shall clearly show all structural members and their locations.

1.5.3.2 Connections

Types of connections shall be consistent with the design assumptions for the basic type of steel construction used. Connections shall be designed and detailed to provide adequate capacities for the applied forces and moments. Connection design shall be the responsibility of the structural engineer and shall not be delegated to the steel fabricator.

1.6 EXTERIOR AND INTERIOR WALLS

Criteria indicated in the Architectural Requirements shall be incorporated into the design of all walls. The Architectural floor plan included in the attachments to this document, indicates the maximum number of permanent fixed walls that can be allowed in the building.

1.6.1 Exterior Load-Bearing and Shear Walls

Exterior load-bearing/shear walls, where used, shall be constructed of precast reinforced concrete panels. The design of the walls shall be in accordance with ACI 318.

1.6.2 Non-Load-Bearing Walls

Non-load-bearing exterior walls shall be constructed of reinforced concrete masonry units or precast reinforced concrete panels at the Contractor's choice. All interior walls will be non-load-bearing and may be constructed of reinforced concrete masonry units or cold-formed steel studs as long as they meet the architectural requirements including fire protection. Where required, the walls shall extend up to just below the underside of the roof structure with allowance for roof deflection and shall be laterally braced by the roof structure. Where CMU walls are used, the reinforcement shall be not less than the minimum seismic reinforcement required below. Steel studs if used, will be sized according to the wall heights required with the design thickness (gage) and depth shown on the drawings. The design of the walls shall be in accordance with ACI 318, ACI 530 or AISI as applicable.

1.6.3 Masonry

1.6.3.1 Design

Masonry design shall be in accordance with ACI 530-92. Wall thickness and reinforcement shall be sufficient to satisfy the calculated requirements for strength, shrinkage crack control, and seismic design. Minimum wall

thickness will be 200 mm (8") with a minimum vertical reinforcing of 15M (#4) @ 800 mm (32") on center. A bond beam will be provided at the top of all cmu walls. Walls greater than 2.5 m (8 feet) in height will have intermediate bond beams. If masonry walls are used in conjunction with steel framing, the connections between walls and the structural steel frames must be designed to allow frame movement with minimum influence on the adjoining walls.

1.6.3.2 Masonry Material Strengths

Specified compressive strength of masonry shall be f'm = 9.5 MPa (1350 psi). Type S mortar shall be specified for all masonry. Specified compressive strength of grout shall be 14 MPa (2000 psi) minimum.

1.6.3.3 Crack Control

Concrete masonry crack control measures comprised of masonry control joints, joint reinforcement, and bond beams shall be incorporated in the design of concrete masonry walls and partitions. Masonry Control Joints (MCJ) shall be judiciously located at spacings no greater than the maximums recommended in ACI 530. MCJ shall be shown on the Architectural Floor Plans and Elevations.

1.6.4 Precast Concrete

1.6.4.1 Design

The design of precast wall panels shall conform with the requirements of ACI 318. The precast panels shall be designed for all applicable loads indicated in paragraph STRUCTURAL LOADING CRITERIA and the design shall consider all loading and restraint conditions from initial fabrication and handling to completion of the structure. Attachment of precast panels shall be by welding or bolting, at the Contractor's option.

1.6.4.2 Precast Concrete Strengths

The required 28-day compressive strength for precast concrete wall panels shall be 21 MPa (3000 psi) minimum. For exterior exposure, air-entrained concrete will be used, with a total air content between 4 and 7 percent by volume.

1.7 FOUNDATION SYSTEM AND DESIGN

Contractor's bid proposal for the foundation system shall be based on continuous and/or spot spread footings. See section 1.7.4 Foundation Proposal. Final design of the foundation shall be based on a complete Geotechnical/Soils Report prepared by the Contractor's consultant.

1.7.1 Geotechnical/Soils Report

The report shall include the following information as a minimum:

1.7.1.1 Soil profiles, plotted logs of borings and a plan showing boring locations

1.7.1.2 Classification of soil and rock including satisfactory and unsatisfactory material types for earth work specifications

1.7.1.3 Recommended type and depth of foundation

1.7.1.4 Allowable soil or rock bearing pressure

1.7.1.5 Anticipated settlements

1.7.1.6 Lateral earth pressure coefficients and soil unit weight

1.7.1.7 Ground water data

1.7.1.8 Soil resistivity data for corrosion protection requirements for underground utilities

1.7.1.9 Depth of top soil to be stripped

1.7.1.10 Excavation, backfill and compaction requirements

1.7.1.11 Frost penetration depth

1.7.1.12 Cement requirements to resist sulfate attack, if applicable.

The components of the foundation system shall be constructed of reinforced concrete. The required 28-day compressive strength of concrete for the foundations shall be left to the Contractor's discretion, except that 21 MPa (3000 psi) shall be a minimum. All parts of the foundation system shall be designed for a dead load balance to keep differential settlements to a minimum. Buildings were removed from the site of the new warehouse, however some portions of the original foundations may still remain and will be removed under this contract. Perimeter insulation shall be installed on all exterior perimeter foundation walls and shall extend from the bottom of slab down to top of footing or down to design frost depth.

1.7.2 Earthwork

Earthwork for the BSC Warehouse shall be in accordance with the Contractor's Geotechnical/Soils Report. See 1.7.1 "Geotechnical/Soils Report."

1.7.3 Type of Foundation

The foundation for the BSC Warehouse will be based on the Contractor's Geotechnical/Soils Report and shall conform to one of the following types foundation.

1.7.3.1 Continuous Footings with Foundation Walls

The design of continuous footings and foundation walls shall be in accordance with ACI 318.

1.7.3.2 Spread Footings with Grade Beams

The design of spread footings and grade beams shall be in accordance with ACI 318.

1.7.3.3 Drilled Foundation Caissons (Piers) with Grade Beams

A practical minimum diameter for piers is considered to be 600 mm (24 inches). Drilled piers 450 mm (18 inches) in diameter may be used if conditions do not warrant use of a 600 mm (24-inch) diameter pier. Bearing type drilled piers 450 mm (18 inches) in diameter should be limited to a maximum depth of 6 meters (20 feet). Piers shall be designed with diameters in 150 mm (6") or 300 mm (12") increments. If belled piers are used, the diameter of the bell must be shown on the drawings. The edge thickness of the base of the bell should not be less than 150 mm (6 inches). Prior to designing a belled pier, consideration should be given to using a larger diameter pier without a bell. The Contractor shall not require bells with diameters less than the shaft diameter plus 300 mm (12 inches). Drilled piers will be vertically reinforced with a minimum of 1% of the cross-sectional area.

1.7.3.4 Auger Placed Grout Piles with Grade Beams

The pile diameter specified should be the diameter of the auger which should be 50 mm (2 inches) larger in diameter than that used to calculate the structural capacity of the pile. The structural capacity of the pile should be based on an allowable design stress not greater than 20 percent of the 28-day grout strength. The minimum compressive strength specified for the grout shall be 21 MPa (3,000 psi). Assuming subsurface conditions are adequate, the working load on the piles should be limited to about 36 metric tons (40 tons) per pile for 300 mm (12-inch) piles up to about 72 metric tons (80 tons) per pile for 450 mm (18-inch) piles. Test reports on soil samples shall be used to determine "calculated" pile tip elevations. Test piles and load test data shall be used to verify and/or to redetermine the pile tip elevations. One test pile should be load tested in each area of substantially different subsoil conditions, but not less than one pile load test shall be made for the project. Test piles shall be loaded to twice the design working load, unless failure occurs first. The safe design capacity of a test pile as determined from the results of load tests shall be the lesser of the two values computed according to the following:

a. One-half the load that causes a net settlement after rebound of not more than 3 mm per metric ton (0.01 inch per ton) of total test load.

b. One-half the load that causes a gross settlement of not more than 25 mm (1 inch) provided that the load settlement curve shows no sign of failure.

The withdrawal and examination of the auger to verify soil profile should be required for all test piles and for 10 percent of the remaining piles to supplement the soil boring information. Design of grade beams shall be in accordance with the requirements of ACI 318.

1.7.4 Foundation Proposal

The Contractor's bid proposal shall be based on continuous and/or spread footings with a bottom of footing depth as called for in paragraph 1.7.5 "Design Depth for Footings." The final design of the foundation will be based on the Geotechnical/Soils Report prepared by the Contractor's consultant.

1.7.4.1 Allowable Soil Bearing

The allowable soil bearing pressure represents the allowable soil stress at the base of footings in excess of that due to existing overburden. The weight of any fill added to the site shall be subtracted from the allowable soil bearing pressure to arrive at a net allowable pressure due to structural loads. An allowable soil bearing pressure of 96 kPa (2000 psf) shall be used for the foundation proposal. The Contractor shall assume fill material is present from the ground surface to a depth of five feet below existing grade.

1.7.5 Design Depth for Footings

All footings shall extend a minimum of 1.5 m (5.0 feet) below final exterior grade.

1.8 CONCRETE FLOOR SLABS-ON-GRADE

The concrete floor slabs-on-grade subjected to fork lift traffic or other type wheel loads shall be designed in accordance with TM 5-809-12 "Concrete Floor Slabs On Grade Subjected To Heavy Loads"; however, it shall not be less than 200 mm (8") thick reinforced with 15M (#5) @ 300 mm (12") on center both ways.

1.8.1 General

The floor slab shall be a "floating slab" without rigid edge support, and with lateral and vertical movement unrestrained, except where noted below. Where compressible filler is used as a cushion, its thickness shall be not less than 50 mm (2 inches). A bond breaker, usually one layer of No. 30 asphalt felt, is required where slabs abut vertical surfaces. A 6-mil polyethylene vapor barrier and a capillary water barrier, not less than 150 mm (6-inch) compacted thickness, shall be required under all interior slabs-on-grade. Crack control measures shall be incorporated in the slab design. If checkerboard placement is used, construction joint spacings shall not exceed 7.5 m (25 feet) on centers both ways. If lane placement is used, construction joints will be used between lanes and spaced at 7.5 m (25 feet) on centers with weakened plane (saw cut) joints used transverse to the construction joints and spaced not to exceed 6.0 m (20 feet) on centers. The required 28-day compressive strength for the concrete slab shall be a minimum of 21 MPa (3000 psi).

1.8.2 Capillary Water Barrier

Capillary Water Barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 25 mm (1 inch) and no more than 2 percent by weight shall pass the No. 4 sieve. The compacted thickness shall be a minimum of 150 mm (6 inches).

1.8.3 Modulus of Subgrade Reaction

Floor slabs resting on capillary water barrier shall be designed using a modulus of subgrade reaction "K" of 41 MN/m^3 (150 pci).

1.8.4 Administrative Areas

Slabs in administrative areas shall be a minimum thickness of 125 mm (5").

1.8.5 Slabs to Receive Ceramic Tile or Floor Mat Finish

The slab shall be of 125 mm (5-inch) uniform thickness, reinforced with 15M (No. 5) bars at 400 mm (16-inch) o.c. each way, and the slab shall be depressed as necessary to receive the ceramic tile or the floor mat and frame. At interior edge locations, the slab shall be thickened and doweled into the adjacent slab with 20 mm (3/4") diameter by 375 mm (1'-3") long dowels at 300 mm (12") o.c.

1.8.6 Structural Stoops at Exterior Doorways

All exterior doorways require structural stoops. Stoops shall have foundation walls extending down to frost depth and shall be rigidly attached to building foundation walls/grade beams with 300 mm (12") of compacted fill under the stoop slab. The stoop slab shall be flush with the interior floor slab at the threshold and shall slope away from the building at 2%.

1.8.7 Exposed Concrete Floor Slabs

Exposed concrete slabs shall be sealed with a floor hardener to inhibit the liberation of concrete dust.

1.8.8 Equipment Pads

Floor mounted mechanical and electrical equipment shall be installed on 125 mm (5-inch) thick raised concrete housekeeping pads. The pads shall be reinforced with at least the minimum temperature reinforcement required. The pads shall be sized 150 mm (6 inches) larger all around than the piece of equipment furnished and all edges of the pad shall be chamfered.

1.8.9 Equipment Vibration Isolation

All vibration producing mechanical and electrical equipment shall be mounted in such a manner as to prevent the transfer of vibrations to adjacent parts or areas of the building. If necessary for any large vibration producing equipment installed within the facility, the equipment will be supported on individual isolated foundations. The isolated foundation shall be separated from the building slab by a continuous 25 mm (1 inch) expansion joint.

1.9 OTHER STRUCTURAL WORK

1.9.1 Exterior Equipment Pads

Any exterior mechanical or electrical equipment shall be installed on concrete pads. The pads shall be a minimum of 150 mm (6-inches) thick and shall be reinforced with at least the minimum temperature reinforcement required. The pads shall be sized 150 mm (6 inches) larger all around than the piece of equipment furnished and all edges of the pad shall be chamfered. Exterior pads shall be coordinated with the Mechanical and Electrical engineers.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 02600

MECHANICAL DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

This chapter contains instructions and engineering requirements for the mechanical design of the following:

- Identification of Piping
- Seismic Protection for Mechanical Piping and Equipment
- Thermal Insulation of Mechanical System
- Plumbing System
- Exterior Gas Piping System
- Interior Gas Piping System
- Air Supply and Distribution Systems
- Ventilation and Exhaust System
- Other Systems
- Controls
- Operation and Maintenance Requirements
- Construction Specifications (CSI)

Provide building mechanical systems, complete and ready for operation. The design and installation of all mechanical systems, including manufacturer's products, shall meet the instructions and requirements contained herein and the requirements of the provided construction specifications (CSI) . Where conflicts between these instructions and the construction specifications (CSI) exists, these instructions shall take precedence. Any installation requirements within these instructions, but not contained in the construction specifications, shall be added to the construction specifications or shown on the drawings.

Mechanical design shall be economical, maintainable and energy conservative with full consideration given to the functional requirements and planned life of the facility. Mechanical design shall also consider maintance and repair of the facility and real property installed equipment components and systems. Ease of access to components and systems in accordance with industry standards and safe working practices is a design requirement. All like equipment and accessories shall be from a single manufacturer.

1.1.1 Facility Description

The majority of the Base Supply and Equipment Warehouse is a standard warehouse type facility, consisting of general storage, secure storage, administration office space, toilet room, and janitor closet, generally occupied 8 hrs/day, 5 days/week.

1.1.2 General Piping Requirement

The following shall be provided for all piping systems:

a. All piping and equipment located in finished area of the building shall be concealed or furred-in; exposed piping is only allowed in utility, equipment, storage, and other rooms of this nature.

b. All underground metallic lines, fittings, and valves: except for cast-iron soil and storm drains piping system, shall be cathodically protected in accordance with Electrical Section paragraph entitled "Cathodic Protection".

1.1.3 Roof Mounted Equipment

Except for Exhaust fans, mechanical equipment shall not be located on the roof of the facility. The maximum allowable installed height of any mechanical equipment shall not exceed the height of the building parapet wall cap flashing.

1.1.4 Color Coding Scheme for Locating Hidden Utility Components

Color coding scheme shall meet the requirements of Construction Specification (CSI).

1.1.5 Utility Interruptions

Certain limitations on utility interruptions apply. Unauthorized utility interruption will not be premitted. Any work that requires a utility interruption shall be scheduled in advance. Outage are subject to postponement or cancelation by site authorities with out prior notificition. Coordination requirements of utility interruptions shall be in accordance with federal, state, local standard and Construction Specification (CSI).

1.1.6 Design Conditions

The following conditoins shall be used in designing the mechanical systems:

Site Elevations:	Equipment design elevation is 1726 mm (5663 feet) above sea level. Appropriate corrections shall be made when calculating the capacity of all mechanical equipment installed at this elevation.
Latitude:	40 DEG N
Heating Degree Days:	6239 annual
Cooling Degree Days:	582 annual

Heating and air conditioning

Outside Design Conditions:

Summer:	33.3ºC db; 18ºC MCWB

Winter: -32ºC For outside make up air and infiltration loads.
-21ºC For Transmission loads.

Inside Design Conditions:
Warehouse Area:

Winter: Maintain 13ºC in area with active employment

Administration Area (Office):
Winter: 21ºC For all occupied areas including cooridors.
Summer: 23ºC db

Utility Area:
Summer: 29ºC
Winter: 10ºC

Mechanical ventilation and special exhaust:
(a) Toilets- 24 L/s per water closet, unrinal or 10 L/s/m^2,greater
(b) Janitor Closet-10 L/s/m^2
(c) Utility Room - Summer- 10 air changes/hr
Winter- 0.75 L/s/m^2
(d) Warehouse-0.75 L/s/m^2

1.2 IDENTIFICATION OF PIPING

All exposed piping in accessible space shall be identified with color code bands and titles in accordance with American National Standards Institute (ANSI) Standard A13.1, Scheme for Identification of Piping Systems, and shall meet all techanical requirements .

1.3 SEISMIC PROTECTION FOR MECHANICAL PIPING AND EQUIPMENT

The seismic protection design of the mechanical, ductwork, piping, and equipment is located in seismic zone 3 the design shall meet the requirement of Construction Specification (CSI).

1.4 THERMAL INSULATION OF MECHANICAL SYSTEMS

Insulation requirement of all mechanical systems: including insulation of plumbing systems and equipment, shall meet the requirements of Technical Specification.

1.5 PLUMBING SYSTEM

The plumbing system consists of the hot and cold water service to the various plumbing fixtures; soil waste and vent piping; fixture, and fixture trap. The design of the plumbing system shall comply with the most current

National Standared Plumbing Code and shall meet the requirement of the Construction Specification (CSI).

1.5.1 Emergency Eye Wash

A emergency eye wash shall be provided near the battery charging area.

1.5.2 Domestic Hot-Water

Concealed, local point-of use electric water heater shall be provided in restroom area for hot water to the plumbing fixtures needing hot water. The location of the water heater shall be coordinated with the Contracting Officer and access for maintenance provided.

1.5.3 Wall Hydrants

Non-freeze wall hydrant shall be provided with vacuum breaker backflow preventer on outside wall. Locate so that, the area can be watered without crossing the main building entrances.

1.5.4 Pipe Material

The piping material shall meet the requirements in Construction Specification (CSI).

1.6 EXTERIOR GAS DISTRIBUTION SYSTEM

This section contains design requirements for the exterior natural gas distribution system, including the building gas service line and gas service regulator assembly. The gas distribution system shall be design in accordance with ANSI Z223.1 and NFPA 54, shall meet safety requirements of ANSI B31.8, and shall meet the requirement of Construction Specification (CSI).

1.7 INTERIOR GAS PIPING SYSTEM

The interior gas piping system shall extend from the outlet of the gas service regulator assembly to the point of connection of each gas device. The gas piping system shall be steel design in accordance with ANSI Z223.1 and NFPA 54, and shall meet the requirement of Construction Specification (CSI).

1.8 AIR SUPPLY AND DISTRIBUTION SYSTEM

The design of all systems will comply with the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbook, to the requirement of NFPA standard Nos. 90A, 90B, and 91, and meet the requirements of Construction Specification(CSI).

1.8.1 Air Conditioning

The Office shall be air conditioned using a standard package air conditioner. There are no air condition requirements for the other areas Warehouse, Secured Storage, Rest Room, and Janitor Closet.

1.8.2 Heating

The Office will be heated using radiant heaters, the Warehouse will be heated using gas fired unit heaters. The Restroom shall be heated using electric unit heaters, The Secured Storage shall be heated inaccordance with criteria.

1.9 VENTILATION AND EXHAUST SYSTEM

The design of all systems shall comply with American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbooks, ASHRAE Standard 62, to the requirement of NFPA Standards Nos. 90A, 90B, and 91, and shall meet the requirements of the applicable Construction Specification (CSI), federal, state and local standards.

1.9.1 Exhaust Fans

The Warehouse Area shall be ventilated using roof or wall mounted exhaust fans. Restroom and Janitor Closet shall be ventilated using inline fans. No exhaust requirements for the Office And Secured Storage area.The forklift battery charge station must have ventilation natural or forced. The power ventilation system for the forklift battery charge station must be separate from ventilation system for the other area an exhaust hood shall be provided with this system.

1.10 OTHER SYSTEM

The Warehouse will be serviced by one 4.5 metric ton bridge crane design shall be in accordance with the requirements of the Association of American publication CMAA70, Contruction Specification (CSI) and Crane Manufacturer.

1.11 CONTROLS

All mechanical controls will be standard controls.

1.12 CONSTRUCTION SPECIFICATIONS (CSI)

Construction specifications (CSI) shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the product and installation requirements for the facility.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 02700

FIRE PROTECTION DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Fire protection shall be based on sound fire protection engineering principles and give safeguards against loss of life and property by fire, consistent with the mission, risk involved, and economical utilization. Fire protection shall be design for a Wet Pipe sprinkler system and based on the Uniform Building Code, Life Safety Code, NFPA Standards Nos. 13, and 231C. Applicable requirements of the Uniform Building Code will also be included in the design. These will include the following: Types of construction; Fire area limitations; increases to allowable floor areas; seperation of structures. The fire alarm system to be provided in this contract will be designed to interface with existing BANG base fire department alarm system. The design of the fire protection system shall be done by a registered Fire Protection Engineer.

1.1.1 Occupancy Classification

The Base Supply Warehouse will be classified as a mixed Occupancy in accordance with NFPA 101. The administrative potion classified as a Business Occupancy in accordance with NFPA 101. The facility also include a warehouse potion, which will be classified as storage Occupancies in accordance NFPA 101. Accordance to the Uniform Building Code (UBC), the facility will also be classified as a Mixed Occupancy.

1.1.1.1 Classification of Hazard of Contents

The classification of hazard of contents for this building will be determined by the portion of the building which has the greatest hazard.

1.1.2 Fire fighting Support

The Base Supply Warehouse Facility fire fighting support will be supplied by an automatic wet pipe sprinkler system. This fire protection and suppression system will be tied into the building's fire detection and alarm system. The building will be provided with fire extinguisher cabinets and standpipes for hose station. The fire alarm system will have manual pull station in the paths of egress of the building.

1.1.3 Presence of Handicapped Occupants

Handicapped personnel will potentially be present in the facility. Provisions for accessibility and usability will be made for physically handicapped individuals for exiting.

1.2 FUNCTIONAL AND TECHNICAL REQUIREMENTS

1.2.1 Construction for Fire Resistance of the building including Roof,Walls, and Doors.

1.2.1.1 Building Construction Type

The Base Supply Warehouse will be of Type I or Type II, Non- combustible construction in compliance with UBC and Mil handbook 1008B.

1.2.1.2 Exterior Walls
Exterior walls of the facility will be rated in accordance with NFPA.

1.2.1.3 Interior Wall

One hour fire rated walls will be constructed around or separate janitor's closets, and electrical room from other parts of the building per NFPA 101. All penetrations in fire rated walls (conduits, pipes...etc.) will be fireproof according to their respective wall/floor/ceiling rating (sealed) at each penetration.

1.2.1.4 Roof

Roof system shall have Factory Mutual rated class I-90 and have a U.L. Class A classification.

1.2.2 Occupant Load, Exits, and Travel Distances to Exit

For purposes of determining required occupant load, exits,and travel distances to exit for the Base Supply Warehouse will be in accordance with NFPA 101.

1.2.3 Fire Extinguishers Cabinets

Fire extinguishers cabinets will be provided in accordance with NFPA 10.

1.2.4 Sprinkler System

Sprinkler system shall be provided throughout the facility. The facility shall be protected by a wet pipe sprinkler system. System design will be in accordance with NFPA 13 and NFPA 231C for the rack storage.

1.2.5 Fire Alarm And Detection System

The Fire detection system shall be EST. The fire alarm system control panel's communication protocols shall be fully compatible with the existing computerized graphic control panel.The existing computerized graphic control panel is manufactured by Edwards System Technology, Inc. (EST). The alarm shall sent to building 465 via fiber optics. The entire facility will have automatic fire detectors in accordance with NFPA 72. Detector in secured storage shall be photoelectric smoke detector. Pull stations will be provided and located in accordance NFPA 101. Supervisory initiating devices will be provided and design in accordance with NFPA 13 and NFPA 72.

1.2.5.1 Alarm Verication

The EST system shall be provided with alarm verification features. The alarm verification features will reduce false alarms due to transient condition.

1.2.5.2 Indicating Devices

Evacuation indicating signalling devices will be provided and designed in accordance with NFPA 101 and the Americans With Disabilities Act (ADA).

1.2.5.3 System Design

The fire detection system shall be design in accordance with the above criteria and Construction Specification (CSI).

1.3 DESIGN OBJECTIVE AND PROVISION

1.3.1 Zoning and Treatment of Each Potential Hazard

1.3.1.1 Walls

All areas where a potential hazard exists greater than that of the primary occupancy, will be seperated from the primary occupancy by walls having not less than 1-hour fire resistive construction.

1.3.1.2 Fire Alarms and Extinguishing System

The entire facility will be provided with a fire supression system and detection system.

1.3.2 Provision and Maintenance of an Onobstructed Emergency Egress System to Include Consideration for the Physically Handicapped.

1.3.2.1 All cooridor widths, clear space requirements relative to exits doors,etc., shall be in acordance with the Uniform Federal Accessibility Standards for unobstructed egress.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 02800

ELECTRICAL DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The installation shall conform to the requirements of ANSI C2, NFPA 70, and NFPA 101, unless more stringent requirements are indicated herein.

1.1.1 Coordination

The drawings shall indicate the extent and the general location, height and arrangement of equipment, conduit, and wiring. The Contractor shall become familiar with all details of the work and verify all dimensions in the field so that the outlets and equipment shall be properly located and readily accessible. Lighting fixtures, outlets, and other equipment and materials shall be located to avoid interference with mechanical or structural features; otherwise, lighting fixtures shall be symmetrically located according to the room arrangement when uniform illumination is required, or asymmetrically located to suit conditions fixed by design and shown. Raceways, junction and outlet boxes, and lighting fixtures shall not be supported from sheet metal roof decks. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change. The Electrical Contractor shall coordinate the electrical work with HVAC and other building systems and provide all power related wiring for new electrically operated equipment and communications systems.

1.1.2 Standard Products

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

1.1.3 Identification Nameplates

Major items of electrical equipment and major components shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number as indicated. Designation of motors shall coincide with their designation in the motor control center or panel. Unless otherwise specified, all identification nameplates shall be made of laminated plastic with black outer layers and a white core. Edges shall be chamfered. Letters and/or numbers shall be a 6 mm (1/8 inch) minimum height. Plates shall be fastened with black-finished round-head drive screws, except motors, or approved nonadhesive metal fasteners. When the nameplate is to be installed on an irregular-shaped object, the Contractor shall devise a support suitable for the application and ensure the proper installation of the supports and nameplates. In all instances, the nameplate shall be installed in a conspicuous location. At the option

of the Contractor, the equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic. The front of each panelboard, motor control center, switchgear, and switchboard shall have a nameplate to indicate the phase letter, corresponding color and arrangement of the phase conductors. Each panel, section, or unit in motor control centers, switchgear or similar assemblies shall be provided with a nameplate in addition to nameplates listed above, which shall be provided for individual compartments in the respective assembly, including nameplates which identify "future," "spare," and "dedicated" or "equipped spaces."

1.1.4 UL Label

All electrical equipment shall meet the requirements of Underwriters Laboratories which apply to the circumstances of use. The label or listing of the Underwriters Laboratories, Inc., shall be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted. However, materials and equipment installed in hazardous locations must bear the UL label unless the data submitted from other testing agency is specifically approved in writing by the Contracting Officer. Materials and equipment shall be approved based on the manufacturer's published data.

1.1.5 Calculations

Calculations for lighting levels, connected and demand loads, conductor sizing and short circuit shall be submitted to support the design and construction of the facility.

1.2 CONDUCTORS AND CONDUITS

1.2.1 All conductors shall be in conduit.

1.2.2 Medium Voltage Cable shall be NEMA WC 8; Ethylene Propylene Rubber insulated cable, manufactured and tested in accordance with AEIC-CS-6-87. The cable shall be 15KV with 133% insulation level, copper conductor, class B stranded, annealed with semiconductive conductor shield. The construction of the cable shall include single conductor with 1/3 copper concentric neutral, and extruded semiconductive insulation screen. The insulation jacket shall be pvc, 80 mils minimum thickness overall.

1.2.3 For systems with voltages lower than 600 Volts, conductors of 6 AWG or smaller shall be copper. In these systems, conductors larger than 6 AWG may be of AA-8000 series aluminum conductors. Intermixing of copper and aluminum conductors is not permitted. The design shall be based on copper conductors and aluminum conductors used shall have an ampacity not less than that of the copper conductors shown in the design.

1.2.4 Conductors shall be 12 AWG or larger for power and lighting systems and 14 AWG or larger for Class 1 remote control and signal circuits.

1.2.5 Minimum conduit size shall be 21 mm (3/4 inch) for power and/or lighting systems.

1.2.6 All paved road crossings shall be jack and drill at minimum depth of 900 mm (36 inches).

1.2.7 Conduit shall be RGS where exposed above ground . Aluminum conduit shall not be in damp areas or in contact with concrete or earth. EMT shall not be used below ground. Conduit shall have a PVC sleeve where it penetrates floors or walls. There shall be no horizontal runs of conduit in any part of any slab.

1.3 LIGHTING

1.3.1 General

Facility lighting shall be accomplished using HPS lighting in the warehouse areas and fluorescent lighting in all other locations inside the building. Spaces shall be illuminated to levels as recommended in the IES with the exception that the warehouse areas shall be illuminated to 300 lux in areas 4500 mm (15 Feet) from the outer roll up doors and the area below the bridge crane. The extra lighting shall be in addition to the IES recommended levels and shall be separately switched. Quartz re-strike lamps shall be installed in selected HPS fixtures throughout the facility for safety during re-striking of the HPS lighting. Emergency lights shall be furnished in all areas. Where fluorescent lighting is used, the emergency light shall be incorporated as part of the fluorescent fixture.

1.3.2 Electronic Ballasts

Electronic ballasts and T8 type lamps shall be used for all fluorescent lighting.

1.3.3 HPS Lighting Fixture

A wall-mounted high pressure sodium (HPS), photoelectric-controlled lighting fixture Shall be mounted above each exterior roll up door.

1.3.4 Maximum to minimum ratios shall meet the recommended values of the IES.

1.3.5 Emergency Lighting

Emergency lighting shall be furnished in all lighted spaces. The battery shall be an integral part of all emergency lighting fixtures. In areas where fluorescent lighting is used, integral battery backup type lighting shall be used.

1.4 POWER

1.4.1 The source of the electrical power shall be an existing 13.2 KV pole located outside of the compound fence on the northwest corner. THIS POWER SHALL NOT BE USED FOR CONSTRUCTION POWER.

1.4.2 The new service shall be tapped from an existing pole located outside of the facility fence on the northwest corner. The pole has an existing crossarm with surge arrestors and two aerial to underground transitions all of which have been abandoned in place. All existing equipment not reused shall be removed from the pole. New fused disconnects shall be used. The service shall be underground to the new building.

1.4.3 All power interruptions shall be kept to a minimum. Prior to any power interruptions, all equipment for re-connection of power shall be laid out and inventoried in the presence of the Contracting Officer. All parts required to reconnect service shall be at the site before any interruption may take place. All interruptions shall be coordinated with the Contracting Officer 14 days prior to the interruption.

1.4.4 Over current devices shall be of the circuit breaker type.

1.4.5 There shall be 20% spare capacity in all electrical panels. 20% of the circuit breakers in the panels shall be spares.

1.4.6 In office spaces, convenience duplex receptacles (120 V, 20 A) shall be spaced at intervals of no more than 1800 mm (6 feet) at 600 mm (24 inches) above finished floor (AFF). In all other areas, convenience duplex receptacles shall be spaced at intervals of no more than 3600 mm (12 feet) at 1050 mm (42 inches) AFF. There shall be no less than one receptacle on any wall of 600 mm (2 feet) in length or more. There shall be a four plex (double duplex) receptacle installation next to each roll up door. There shall be no more than six duplex receptacles on each circuit. There shall be one 120 V, 20 A, Weather Proof, GFI, duplex receptacle next to each exterior roll up door mounted on the exterior of the building.

1.4.7 There shall be no more than six receptacles on any one circuit.

1.4.8 There shall be two receptacles installed for user furnished battery chargers in the loading area of the equipment storage room. The size for these receptacles shall be 240 Volt, 30 Ampere mounted at 1050 mm (42 inches).

1.4.9 All electrical or mechanical equipment installed by the contractor shall be supplied with power by means other than the above mentioned receptacles.

1.5 COMMUNICATIONS

1.5.1 A duplex eight pin, modular telephone jacks shall be installed in the office next to each convenience receptacle. Each jack shall be wired with 2 ea. 4 pair cables back to the telephone backboard. The minimum size conduit for communications shall be 21 mm (3/4 inch). An eight pin, modular jack, for wall type telephone installation, shall be mounted at 1050 mm (42 inches) AFF next to each roll up door on the loading dock.

1.5.2 A door chime device will be installed to the exterior entrance door to notify workers in the warehouse that someone has entered the facility and a push button ringer at each roll up door to notify that there is someone waiting on the loading dock.

1.5.3 There will be a PA system in the building. Speakers will be installed in all areas. Recessed speakers will be used in areas where there are finished ceilings. The contractor will furnish all amplifier and interface devices for the PA system. The PA system will be controlled via fiber optics from Building 465.

1.5.4 Communications shall be run from the new building into the compound using two 103 mm (4 inch) conduits, one of which shall be sub-ducted. The communications at the compound end will be terminated in Building 465, entering on the northwest corner, going up to the ceiling on the second level and routed to a location in the control room on the southeast corner of the building. Termination will be near two junction boxes located on the south wall of the control room at approximately 1500 mm (60 inches) AFF on the second floor. Where the conduit crosses the fence, it shall be jacked and bored under the fence at a right angle to the fence. The jack and drill operation shall start 10,000 mm (33 feet) from the outside of the fence and go 20,000 mm (66 feet) to a point 10,000 mm (33 feet) on the other side of the fence. The minimum depth of all work below the fence shall be 1000 mm (40 inches).

a. A 12 fiber 62.5/125 multimode fiber optic cable shall be run for the new PA, Fire and Security systems. Steel ST connectors shall be installed on all 12 fibers at both ends. This will be installed in one of the sub-ducts.

b. A 25 pr. telephone cable will be run for telephone in the new facility. This cable will be installed in a separate one of the sub-ducts.

1.5.5 Final termination of the PA and Telephone systems on the Building 465 end will be accomplished by Base personnel.

1.6 FIRE ALARM

1.6.1 The Fire alarm will consist of pull stations, HVAC shutdown, flow switches on the fire protection system and photoelectric smoke detectors in the secured storage. The alarm shall be sent to building 465 via fiber optics. The fire alarm equipment shall be Edwards System Technology equipment and compatible with existing Edwards System Technology fire alarm system in building 465.

1.6.2 Final termination of the Fire Alarm system on the Building 465 end will be accomplished by Base personnel.

1.7 SECURITY

1.7.1 The secured storage area shall have BMS devices on each door. A secure entry device shall be installed at the personnel door. The alarms shall be sent to Building 465 via fiber optics. All security system electronic equipment shall be Mosler LINX with a battery back system.

1.7.2 Final termination of the Security system on the Building 465 end will be accomplished by Base personnel.

1.8 GROUNDING

1.8.1 All equipment shall be grounded.

1.8.2 Service and equipment grounding shall be by grounding conductors in the conduit with the current carrying conductors.

1.8.3 All lighting and power circuits shall have a ground wire installed in the conduit with the current carrying conductors.

1.9 CATHODIC PROTECTION SYSTEM

A sacrificial anode corrosion control system shall be designed and installed by a Corrosion Engineer for all ferrous metals in contact with earth. The design/installation shall be for a minimum of 15 years.

1.10 SEISMIC ZONE

All installations shall be suitable for installation in a seismic zone 3 environment.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SPECIFICATIONS