

DEPARTMENT OF THE ARMY

AFGHANISTAN ENGINEER DISTRICT
US ARMY CORPS OF ENGINEERS
KABUL, AFGHANISTAN
APO. AE.09356



10 November 2005

REPLY TO
ATTENTION OF:
CEAED-CT

Subject: Amendment 0001 to Request for Proposal (RFP), for: D/B Warehouses (National Military Academy of Afghanistan), D/B Bathrooms (Darulaman) and D/B Parking (Camp Julian), Kabul, Afghanistan

Gentlemen:

Replace Section 01010 Scope of Work with the revised Section 01010 Scope of Work dated 6 November 2007. Replace Section 01015 Technical Requirements with the revised Section 01015 Technical Requirements dated 6 November 2007. Replace Appendix -B1 Darulaman Area Map with the attached Appendix B1 Darulaman Area Map, dated 6 November 2007.

Your proposal must be submitted and received no later than 5 PM, on 16 November 2007, to the attention of Stella Lejeune. Proposals shall be submitted by hand or by courier at the USACE compound in Kabul. No e-mail submissions will be accepted. Negative replies are requested.

Technical questions shall be addressed in writing to: Stella Lejeune, via email to **Stella.M.Lejeune2@usace.army.mil**.

Please date, sign and return this letter as acknowledgement of receipt. Acknowledgment and questions in regards this request **shall be addressed to: Stella Lejeune via e-mail to Stella.M.Lejeune2@usace.army.mil**.

Sincerely,


Contracting Officer

RECEIPT ACKNOWLEDGED

(Signature & Date)

(Print Name & Title)

SECTION 01010

SCOPE OF WORK

Revised on 06 November 2007

1. GENERAL

The project consists of the design and construction of K-Span buildings for Warehouses at National Military Academy of Afghanistan (NMAA), Temporary Bath Facilities at Darulaman Garrison and a Vehicle Parking Lot at Camp Julian within the vicinity of Kabul, Afghanistan. Refer to Appendix-A and B for approximate site locations. The project is defined as the design, material, labor, and equipment to construct buildings, parking, utilities and other infrastructures. The work in this contract shall meet and be constructed in accordance current U.S. design and International Building Codes (IBC), Life Safety Codes (NFPA-101), Force Protection and security standards. A partial listing of references is included herein:

IBC, International Building Codes 2003

NFPA 101, Life Safety Codes

UFC 4-010-01, DoD Minimum Anti-Terrorism Standards for Buildings.

1.1. ENGLISH LANGUAGE REQUIREMENT

All information shall be presented in English. The Contractor shall have a minimum of one English-speaking representative to communicate the COR at all times when work is in progress.

1.2. SUBMITTALS

Submittals and a Submittal Register are required as specified in Section 01335 of the Basic Contract.

1.3. COST ESTIMATE

The contractor shall prepare a parametric construction cost estimate for AED Engineering data collection purposes. The contractor shall prepare a thorough, well-supported, estimate reflecting the final design features, construction schedule and conditions, and any construction phasing requirements. The cost estimate shall be submitted as part of the 35%, 99% and Final design submittals are required for this contract.

1.4. CQM TRAINING REQUIREMENT

Before project design and construction begin, the Contractor's Quality Control Manager is required to have completed the U.S. Army Corps of Engineers CQM course, or equivalent. The Construction Trades Training Center (CTTC) in Jalalabad, Afghanistan provides a course that satisfies the requirement. Courses are offered at regular intervals. For enrollment and course information contact CTTC at the following:

Mhd. Haris

e-mail: mharis@afghanreconstruction.org

Telephone: 0700 08 0602

Pervaiz

e-mail: adpzmuj@yahoo.com

Telephone: 0700 61 3133

2. LOCATION

The proposed buildings and facility are located in 3 different sites at NMAA, Darulaman Garrison and Camp Julian in Kabul, Afghanistan.

3. UNEXPLODED ORDNANCE (UXO)

3.1. UXO REMOVAL AND CLEARANCE

The contractor is not responsible for the clearance or removal of mines and unexploded ordnance (UXO) from the site prior to the commencement of construction.

It is the responsibility of the Contractor to be aware of the risk of encountering UXO/mines and to take all actions necessary to assure a safe work area to perform the requirements of this contract. The Contractor assumes the risk of any and all personal injury, property damage or other liability arising out of or resulting from any Contractor action taken hereunder. The Contractor and its subcontractors may not handle, work, move, transport, render safe, or disarm any UXO/mine, unless they have appropriate accreditations from the MAC.

If a UXO/mine is encountered during project construction, UXO/mine disposal shall be handled in accordance Section 01015, Technical Requirements.

4. SUMMARY OF WORK

4.1. CONTRACTOR REQUIREMENTS

The contractor shall design and construct the facilities as a design-construct contract and shall be in accordance the requirements stated in Section 01015: TECHNICAL REQUIREMENTS. Refer to attachment following this section for more specifics for required spaces. The design and construction work shall include but not be limited to that shown in attached table and described herein.

4.1.1. GENERAL REQUIREMENTS FOR FACILITIES

All requirements set forth in the Scope of Work, but not included in the Technical Requirements, shall be considered as set forth in both, and vice versa. Provide heating and cooling for all facilities unless otherwise stated in Section 01010 or 01015.

All standard construction amenities and details such as heating, lighting, site drainage, utility connections, etc. shall be implied as a design and construction requirement. Drawings referenced are contained in Section 01015.

In general, this project consists of designing and constructing of the following:

4.1.2. BASE BID

The project consists of the design and construction of the following items:

Item-1: K-Span Warehouses-1 and 2 at NMAA

Attached Image and Drawings: Appendix-A1 through A10

Building Type: Warehouses for storage of supplies of US Government and NMAA.

Construction Type: Permanent with Life Expectancy of Minimum 20 Years, Fire-Resistant.

Configuration: 1-Story, Long-Span. Height of the K-Span shall be designed for most Economical Construction and Energy Conservation. Both Warehouses will be Air-conditioned as required under HVAC. Therefore, the Rise of K-Span Roof shall be kept to optimum height. See Appendix-A10.

Dimensions/Size: 70.0M Long x 20.0M Wide (Nominal) for each Building.

Basic Structural Materials: Floor: Concrete Floor Slab-On-Grade to support Truck (7.0 Metric Tons) Entering one side and Exit at other end. Stem Wall: 3.0M High, Concrete or CMU with concealed or protected Insulation. Roof: K-Span (Pre-Engineered).

Site Works: Earthwork for Warehouse-1 has been partially Filled and Compacted. Earthwork for Warehouse-2 requires full execution.

Road Work: The Contractor shall construct asphalt paved entrance and exit driveways to both warehouses and an asphalt paved access road, as shown in Appendix A4. The driveways and access road shall be a minimum 7.3M wide. The length of the driveways shall extend from the nearest road to the warehouse doors. A minimum turning radius of 19M shall be used for the driveways and access road.

Exterior Stairs and Steps: Reinforced Concrete, if required.

Basic Roofing Materials: Pre-engineered K-Span Metal Roof Curve with Ribs. Metal Roof shall be Pre-finished.

Energy Conservation: Provide Insulation with R-Value as specified under Section 01015 - Technical Requirements (Mechanical & HVAC) to building's enclosure (Roof, Walls and Door). Wall Insulation shall be Rigid type and protected by Plywood ¾" Thick up to 2.4M High. Secure Plywood sheet to Concrete or CMU wall and paint with same color as specified for Interior and Exterior.

Roofing Drainage: Provide Gutter and downspout and direct to nearest Storm Drainage Main.

Exterior Wall: Reinforced Concrete, CMU or 3D-Panel.

Doors: Door shall be Steel Leaves and Frames. Provide Sliding Steel Doors at both ends. Doors shall be Bi-parting with clear opening of 4.00M x approx 4.50M High to allow for Truck entering K-Span building and for moving large equipment in-out. Provide Swing Door for Egress at each End of Building per Safety Codes.

Door Hardware: Provide complete sets of Hardware to all Doors. Heavy-duty commercial Grade. Do not provide Louvers at Doors.

Exterior Window: Not Required.

Exterior Finishes: All visible Concrete and CMU surfaces shall have Stucco finish Paint. 3D-Panel shall be painted. Color shall be "Desert Sand". Roof Cladding shall be Pre-finished (Powder-Coat). Metal Doors and Louver shall be painted.

Interior works: Include Chain-link Storage Bays, 3.0M High as shown on Appendix. Provide Chain-link Doors with size to allow for Dolly or Crane with Standard Shipping Pallet to pass through. Provide complete Hardware. Provide Service Window, 1 per each Bay (Sliding, Size 0.60M Wide x 1.0M High). Provide Stainless Steel Shelf 0.60 M Wide x 0.35M Deep).

Interior Finishes - Floor: Machine-Trowel Finish for entire warehouse areas and Extended Slab front and rear of Sliding Doors, as shown.

Interior Finishes Walls: All visible Concrete and CMU surfaces shall have Stucco and Paint finish. 3D-Panel shall be painted. Interior Chain-link Partition and Doors shall be Manufacturer Primed.

Interior Doors and Louvers: Shall be painted.

Finish-Ceiling: Prefinished Structure or Paint over Sprayed-on Insulation.

HVAC: Naturally Ventilated. Provide Fixed Louver Shut-off Damper at both Roof Gable Ends. Provide Ceiling Fans at Height of 3.60M Above Finish Floor. Fan shall be provided in 2 Rows at 10.00M On Center. Both Warehouses shall be cooled and heated by Forced Air System with Ductwork to maintain Indoor Temperature range of 50 Degree in Winter and 90 Degree in Summer. Provide room for Mechanical Unit and Fuel Tanks as required. Provide Concrete Slab Base and Chain-link cage & Gate for Outdoor unit, as required under Technical Requirement of Mechanical, HVAC.

Electrical: Power Supply to K-Span Warehouses will be from Existing ~~Power Poles adjacent to Proposed Lots~~. Power plant onsite. Provide Duplex Receptacles (220V). Provide Communal Lighting per Electrical requirements for Warehouse Type.

Special Construction: Long-Span. No intermediate columns, No shear-walls or supports that obstruct open areas.

Item-2: Temporary Bath Facility at Darulaman Garrison.

Attached Drawing and Table: Appendix-B1 through B8.

Main Functions: Ablution, Toilet and Shower for ANA 1,000 Soldiers.

Construction Type: Fire-Resistant.

Configuration: 1-Story, Modular CONEX Units.

Dimensions/Size: Designer of D-B Contractor shall compile spaces from Table (Appendix-B7) plus maximum of 20% Circulation.

Basic CONEX Materials: Floor: Lightweight Concrete on Steel CONEX Floor. Wall: Metal, Insulated. Ceiling. Roof Assembly: Metal, Insulated.

Stairs and Steps: Reinforced Concrete if required for Elevated Floor.

Basic Roofing Materials: Roof shall be basic Unit's Top. Pitch Roof is not required for CONEX.

Energy conservation: Insulated Building Enclosure, all sides. Provide Insulation with R-Value as specified under Section 01015 - Technical Requirements (Mechanical & HVAC) to building's enclosure (Roof, Walls and Door). Provide Windows for Natural Ventilation and Light.

Doors: Door shall be Swing type with Steel Leaves and Frames. Provide complete sets of Hardware to all Doors (Heavy-duty type). Do not provide Louvers at Doors.

Interior Partitions: Provide Stainless Steel Panels.

Interior Finishes - Floor: Non-slip Ceramic, Mosaic Tile or Terrazzo Tile.

Finish-Bases: Stainless Steel.

Interior Finishes Walls: Stainless Steel Panels or Prefinished Panels.

Finish-Ceiling: Pre-finished, Fiberglass Panels.

HVAC: Provide Exhaust Fans for Ventilation. Each Module will be heated with Electric Unit Heater. Heating Unit, Thermostat and Power Outlets must be concealed inside compartment lock.

Plumbing: According to the on-site O&M site managers at Darulaman Garrison, there is sufficient existing water supply and wastewater treatment capacity. Contractor shall obtain site utility drawings from on-site O&M managers and verify existing utilities that are located adjacent to the proposed site of this facility. The Contractor shall be responsible for connecting the bath facility to the existing water distribution and wastewater collection systems (see Appendix B4 and B5 for approximate utility hook-up locations).

Plumbing Fixtures: See Minimum Requirements at Appendix-B7.

Electrical: Power line shall run from Existing Transformer at Site. No Receptacles are required.

Special Construction: Provide Base, Anchors and Hold-down for CONEX as required.

Toilet Accessories: See Schedule at Appendix-B8.

Site Work: The Contractor shall surface the area, within the site and surrounding the bath facilities, with 150mm of compacted aggregate (see section 01015, paragraph 2.3.4.2).

Item-3: Vehicle Parking at Camp Julian.

Attached Drawing/Table: Appendix-B1

Construction Type: Aggregate Parking Space for 200 vehicles with Fence. Provide 2 sets of Gates (one on each end) approximately 7.3M Wide (2 -3.65m wide leafs) x 2.4m High.

Design Vehicle: Passenger Car/Light Truck

Dimensions: Provide standard 2.5M Wide x 6.0M Long Parking Space. 90 Degree Configuration. Driveway = 7.0M Minimum.

Basic Structure: Site improvement: The parking area is already graveled, need vegetation removed & gravel as needed. Leveled, compacted aggregate as required. Parking Area shall be minimum 150mm thick.

Fence: Shall be 2.4M High, Galvanized Steel Posts, Beams and Bracers with Chain-link. Provide Triple-Strand and Concertina Wires on top of post, with "Y" shaped outriggers (see Appendices B9 and B10 for fencing details).

Safety and Property Protection: Provide bollards constructed from steel and concrete filled at the corners of the entrance and exit gates.

4.2. WATER SYSTEM

There is an existing water supply and distribution system in place, at the Darulaman site, that includes a water well source, water well pump, water storage tanks and underground water distribution system. The Contractor shall connect the new bathroom facilities to the existing water distribution system. An approximate connection point is shown in Appendix B4. The Contractor shall coordinate with O & M on-site Managers (AED and its contractor – Contrack International Inc.), during construction of bathroom facilities and before connection to existing utilities.

4.3. SANITARY SEWER SYSTEM

There is an existing wastewater collection and treatment system in place, at the Darulaman site. The Contractor shall connect the new bathroom facilities to the existing wastewater collection system. An approximate connection point (manhole) is shown in Appendix B5. The wastewater building service connection line shall consist of gravity sewer pipe and appurtenances such as manholes, cleanouts and building service connections. The Contractor shall coordinate with O & M on-site Managers (AED and its contractor – Contrack International Inc.), during construction of bathroom facilities and before connection to existing utilities.

4.4. DEMOLITION

Minor site demolition is required prior to construction of new work mostly found in replacement work.

4.5. SITE ELECTRICAL DISTRIBUTION SYSTEM

The contractor shall design a power system for supply and distribution to all buildings and underground electrical distribution. Contractor shall connect to local power grid from an existing power poles or pad mounted transformer at the site accordingly. Contractor shall design and install all interior electrical systems and any required exterior lighting as described in section 01015, Technical Requirements. Conductors and circuits shall be size for the specific loads. All wiring shall be run and pull through conduits. All electrical design and installation shall meet NEC (NFPA 70).

4.6. FORCE PROTECTION MEASURES

Force protection design shall be in accordance Joint Security Directorate Antiterrorism/Force Protection Guide, March 2002.

4.7. TRASH POINT

The Contractor shall provide, in a location convenient for easy removal, a trash collection point. It shall be located inside the compound walls.

4.8. HVAC, Heating Ventilation Air-Conditioning

Environmental control of the facilities shall be achieved by HVAC equipment proposed by the contractor and approved by the U.S. Government. See section 01015 for scope of work required.

4.9. LIFE SAFETY

Design and Construct circulation pathways and exit stairs in accordance building code references herein. Fire sprinkler system is not required. The facility shall comply with all other safety requirements as required in references. Smoke detectors and fire alarm systems shall be installed in accordance requirements herein.

4.10. LIGHTING

General lighting shall be provided as indicated and shall meet recommendations from IESNA for each building type and function in each building. Design and installation shall meet the requirements of the NEC.

Exterior lighting shall be high intensity discharge luminaires and consistent the predominant fixture type found throughout the compound.

4.11. ELECTRICAL

The contractor shall design and construct a power system to supply necessary power to new and existing electrical loads. Additional power supply shall be obtained via the existing power distribution system. All electrical design and installation shall meet NEC requirements. Electrical receptacles shall be provided as indicated. Conductors and circuits shall be sized for the specific loads. Secondary voltage shall be 220/380V, 3-phase, 50Hz.

4.12. FENCING AND BARRICADES

Fencing shall consist of the types to create a safe working project area to ensure occupants and workers are kept safe from the construction as much as possible.

4.13. FOUNDATION DESIGN

Foundations, including subgrade, shall be designed and constructed based on recommendations from geotechnical investigation required herein.

5. COMPLETION OF WORK

Each Item shall be completed by calendar days, including government review time from Notice To Proceed (NTP) as shown in Table below:

5.1. PERFORMANCE PERIOD

For Item-1: K-Span Warehouse at NMAA, Item-2: Temporary Bath at Darulaman Garrison and Item-3: Parking at Camp Julian

Item-2: Temporary Bath (Ablution + Toilets + Shower at Darulaman Garrison)	Completion Time From Notice to Proceed
1- Site Survey/Master Planning	10 days
2- Site Grading	65 days
3- Water Distribution System	65 days
4- Sewer Distribution System	65 days
5- Electrical System	65 days
6- Toilet Building	65 days

Item-3: Parking at Darulaman (at Camp Julian)	Completion Time
1- Site Survey/Master Planning	10 days
2- Site Grading/Parking	65 days
3- Fencing	65 days

Item-1: K-Span Warehouses at NMAA	Completion Time
1- Site Survey	5 days
2- Site Grading	180 days
3- Electrical System	180 days
4- K-Spans	180 days

5.2. LIQUIDATE DAMAGE:

Failure by the contractor to meet the deadline for 65 calendar days will require the US Government to incur costs for continuing project. For this phase Liquidated Damages per day \$496.08 will be charged.

Failure by the contractor to meeting deadlines for 180 calendar days for the whole project will require the US government to incur cost for continuing project and site management on the project beyond planned time-lines. If the whole project is not completed in 180 calendar days Liquidated Damages per day \$992.15 will be charged.

6. REFERENCES

Refer to Section 01015 for Technical Requirements.

-- End of Section --

SECTION 01015

TECHNICAL REQUIREMENTS

Revised on 06 November 2007

1. GENERAL

- 1.1. The Contractor's design and construction must comply with technical requirements contained herein. The Contractor shall provide design and construction using the best blend of cost, construction efficiency, system durability, ease of maintenance and environmental compatibility.
- 1.2. These design and product requirements are minimum requirements. The Contractor is encouraged to propose alternate design or products (equipment and material) that are more commonly used in the region; will be equally or more cost effective or allow for more timely completion, but furnish the same system durability, ease of maintenance and environmental compatibility. The Contractor will be required to submit information as requested by the Contracting Officer to make a comparison of the proposed alternate. All variations must be approved by the Contracting Officer.

1.3. ASBESTOS CONTAINING MATERIALS

Asbestos containing material (ACM) shall not be used in the design and construction of this project. If no other material is available which will perform the required function or where the use of other material would be cost prohibitive, a waiver for the use of asbestos containing materials must be obtained from the Contracting Officer.

1.4. SAFETY

1.4.1. Unexploded Ordnance (UXO)

1.4.1.1. UXO/Mine Discovery During Project Construction

Contractor IS NOT responsible for clearance/removal if UXO/mines are found during construction.

It is the responsibility of the Contractor to be aware of the risk of encountering UXO and to take all actions necessary to assure a safe work area to perform the requirements of this contract. If during construction, the contractor becomes aware of or encounters UXO or potential UXO, the contractor shall immediately stop work at the site of encounter, move to a safe location, notify the COR, and mitigate any delays to scheduled or unscheduled contract work. Once the contractor has informed the COR, the contractor will await further direction. The Contractor assumes the risk of any and all personal injury, property damage or other liability arising out of or resulting from any Contractor action taken hereunder.

Scrap metal shall be the property of the Host Government. The scrap metal on site shall be moved to an area away from the site perimeter as directed by the Contracting Officer's Representative and left for the Host Government to remove and/or salvage.

NOTE: For previous UXO/mine information, the following points of contact from the UN Mine Action Center of Afghanistan are provided:

Mohammad Sediq, Chief of Operations,
Email: sediq@unmaca.org
Cell: +93 070 295207

Hansie Heymans, Chief Information Officer,
Email: hansie@unmaca.org

Cell: +93 070 294286

1.4.1.2. Explosives Safety

1.4.1.2.1. General Safety Considerations

General safety considerations applicable to personnel, both essential and non-essential, at project sites where UXO may be encountered include:

- a. Do not carry fire or spark-producing devices.
- b. Do not conduct explosive or explosive-related operations without approved procedures and proper supervision and UXO safety support.
- c. Do not become careless by reason of familiarity with UXO or the reported probability level of UXO contamination.
- d. Do not conduct explosive or potentially explosive operations during inclement weather.
- e. Avoid contact with UXO except during UXO clearance operations.
- f. Conduct UXO-related operations during daylight hours only.
- g. Employ the "buddy system" at all times.

1.4.1.2.2. Activity Hazard Analysis (AHA) briefings

- a. Activity Hazard Analysis's shall be prepared in accordance with the Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.
- b. Hazard analyses will be prepared and briefed by personnel that are knowledgeable in UXO and explosives safety standards and requirements. These personnel should understand the specific operational requirement and hazard analysis methodologies. A hazard analysis will be performed for each activity to determine the significance of any potential explosive-related hazards. Explosive residues may be discovered or exposed during UXO operations in the form of powder or various granular and powder based pellets. These contaminants can enter the body through the skin or by ingestion if proper personal hygiene practices are not followed. Explosive fillers such as white phosphorus are dangerously reactive in air and acute exposure can result in serious injury to the skin, eyes, and mucous membranes. They are also a fire hazard.

Safety requirements (or alternatives) that will either eliminate the identified hazards, mitigate or control them to reduce the associated risks to an acceptable level will be developed. The adequacy of the operational and support procedures that will be implemented to eliminate, control, or abate identified hazards or risks will then be evaluated and a second risk assessment completed to verify that a satisfactory safety level has been achieved.

1.4.1.3. Notification of Noncompliance

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

1.5. LIMITATION OF WORKING SPACE

The Contractor shall, except where required for service connections or other special reason(s), confine his operations strictly within the boundaries of the site. Workmen will not be permitted to trespass on adjoining property. Any operations or use of space outside the boundaries of the site shall be by arrangement with all interested parties. It must be emphasized that the Contractor must take all practical steps to prevent his workmen from entering adjoining property and in the event of trespass occurring the

Contractor will be held entirely responsible.

Areas located immediately outside the construction area are known to contain mines and unexploded ordnance (UXO). Contractors assume all risks when venturing in or out of the designated work area.

1.6. TEMPORARY STRUCTURES

The Contractor shall erect suitable temporary fences, lighting, and necessary structures to safeguard the site, materials and plant against damage or theft and for the protection of the general public and shall adequately maintain the same throughout the course of the contract.

1.7. SUBCONTRACTORS

Compliance with the provisions of this section by subcontractors will be the responsibility of the contractor.

1.8. LIST OF CODES AND TECHNICAL CRITERIA:

The following codes and technical criteria and those referenced therein shall be required for this project. References within each reference below shall be required and adhered to. This list is not exhaustive and is not necessarily complete.

AABC - Associated Air Balance Council (National Standards for total System Balance)

ACI 318 Building Code Requirements for Structural Concrete (latest edition), American Concrete Institute

Air Force Manual 32-1071, Security Engineering, volumes 1-4, 1 May 1994

American Water Works Association, ANSI/AWWA C651-99 standard

ARI - Air Conditioning and Refrigeration Institute

ASCE 7-02, Minimum Design Loads for Buildings and Other Structures, 2002

ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers

ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy

ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality

ASHRAE Standard 62.2-2004, Ventilation and Acceptable Indoor Air Quality for Low-Rise Residential

ASHRAE Standard 90.1-2001, Energy Standard for Buildings Except Low-Rise Residential Buildings

ASHRAE Standard 90.2-2004 with 2006 supplement, Energy-Efficient Design of Low-Rise Residential Buildings

ASME - American Society for Mechanical Engineering

ASTM - American Society for Testing and Materials

AWS - American Welding Society

EIA ANSI/TIA/EIA-607: (1994) Commercial Building Grounding/Bonding Requirement Standard.

Factory Mutual (FM) Approval Guide-Fire Protection (2002).

IBC - International Building Codes, 2003 (and its referenced codes including those inset below)

IMC – International Mechanical Code

IPC – International Plumbing Code

Lighting Handbook, IESNA, latest edition

MIL-HDBK-1190, Facility Planning and Design Guide

Codes and Standards of the National Fire Protection Association (NFPA)

[as applicable and enacted in 2002 or later, unless otherwise noted].

National Electrical Safety Code (NESC), Institute of Electrical and Electronic Engineers (IEEE C2), 2002 edition

NFPA 10, Portable Fire Extinguishers, 2002 edition

NFPA 70, National Electrical Code, 2002 edition

NFPA 90A, Air Conditioning and Ventilating Systems, 2002 edition

NFPA 101, Life Safety Code, 2003 edition

Plumbing and Drainage Institute (PDI-WH-201) water hammer arrestors

SMACNA - Sheet Metal and Air Conditioning Contractors' National Association, Standards and Guides, latest editions

TM 5-785 Weather Data
TM 5-802-1 Economic Studies
TM 5-805-4 Noise and Vibration
UFC 1-200-01, Design: General Building Requirements, 20 June 2005
UFC 1-300-07A Design Build Technical Requirements
UFC 3-230-04a, Water Distribution, 16 Jan 2004
UFC 3-230-06a, Subsurface Drainage, 16 Jan 2004
UFC 3-230-07a, Water Supply: Sources and General Considerations, 16 Jan 2004
UFC 3-230-10a, Water Supply: Water Distribution, 16 Jan 2004
UFC 3-230-17FA, Drainage in Areas Other than Airfields, 16 Jan 2004
UFC 3-240-04a, Wastewater Collection, 16 Jan 2004
UFC 3-260-02, Pavement Design for Airfields, 30 June 2001
UFC 1-300-09N, Design Procedures, 25 May 2005
UFC 3-310-01, Structural Load Data, 25 May 2005
UFC 3-400-01, Design: Energy Conservation, 5 July 2002
UFC 3-410-01FA Heating, Ventilating and Air Conditioning, Change 1, 15 May 2003
UFC 3-410-02A, HVAC Control Systems, 15 May 2003
UFC 3-430-01FA, Heating and Cooling Distribution Systems, 27 Jy 2003
UFC 3-501-03N, Electrical Engineering Preliminary Considerations, 16 Jan 2004
UFC 3-520-01, Interior Electrical Systems, 10 June 2002
UFC 3-530-01AN, Design: Interior and Exterior Lighting and Controls, 19 Aug 2005
UFC 3-550-03FA Design: Electrical Power Supply and Distribution Systems, 1 Mar 2005
UFC 3-600-01, Design: Fire Protection Engineering for Facilities, 26 Sept 2006
UFC 4-010-01, Design: Minimum DoD Antiterrorism Standards for Buildings, 22 Jan 2007
UFC 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings, 19 Jan 2007
UFC 4-020-01FA, Security Engineering: Project Development, 1 Mar 2005
UFC 4-020-02FA, Security Engineering: Concept Design, 1 Mar 2005
UFC 4-020-03FA, Security Engineering: Final Design, 1 Mar 2005
UFC 4-020-04FA, Electronic Security Systems: Security Engineering, 1 Mar 2005
Underwriters' Laboratories (UL) Fire Protection Equipment Directory (2002)
UL Standards (as applicable)
USCINCCENT OPOD 97-1

The publications to be taken into consideration shall be those of the most recent editions. Standards other than those mentioned above may be accepted if the standards chosen are internationally recognized and meet the minimum requirements of the specified standards. The Contractor shall be prepared to submit proof of this if requested by the Contracting Officer.

2. SITE DEVELOPMENT:

2.1. GENERAL

The project includes furnishing all materials, equipment and labor for constructing water, sanitary sewer and storm sewer service lines, as applicable, and connecting to the existing sewer networks.

2.2. ENVIRONMENTAL PROTECTION

2.2.1. APPLICABLE REGULATIONS

The Contractor shall comply with all Host Nation laws, rules, regulations or standards concerning environmental pollution control and abatement with regard to discharge of liquid waste into natural streams or manmade channels. The contractor shall review host nation and U.S. Government environmental regulations with the contracting officer prior to design and discharge of any liquid wastes into natural streams or manmade channels.

2.2.2. NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed non-compliance with the

foregoing provisions. The Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No extension of time or damages will be awarded to the Contractor unless it was later determined that the Contractor was in compliance.

2.2.3. SPILLAGES

Measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides and insecticides, and construction materials from polluting the construction site and surrounding area.

2.2.4. DISPOSAL

Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., shall be taken to a dumpsite off site and subject to the approval of the Contracting Officer. Burning at the project site for the disposal of refuse and debris will not be permitted.

2.3. CIVIL SITE DEVELOPMENT

2.3.1. SITE PLAN

The contractor shall locate the facilities in general agreement with the drawings included and any requirements in the Scope of Work 01010. All buildings, roads, parking areas, entry control points, guard towers, wall, fence, utility structures, and other site features shall be clearly defined and dimensioned on the site plan. Buildings shall be located to provide access for emergency vehicles and fire fighting. Roads and parking areas shall be designed for turning radius of the largest vehicle entering the compound. The site plan shall show geometric design of the site, including applicable dimensions of all exterior facilities, mechanical equipment, pavements, utilities, etc. Required facilities are described in the following sections of this specification. All roads and areas where tractor-trailer vehicles will travel shall be designed for the worst case turning radius. Design and construction of roads and pavements shall be based on recommendations from geotechnical investigation required herein.

All site plans and master plans shall be drawn in the following projection and datum for incorporation into the U.S. Army Corps of Engineers GIS system:

WGS 1984 UTM Zone 42 N

2.3.2. DEMOLITION

Demolition shall include removal of all structures, foundations, pavements, and utilities, and clear and grubbing. All refuse and debris shall be disposed of off site. Holes and depressions shall be backfilled. Fill materials shall be composed of satisfactory soils or aggregates defined in ASTM D 2487 as GW, GP, GM, SP, SM, SW, CL-ML. Minimum soil compaction shall be 95 percent of maximum density as defined in ASTM D 1557.

2.3.3. GRADING AND DRAINAGE

The contractor will provide all necessary site grading to insure adequate drainage so that no areas will be flooded due to a rainfall of a 10-year frequency. Drainage of the area shall be compatible with the existing terrain. Building floor elevation shall be a minimum 150mm above grade and slope away from the building on all sides at a minimum of 5% for 3 meters.

Because the construction of the facilities shall take place during the winter months, where snow and rain can hinder compaction efforts, the Contractor shall be prepared to make extra effort to achieve proper compaction for all sites (K-Spans, parking area and bathroom facilities). Extra effort could involve the use of various soil stabilization methods, including: chemical stabilization (i.e. Lime); incorporating additional aggregate with the soil; removing soil and replacing with aggregate; or other methods.

2.3.4. PAVING

2.3.4.1. Driveway

Paved driveways are required for access to the warehouses at the NMAA site. Driveways shall be of wearing surface 7.3 meters (24 feet) wide, unless otherwise noted, graded for proper drainage, provided with necessary drainage structures and completed with prescribed surfaces in accordance with applicable sections of TM 5-822-2 and TM 5-822-5 standards. The driveway cross-sections shall have 200mm (8 inches) compacted aggregate base course minimum and shall be surfaced with minimum 50 mm (2 inches) hot mix asphalt concrete, unless otherwise noted. Subgrade shall be 300mm (12 inches) minimum depth scarified and compacted to 95% proctor density. Aggregate base course shall be compacted to 100% proctor density. Aggregate base course material must be well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction. Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or equivalent DIN, BS, or EN standards.

Contractor shall notify the Contracting Officer immediately if initial site survey determines that area hydrology requires major drainage structures or bridges. Also, the Contracting Officer shall be immediately notified if the required lengths of road or preexisting conditions are determined to be substantially or materially different than the above-described conditions/estimates.

2.3.4.2. Parking Areas (Motor Pool) and Bathroom Facilities

Contractor shall construct the parking area and bathroom facility sites using aggregate surface as required. Subgrade shall be 150mm (6 inches) minimum in depth scarified and compacted to 95% proctor density. Aggregate base shall be 150mm (6 inches) in depth and compacted to 100% proctor density. Aggregate Base Course (ABC) material must be well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction. Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or equivalent DIN, BS, or EN standards.

2.3.5. GATES AND FENCE:

- 2.3.5.1. Fencing shall be a minimum 2.4 m high from the top of the fence to the top of the ground. Fence and gate fabric shall be No. 9 gage wires woven into a 50 mm diamond mesh. Fabric shall be coated with 366 grams per square meter zinc galvanizing. Posts shall be ASTM F 1083 Pipe, Steel, Hot Dipped Zinc Coated (Galvanized) Welded or equal. Post sizes shall be as shown on drawings. The gates shall be swing type. Vehicle gates shall be a pair of 3.65 m wide x 2.4 m high leafs, constructed of a steel tube frame and steel tube intermediate posts and rails. The design of the gates shall insure that it is dimensionally stable, square, true and planar. Gate leafs shall not rack or deflect when installed on its hinges. Gates shall have a sufficient number of hinges to support each gate leaf. Provide a locking mechanism that holds the gates together when in the closed position as well as a drop bolt that engages a steel sleeve embedded in the pavement.
- 2.3.5.2. Reinforced Barbed Tape: Reinforced barbed tape shall be 600 mm diameter concertina style coil consisting of 31 loops. Each loop shall consist of 19 barb clusters per loop. Adjacent coils loops shall be alternately clipped together at three points about the circumference to produce the concertina effect upon deployment. Spacing between attachments points when deployed shall be 400 mm. The reinforced barbed tape shall be fabricated from 430 series stainless steel with hardness range of Rockwell (30N) 37-45 conforming to the requirements of ASTM A 176. Each barb shall be a minimum of 30.5 mm (1.2 inch) in length, in groups of 4, spaced on 102 mm (4 inch) centers. The stainless steel core wire shall have a 2.5 mm (0.098 inch) diameter with a minimum tensile strength of 895 MPa. Sixteen gauge stainless steel twistable wire ties shall be used for attaching the barbed tape to the barbed wire. The reinforced barbed tape shall be equivalent to NSN: 5660-01-457-9852.
- 2.3.5.3. Outriggers: Outrigger supporting arms shall be "Y" shaped. Posts shall conform to ASTM F 1083, Pipe, Steel, Hot Dipped Zinc Coated (Galvanized) Welded.

2.3.6. CIVIL UTILITIES

2.3.6.1. General

The design of the water and sanitary systems shall be sized to provide flow and discharge based on a fixture unit basis. The design drawings shall show all utility lines, line sizes, valves, manholes, and applicable details associated with water and sanitary system designs. Specifications covering water lines, valves, pumps, controls, sanitary sewers and storm sewers shall be submitted as part of the design and shall require standard materials that are available in-country. Contractor shall install and connect exterior sanitary sewer collection and water supply piping to service connection points of each facility requiring such.

2.3.6.2. Water

2.3.6.2.1. General Water: Infrastructure design and construction shall serve the demand. The Contractor shall install branches, laterals, lines and service connections to include all pipe, valves, fittings and appurtenances. Exterior water line construction shall include service to all buildings as described in the Scope of Work Section 01010.

2.3.6.3. Water Distribution System

2.3.6.3.1. General: The Contractor shall provide a water distribution system described as follows: Pipe diameters used in the network shall be 300mm (12 inch), 250mm (10 inch), 200mm (8 inch), 150mm (6 inch) and 100mm (4 inch), as calculated, using ductile iron (DI) conforming to AWWA C151, installed in accordance with C 600 or polyvinyl chloride (PVC) as per ASTM D 1784 and 1785. All pipes and joints shall be capable of at least 1.03 Mpa (150 psi) and 1.38 (200psi) hydrostatic test pressure unless otherwise specified. Pipes should be adequate to carry the maximum quantity of water at acceptable velocities 0.9 to 1.5m/sec (3 to 5 ft/sec) at maximum flows not to exceed 2.8m/sec (9.2ft/sec) with working pressures of 275kPa (40psi) to 517kPa (75psi). **Minimum pressure shall be 207kPa (30psi)** to all points of the distribution system except that **Minimum pressure shall be 140kPa (20 psi)** when fire protection is used and **maximum pressure of 690kPa (100psi)** can be allowed in small, low-lying areas not subject to high flow rates and surge pressures. If high pressures (greater than 690kPa) cannot be avoided, pressure-reducing valves shall be used. Water service connections to buildings shall vary from 19mm, 25mm or 38mm to 75mm, as calculated, depending on the usage requirement. Pipe service connections from the distribution main to the building shall be either Polyvinyl Chloride (PVC) plastic Schedule 80 ASTM D 1785 or copper tubing conforming to ASTM B 88M, Type K, annealed. After choosing piping material type, use similar piping materials for all buildings for efficiency of future maintenance activities. The distribution network shall be laid out in a combination grid and looped pattern with dead ends not exceeding 30m (99 feet). Dead end sections shall not be less than 150mm (6 inch) diameter and shall either have blow off valves or fire hydrants (flushing valves) installed for periodic flushing of the line. Any pipe with a fire hydrant on the line shall be at least 150mm (6 inch) in diameter. Water supply distribution shall connect to a building service at a point approximately 1.5m (5 feet) outside the building or structure to which the service is required. Adequate cover must be provided for frost protection. A minimum cover of 800mm (2'-8") is required to protect the water distribution system against freezing. Water lines less than 1.25 meters (4 feet) deep under road crossings shall have a reinforced concrete cover of at least 150 mm (6 inch) thickness around the pipe.

2.3.6.3.2. Pipe: The Contractor shall provide pipe of adequate strength, durability and be corrosion resistant with no adverse effect on water quality. The exterior surface of the pipe must be corrosion resistant. If the pipe is installed underground pipe shall be encased with polyethylene in accordance with AWWA C105. Water distribution pipe material shall be PVC or Ductile Iron (DI). Ductile iron pipe shall conform to AWWA C104, etal. DI fittings shall be suitable for 1.03MPa (150psi) pressure unless otherwise specified. Fittings for mechanical joint pipe shall conform to AWWA C110. Fittings for use with push-on joint pipe shall conform to AWWA C110 and C111. Fittings and specials shall be cement mortar lined (standard thickness) in accordance with C104. Polyvinyl Chloride (PVC) pipe shall conform to ASTM D 1785. Plastic pipe coupling and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. PVC screw joint shall be in accordance with ASTM D 1785,

etal, Schedules 40, 80 and 120. PVC pipe couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. Pipe less than 80mm (3 inch) , screw joint, shall conform to dimensional requirements of ASTM D schedule 80. Elastomeric gasket-joint, shall conform to dimensional requirements of ASTM D 1785 Schedule 40, All pipe and joints shall be capable of 1.03 Mpa (150psi) working pressure and 1.38 Mpa (200psi) hydrostatic test pressure.

- 2.3.6.3.3. Hydrostatic, Leakage and Disinfection tests: The Contracting Officer will be notified not less than 48 hours in advance of any water piping test and will be given full access for monitoring testing procedures and results. Where any section of water line is provided with concrete thrust blocking for fittings or hydrants tests shall not be made until at least 5 days after installation of the concrete thrust blocking, unless otherwise approved.
- 2.3.6.3.4. Pressure Test: After the pipe is laid, the joints completed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of 1.03 MPa (150 psi). Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants and valves shall be carefully examined during the partially opened trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered following this pressure test shall be removed and replaced and retested until the test results are satisfactory.
- 2.3.6.3.5. Leakage Test: Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours and during the test the water line shall be subjected to not less than 1.03 MPa (150psi). Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure to within 34.5kPa (5 psi) of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Pipe installation will not be accepted if leakage exceeds the allowable leakage, which is determined by the following formula:
- $L = 0.0001351ND (P \text{ raised to } 0.5 \text{ power})$ L = Allowable leakage in gallons per hour N = Number of joints in the length of pipeline tested D = Nominal diameter of the pipe in inches P = Average test pressure during the leakage test, in psi gauge
 - Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the government.
- 2.3.6.3.6. Bacteriological Disinfection
- Disinfection Procedure: Before acceptance of potable water operation, each unit of completed waterline shall be disinfected as prescribed by AWWA C651. After pressure tests have been completed, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. Flushing will be performed in a manner and sequence that will prevent recontamination of pipe that has previously been disinfected. The chlorinating material shall be liquid chlorine, calcium hypochlorite, or sodium hypochlorite. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the water lines in an approved manner. Polyvinyl Chloride (PVC) pipelines shall be chlorinated using only the above-specified chlorinating material in solution. The agent shall not be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. Valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each fire hydrant on the line shall be opened and closed several times.
 - Sampling: For each building connected to the water system, personnel from the

- Contractor's commercial laboratory shall take at least 3 water samples from different points, approved by the Contracting Officer, in proper sterilized containers and perform a bacterial examination in accordance with approved methods. The commercial laboratory shall be verified to be qualified by the appropriate authority for examination of potable water.
- Acceptance Requirements: The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.
- 2.3.6.3.7. Time for making Tests: Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipeline jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected and tested for leakage at any time after partial completion of backfill.
- 2.3.6.3.8. Concurrent Tests: The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be recorded for submission and approval. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government. a. Pressure test and leakage test may be conducted concurrently, b. Hydrostatic tests and disinfection may be conducted concurrently, using water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be re-accomplished.
- 2.3.6.3.9. Valves: Valves (Gate valves w/box) shall be placed at all pipe network tee and cross intersections and the number of valves shall be one less than the number of lines leading into and away from the intersection. For isolation purposes valves shall be spaced not to exceed 3600 mm (12 feet). Gate valves shall be in accordance with AWWA C 500 and/or C509. Butterfly valves (rubber seated) shall be in accordance with C504 etal. The valves and valve boxes shall be constructed to allow a normal valve key to be readily used to open or close the valve. Provide traffic-rated valve boxes. Provide concrete pad, 1 meter (3'-4") square, for all valve boxes.
- 2.3.6.3.10. Vacuum and Air Release Valves: Air release valves are required to evacuate air from the main high points in the line when it is filled with water, and to allow the discharge of air accumulated under pressure. Vacuum relief valves are needed to permit air to enter a line when it is being emptied of water or subjected to vacuum. Contractor shall submit manufacturer's data for properly sized combination air and vacuum release valves and determine their locations on the distribution system subject to review and approval of the Contracting Officer.
- 2.3.6.3.11. Blow-Off Valves: The Contractor shall provide 40-50mm (1-5/8" – 2") blow-off valves at ends of dead end mains. Valves should be installed at low points in the mains where the flushing water can be readily discharged to natural or manmade drainage ditches, swales or other.
- 2.3.6.3.12. Thrust Blocking: Contractor shall provide concrete thrust blocking at any point where the layout of the system changes the direction of the flow, increases the velocity, or decreases or stops the flow. At these points, the pipes and fittings must be anchored and kept from moving or pulling apart by the use of thrust blocks installed against undisturbed earth.
- 2.3.6.4. Sanitary Sewer
- 2.3.6.4.1. General: There are existing sanitary sewer collection, treatment and disposal facilities at this site. The Contractor shall obtain topographic information or other maps that show vegetation, drainage channels and other land surface features such as underground utilities and related structures that may influence the design and layout of the service connection line. If maps are not available, or do not provide satisfactory information or sufficient detail of the site, field surveys shall be performed. Sanitary sewers less than 1.25 meters (4 feet) under road crossings shall have reinforced concrete cover at least 150 mm (6 inch) thick around the pipe.

- 2.3.6.4.2. Exterior sanitary sewer line construction shall include service to all buildings as described in the Scope of Work Section 01010. Contractor shall design sanitary service connection line using approved field survey data and finished floor elevations. Depending upon the topography and building location, the most practical location of sanitary sewer lines is along one side of the street. In other cases they may be located behind buildings midway between streets. All sewers shall be located outside of the roadways as much as practical, and minimize the number of roadway crossings. To the extent practical, a sewer from one building shall not be constructed under another building, or remain in service where a building is subsequently constructed over it. Construction required shall include appurtenant structures and building sewers to points of connection with building drains 1.5m (5 feet) outside the building to which the sewer collection system is to be connected.
- 2.3.6.4.3. The Contractor shall use the following criteria where possible to provide a layout which is practical, economical and meets hydraulic requirements: 1) Follow slopes of natural topography, 2) avoid routing sewers through areas which require extensive restoration or underground demolition, 3) Avoid areas of high groundwater and placement of sewer below the groundwater table, 4) locate manholes at change in direction, size or slope of gravity sewers, 5) use straight sections between manholes, curved alignment shall not be permitted, 6) locate manholes at intersections of streets where possible, 7) avoid placing manholes where the tops will be submerged or subject to surface water inflow, 8) evaluate alternative sewer routes where applicable, 9) verify that final routing selected is the most cost effective alternative that meets service requirements. In the event that facilities to be provided under the contract must be occupied prior to completion of permanent wastewater infrastructure, the Contractor will be responsible for providing temporary portable shower and bathroom facilities.
- 2.3.6.4.4. Protection of Water Supplies
- The Contractor shall ensure that the sewer design meets the following criteria:
 - Sanitary sewers shall be located no closer than 15m (50 feet) horizontally to water wells or reservoirs to be used for potable water supply.
 - Sanitary sewers shall be no closer than 3_m (10 feet) horizontally to potable water lines; where the bottom of the water pipe will be at least 300mm (12 inches) above the top of the sanitary sewer, horizontal spacing shall be a minimum of 1.8_m (6 feet).
 - Sanitary sewers crossing above potable water lines shall be constructed of suitable pressure pipe or fully encased in concrete for a distance of 2.7m (9 feet) on each side of the crossing. Pressure pipe will be as required for force mains in accordance with local standards and shall have no joint closer than 1 meter (3 feet) horizontally to the crossing, unless the joint is encased in concrete.
- 2.3.6.4.5. Gravity Sewer: Sanitary sewers shall be designed to flow at 70 percent full. Sanitary sewer velocities shall be designed to provide a minimum velocity of 0.6 meters per second (mps) or 2.0 feet per second (fps) at the ADD flow rate and a minimum velocity of 0.8 to 1.05 mps (2.5-3.5fps) at the peak diurnal flow rate. In no case shall the velocity drop below 0.3 mps, (1.0 fps) to prevent settlement of organic solids suspended in the wastewater. Pipe slopes shall be sufficient to provide the required minimum velocities and depths of cover on the pipe. Unless otherwise indicated (see Building Connections and Service Lines), gravity sewer pipe shall be installed in straight and true runs in between manholes with constant slope and direction. Adequate cover must be provided for frost protection. A minimum cover of 800 mm (2'-8") will be required to protect the sewer against freezing.
- 2.3.6.4.6. Manholes: The Contractor shall provide standard depth manholes (MH), (depth may vary) an inside dimension of 1.2 meters (4 feet). Manholes shall be made of cast-in-place reinforced concrete with reinforced concrete cover. Alternate precast manhole option shall taper to a 750 mm (30-inch) cast iron frame that provides a minimum clear opening of 600 mm (24 inches). In every case, the manholes, frames and covers shall be traffic rated, H-20 load rating. All manholes shall be provided with a concrete bench with a flow line trough, smoothly formed to guide waste flow to the outlet pipe from the inlet pipe(s). The top surface of the

- bench shall be above the crown of all pipes within the manhole. All surfaces of the bench shall be sloped smoothly toward the trough to guide flow, even under peak flow conditions.
- Manhole Design Requirements: Manholes are required at junctions of gravity sewers and at each change in pipe direction, size or slope, except as noted hereinafter for building connections.
 - Spacing: The distance between manholes must not exceed 120 m (400 ft) in sewers of less than 460 mm (18 inches) in diameter. For sewers 460 mm (18 inches) and larger, and for outfalls from wastewater treatment facilities, a spacing of up to 180 m (600 ft) is allowed provided the velocity is sufficient to prevent the sedimentation of solids.
 - Pipe Connections: The crown of the outlet pipe from a manhole shall be on line with or below the crown of the inlet pipe.
 - Frames and Covers: Frames and covers shall be cast iron, ductile iron or reinforced concrete, traffic rated in any case to an H-20 load rating. Cast iron frames and covers shall be traffic rated, circular with vent holes.
 - Steps for Manholes: Steps shall be cast iron, polyethylene coated, at least 15 mm (5/8 inch) thick, not less than 400mm (16 inches) in width, spaced 300 mm (12 inches) on center.

- 2.3.6.4.7. Pipe: Pipe shall conform to the respective specifications and other requirements as follows: Provide Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 3034, Type PSM with a maximum SDR of 35, size 380 mm (15inch) or less in diameter. PVC shall be certified as meeting the requirements of ASTM D 1784, cell Class 12454 B.
- Fittings: Fittings shall be compatible with pipe supplied and shall have a strength not less than that of the pipe. Fittings shall conform to the respective specifications and requirements as follows: provide PVC fittings conforming to ASTM D 3034 for type PSM pipe.
 - Joints: Joints installation requirements shall comply with the manufacturers installation instructions. Flexible plastic pipe (PVC or high density polyethylene pipe) gasketed joints shall conform to ASTM D3212.
 - Branch Connections: Branch connections shall be made by use of regular fittings or solvent-cemented saddles as approved. Saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.
 - The minimum depth of the cover over the pipe crown shall be 0.8m (2'-8").
- 2.3.6.4.8. Cleanouts: Cleanouts must be installed on all sewer-building connections to provide a means for inserting cleaning rods into the underground pipe. Install manufactured wye fittings. In lieu of a wye fitting, an inspection chamber may be installed. The inspection chamber shall be of the same construction as a manhole. Preferably the cleanout will be of the same diameter as the building sewer, and never be smaller than 100 mm (4 inch).
- 2.3.6.4.9. Building Connections and Service Lines: Building connections and service lines will be planned to eliminate as many bends as practical and provide convenience in rodding. Bends greater than 45 degrees made with one fitting should be avoided; combinations of elbows such as 45-45 or 30-60 degrees should be used with a cleanout provided. Connections to other sewers will be made directly to the pipe with standard fittings rather than through manholes. However, a manhole must be used if the connection is more than 31m from the building cleanout. Cleanouts shall be provided outside of the building. Service connection lines and laterals lines shall be a minimum of 150 mm (6 inch) diameter and sloped to maintain the minimum velocity as described in paragraph "Gravity Sewer."

2.3.6.4.10. Field Quality Control

Field Tests and Inspections

- The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment and incidentals required for testing.
- Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically a full circle of light through the pipeline when viewed from the

- adjoining end of the line. When pressure piping is used in a non-pressure line for non-pressure use, test this piping as specified for non-pressure pipe.
- Test lines for leakage by either infiltration tests or exfiltration tests. Prior to testing for leakage, backfill trench up to at least lower half of the pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe to prevent movement during testing, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.
 - Infiltration tests and ex-filtration tests: Perform these tests for sewer lines made of specified material, not only concrete, in accordance with ASTM C 969M, ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969M, ASTM 969.
 - Low-pressure air tests: Perform tests as follows: 1) Concrete pipe: Test in accordance with ASTM C 924M, ASTM C 924. Allowable pressure drop shall be given in ASTM C 924M ASTM C 924. Make calculations in accordance with the Appendix to ASTM C 924M, ASTM C 924; 2) Ductile-iron pipe: Test in accordance with the applicable requirements of ASTM C 924M, ASTM C 924. Allowable pressure drop shall be as given in ASTM C 924M, ASTM C 924. Make calculations in accordance with the Appendix to ASTM C 924M, ASTM C 924; 3) PVC Plastic pipe: Test in accordance with applicable requirements of UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.
- 2.3.6.4.11. Deflection Testing: Deflection testing will not be required however, field quality control shall ensure that all piping is installed in accordance with deflection requirements established by the manufacturer.
- 2.3.6.5. Storm Sewer Systems
- Oil/water separators shall be utilized for all drains from industrial sites. Separators shall be installed as close as possible from the drain location. Storm sewer system shall not be mixed with sanitary sewer system and shall be in accordance with UFC 3-240-03, reference_latest edition.

3. ARCHITECTURAL REQUIREMENTS

3.1. GENERAL

All material approved shall become standardized material to be used throughout the facilities under contract. Different sub-contractors shall not use different material or standards under the contract. Intent of the project is to use locally procured materials (unless specified otherwise) and labor to the maximum extent possible while satisfying seismic building code. Conflicts between criteria shall be brought to the attention of the Contracting Officer for resolution. In such instances, the Contractor shall furnish all available information with justification to the Contracting Officer.

3.2. DESIGN CRITERIA

The Codes, Standards, and Regulations listed herein shall be used in the construction of this project. The publications shall be the [referenced [most recent] editions. Standards other than those mentioned may be accepted provided they meet the minimum requirements and the contractor shall submit proof of equivalency to the Contracting Officer for approval.

IBC- International Building Code
NFPA-101- National Fire Protection Association, Life Safety Code.

3.3. LIFE SAFETY/ FIRE PROTECTION/ HANDICAPPED ACCESSIBILITY

To the extent possible, all facilities will be designed in accordance with recognized industry standards for life safety and building egress. An adequate fire alarm system, fire extinguishers, and smoke alarms shall all be included as required. If a sprinkler system is required by building code, a waiver will have to be obtained before construction notice to proceed is issued. However, due to the lack of adequate water

volume and pressure, sprinkler systems may not be feasible. The facility shall comply with all other safety requirements of NFPA 101. In keeping with the intended function of these facilities, handicapped accessibility will not be incorporated into this project. Due to the war contingency requirement, it is assumed that only able-bodied military and civilian personnel will use the facilities listed herein.

3.4. ANTITERRORISM/ FORCE PROTECTION

Force protection/anti-terrorism measures for this location shall be followed and incorporated into this project in accordance with the referenced DoD Regulations. Information regarding force protection may be found herein and at the following link: www.tisp.org/files/pdf/dodstandards.pdf.

3.5. EXCAVATION

Trench excavation shall be made for concrete footings. Trenches shall be a minimum of .8 meter deep. Trenches deeper than 1.5 meters shall have protective shoring to protect workers or have the sides of the trench sloped back at a slope of 1.5:1. Care shall be taken when backfilling of foundation trenches to avoid damage to walls. Any excess dirt shall become the property of the Contractor and shall be removed from the site to a location approved by the Contracting Officer.

3.6. CONCRETE

- 3.6.1. Place 150 mm (6") of capillary water barrier below areas to receive a concrete slab on properly compacted soil free of organic material. A plastic vapor barrier (10 mils thick) shall be placed over the crushed stone prior to placing of concrete slabs. Concrete flooring in wet areas shall slope to the floor drain and not allow for water to puddle. Concrete slabs in all areas shall not be placed prior to inspection and approval of piping and sub-surface by the Contracting Officer. Foundation trenches shall be level and free of loose material. Trenches shall be inspected and approved by the Contracting Officer prior to placing of any concrete foundations.

3.7. MASONRY

- 3.7.1. Storage of masonry materials shall be in a dry place or materials shall be covered with a plastic protective layer. Cover open walls each day to keep them protected and dry. Concrete masonry units (CMU) for exterior walls shall be either 200 mm or 300 mm wide x 400 mm x 200 mm high as shown on drawings. All cells shall be fully grouted in exterior walls. They shall be installed in running bond level and plumb. Mortar joints shall be 9 mm on all sides between CMU. Joints shall be struck with a concave tool to provide a smooth recessed curved surface. Install only quality units. The surface shall be free of chips, cracks, or other imperfections that would detract from the overall appearance of the finished wall. Defective CMU or mortar shall be rejected.

3.8. METAL

3.8.1. METAL WINDOW SILLS

Galvanized metal window sills, 1 mm (20 gage), shall be installed on the exterior of all windows. The metal window sills shall have a turn down of 50 mm over the exterior masonry and stucco. Metal sills shall extend from side to side of the masonry opening in a single piece. Extend the metal windowsill a minimum of 20 mm under the bottom of the aluminum windows. Install masonry mortar as required for a smooth surface under the window sills. Sills shall slope a minimum of 6mm to the exterior and not allow water to puddle.

3.9. WEATHER & THERMAL PROTECTION

3.9.1. SEALANT

As required for each Substrate and adjoining Materials.

3.10. DOORS, WINDOWS & HARDWARES

3.10.1. DOORS

- 3.10.1.1. All exterior doors (entry and exit doors) shall be heavy duty metal doors with metal frames. Interior door shall be hollow metal doors with hollow metal frames. All exterior doors shall be 44.5 mm hollow metal 1.30 mm (18 gauge) steel with rigid foam core insulation. Hollow metal frames shall be 1.30 mm (18 gauge) steel and comply with ASTM A-366 cold rolled 3-piece knock down or equal Steel doors, frames, and steel glazing frames shall be painted to match factory finish off-white window frames. Doors shall be 900 mm wide X 2100 mm high.
- 3.10.1.2. Steel Doors: SDI A250.8, except as specified otherwise. Prepare doors to receive specified hardware. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion.

3.10.2. DOOR ACCESSORIES

Provide completed Moldings and accessories required for the swing and close of doors.

3.10.3. STANDARD STEEL FRAMES

- 3.10.3.1. SDI A250.8, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners or knock-down field-assembled corners. Provide steel frames for doors, transoms, sidelights, mullions, cased openings, and interior glazed panels, unless otherwise indicated.
- 3.10.3.2. Welded Frames: Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.
- 3.10.3.3. Mullions and Transom Bars: Mullions and transom bars shall be closed or tubular construction and shall member with heads and jambs butt-welded thereto or knock-down for field assembly. Bottom of door mullions shall have adjustable floor anchors and spreader connections.
- 3.10.3.4. Stops and Beads: Form stops and beads from 0.9 mm thick steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 300 to 400 mm on centers. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

3.10.4. ANCHORS:

- 3.10.4.1. Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, anchors not lighter than 1.2 mm thick.
- 3.10.4.2. Wall Anchors: Provide at least three anchors for each jamb. For frames which are more than 2285 mm in height, provide one additional anchor for each jamb for each additional 760 mm or fraction thereof.
- 3.10.4.3. Masonry: Provide anchors of corrugated or perforated steel straps or 5 mm diameter steel wire, adjustable or T-shaped.
- 3.10.4.4. Existing openings: Secure frames to previously placed concrete or masonry with expansion bolts
- 3.10.4.5. Floor Anchors: Provide floor anchors drilled for 10 mm anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

3.10.5. HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI A250.8 and ANSI A250.6. For additional requirements refer to BHMA A115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI A250.8, as applicable. Punch door frames, with the exception of frames that will have weather-stripping or lightproof or soundproof casework, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

3.10.6. HARDWARE FOR STANDARD DOORS

- 3.10.6.1. Hinges: Exterior hinges shall have non-removable pins and be satin-chrome steel or stainless steel; Grade 1 anti-friction or ball bearing; and 3 each of 115 mm x 115 mm per leaf up to 900 mm wide door 125 mm x 125 mm for doors 900 mm to 1,200 mm wide. Interior hinges shall be Grade 1; anti-friction or ball bearing; and 3 each of 115 mm x 115 mm per leaf up to 900 mm wide door 125 mm x 125 mm for doors 900 mm to 1200mm wide Hinges for labeled fire doors must be either steel or stainless steel. Hinges shall conform to ANSI/BHMA A156.1 and A156.7. Locksets, Latchets, Exit Devices, and Push and Pull Plates: Exterior doors shall have mortise locks conforming to ANSI/BHMA A156.13 for metal doors. Emergency exit devices shall be Grade 1, flush mounted type. Interior doors shall have mortise locksets conforming to ANSI/BHMA A156.13, Series1000, Grade 1. All locks and latchsets shall be the product of the same manufacturer. Locksets, padlocks and latchsets shall be provided, as required, with lever handles on each side. Provide heavy duty hasp and locks at all fuel storage tanks.
- 3.10.6.2. Closers: Closers shall be provided on all exterior doors and fire-rated doors. All exterior Doors and Interior Doors that require Security or Privacy such Conference Room as Toilet Room or Shower Room must have Heavy-duty Hydraulic Closer.
- 3.10.6.3. Closers shall conform to ANSI/BHMA A156.4, Grade 1. Closers shall be surface-mounted, modern type, with cover. Closer must be adjustable type and has slow-down control to prevent Door Leaf from slamming to Frame and become nuisance to tenant.
- 3.10.6.4. Provide Door Silencers to all doors with Closers.
- 3.10.6.5. Cylinders: Lock cylinders shall comply with BHMA A156.5. Lock cylinder shall have six pins. Cylinders shall have key removable type cores. All locksets, exit devices, and padlocks shall accept same interchangeable cores.
- 3.10.6.6. Thresholds: All exterior doors (except Mech/Elect rooms) shall be provided with aluminum thresholds conforming to ANSI/BHMA A156.21. Doors at ceramic tile flooring shall be provided with marble thresholds and set marble threshold 13 mm above tile at all wet areas.
- 3.10.6.7. Door Stops: Doorstops shall be provided on all exterior and interior doors. Doorstops shall comply with ANSI/BHMA A156.16 and shall be satin chrome on bronze, Grade 1.
- 3.10.6.8. All Hardware required for exiting, etc. shall be per NFPA and applicable Codes for exiting and shall comply with ANSI/BHMA and finishes. Provide Panic Hardware (Push-bar) for all Egress Door.
- 3.10.6.9. Master Keying: All submittals/shop drawings referring to keys and keying shall be submitted to engineering for evaluation. A key cabinet shall be provided with a capacity 50% greater than the number of key changes used for door locks. Location of Key cabinet shall as directed by Contracting Officer. Lock cylinder shall have not less than six (6) pins "Small Format Interchangeable Core (SFIC)" manufactured by Best Lock Company. A grand master

keying system shall be provided from the factory. Locks shall be keyed in sets or subsets based on building groups as indicated in Section 01010 and submitted to for evaluation to engineering. Keys shall be supplied as follows:

- Locks: 3 change keys each lock
- Master keyed sets: 3 keys each set
- Grand Master keys: 10 total

3.10.7. FABRICATION AND WORKMANSHIP

- 3.10.7.1. Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 3 mm larger than the actual masonry thickness. Design other frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive calking compound.
- 3.10.7.2. Grouted Frames: For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

3.10.8. INSTALLATION

- 3.10.8.1. Frames: Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. When an additive is provided in the mortar, coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.
- 3.10.8.2. Doors: Hang doors in accordance with clearances specified in SDI A250.8. After erection and glazing, clean and adjust hardware.
- 3.10.8.3. Fire and Smoke Doors and Frames: Install fire doors and frames, including hardware, in accordance with NFPA 80.
- 3.10.8.4. Protection and Cleaning: Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat. Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

3.10.9. FINISHES

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in SDI A250.8, or paintable A25 galvanized steel without primer. Where coating is removed by welding, apply touchup of factory primer.

3.11. WINDOWS & GLAZING

3.11.1. WINDOWS

3.11.1.1. Materials

- 3.11.1.1.1. Aluminum Extrusions: Provide alloy and temper recommended by the window

- 3.11.1.1.2. manufacturer for the strength, corrosion resistance, and application of required finish, meeting the DIN 1725 raw material requirements, but not less than 215 N/mm² ultimate tensile strength and not less than 1.5 mm thick at any location for main frame and sash members.
- 3.11.1.1.3. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
 - Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard non-corrosive pressed-in splined grommet nuts.
 - Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match the finish of the member or hardware being fastened, as appropriate.
- 3.11.1.1.4. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with the requirements of DIN 1748; provide sufficient strength to withstand design pressure indicated. As a minimum provide 3 anchors on each side of the frame.
- 3.11.1.1.5. Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at the manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets.
- 3.11.1.1.6. Sealant: For sealants required within fabricated window units, provide type recommended by the manufacturer for joint size and movement. Sealant shall remain permanently elastic non-shrinking, and non-migrating. Comply with Sealants of these specifications for selection and installation of sealants.
- 3.11.1.1.7. Wire Fabric Insect Screen shall be permanently fixed to the exterior, except for guard towers.
- 3.11.1.2. Hardware: Provide the manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.
- 3.11.1.3. Fixed, Casement, Projected and Horizontal Sliding Windows
- 3.11.1.3.1. Provide window units meeting UL 752, level 5, but no less than 16 mm laminated single glazed. This standard shall apply to all window units within guard shack, guard house, guard tower, and guard rooms in Headquarters Building. Provide cam action sweep sash lock and keeper at meeting rails. All other glazing shall be minimum 5mm laminated single glazed.
- 3.11.1.3.2. Fabrication:
 - Provide horizontally sliding aluminum windows with factory finish in all buildings to fit the masonry openings. Window openings shall be provided with insect screening permanently fixed to the exterior. Provide a locking device on the interior of each window. Provide anchors on each side of the frame into the adjoining masonry, 3 on each side. Provide weather stripping system for all exterior windows and doors.
- 3.11.1.3.3. Finishes: Apply baked enamel in compliance with paint manufacturer's specifications for cleaning, conversion coating, and painting.
 - Color: White meeting the requirements of DIN 50018
- 3.11.1.3.4. Inspection: Inspect openings before beginning installation. Verify that rough or masonry opening is correct and the sill plate is level. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.

- 3.11.1.3.5. Installation: Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, and other components of the work. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the Sealant sections for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.
- 3.11.1.3.6. Adjusting: Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.
- 3.11.1.3.7. Cleaning: Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

3.11.2. LOUVERS

- 3.11.2.1. Exterior Louvers: Louvers shall be inverted "Y", "V" or "Z" type. Weld or tenon louver blades to continuous channel frame and weld assembly to door to form watertight assembly. Form louvers of hot-dip galvanized steel of same gage as door facings. Louvers shall have steel-framed insect screens secured to room side and readily removable. Provide aluminum wire cloth, 7 by 7 per 10 mm or 7 by 6 per 10 mm mesh, for insect screens.
- 3.11.2.2. Louver of K-Span warehouse shall be Operable Louver that can be fully open and close from a Control Switch inside Warehouse (per direction of COR). Louver shall also have interlock Mechanism the works in conjunction with HVAC system.

3.12. FINISHES

3.12.1. EXTERIOR & INTERIOR FINISHES

- 3.12.1.1. Painting and Coating: The first coat shall be a scratch coat approximately 1 cm thick. Allow 7 days to cure. The second coat shall be finish plaster, smooth finish, approximately 1 cm thick. Allow 7 days to cure before painting. Stucco showing over sanding, cracks, blisters, pits, checks, discoloration or other defects is not acceptable. Defective plaster work shall be removed and replaced with new plaster at the expense of the Contractor. Patching of defective work will be permitted only when approved by the Contracting Officer. All exterior color finish shall be integral with the stucco finish. No painted stucco shall be permitted due to minimize future maintenance. Color to be selected by the Contracting Officer from the color board provided by the Contractor.
 - 3.12.1.1.1. Paints shall contain less than 0.06% lead by weight.
 - 3.12.1.1.2. Paint all exposed fascia, soffit, and doors with 2 coats of gloss enamel, white.
 - 3.12.1.1.3. Exposed exterior steel trim, frames, doors and pipe railings: Paint with one coat oil-based primer, with 2 coats of oil-based alkyd gloss enamel, color to be selected by the Contracting Officer from the color board provided by the Contractor.
- 3.12.1.2. Ceramic Tile: Tile work shall not be performed unless the substrate and ambient temperature is at least 10 degrees C and rising. Temperature shall be maintained above 10 degrees C while the work is being performed and for at least 7 days after completion of work. Upon completion, tile surfaces shall be thoroughly cleaned in accordance with manufacturer's approved cleaning instructions. Acid shall not be used for cleaning glazed tile. Floor tile with resinous grout or with factory mixed grout shall be cleaned in accordance with instructions of the grout manufacturer. After the grout has set, tile wall surfaces shall be given a protective coat of a non-corrosive soap or other approved method of protection.
- 3.12.1.3. Terrazzo Tile: Shall be 300 mm x 300 mm terrazzo tile with thin set mortar. Joints shall be 2-3 mm. Waterproof gray grout shall be applied the full depth of the tile. Color of tile shall be

selected by the Contracting Officer from samples provided by the Contractor.

- 3.12.1.4. All high traffic areas shall be completely cleaned and sealed epoxy. Color to be selected by the Contracting Officer from samples provided by the Contractor.

3.13. SPECIALTIES

All Specialties and Accessories as shown on drawings or Appendix shall be heavy duty type. Secure to base building with Heavy-duty, Tamper-proof Screws or Anchor-bolts.

4. STRUCTURAL

4.1. STANDARDS

The Contractor shall use the following American standards to provide sound structural design. The Contractor shall follow American Concrete Institute Standards for design and installation of all concrete structures.

Warehouse Slabs on Grade:	28 MPa (4000 psi) a minimum specified compressive strength @ 28 days, (F_c) (ASTM- C 31M)
Foundations and Walls:	21 MPa (3000 psi) a minimum specified compressive strength @ 28 days, (F_c) (ASTM- C 31M)
Steel Reinforcement:	4218.0 kg./sq.cm, (F_y = 60.0 ksi) yield strength.
Anchor Bolts:	ASTM A307 using A36 steel.
Concrete Masonry Units:	ASTM C90, Type I (normal wt, Moisture Control). Mortar: ASTM C270, Type S (Ultimate compressive strength of 130.0 kg/sq. cm.) Proportion: 1 part cement, 0-1/2 part lime and 4-1/2 parts aggregate Grout: ASTM C476 (Slump between 200 mm to 250 and Compressive Strength 14 MPa (2000 psi) at 28 days.
Structural Steel ASTM A36:	2530.0 kg./sq.cm (F_y = 36,000psi) Welding: AWS (American Welding Society) D1.1-2002.

4.2. GENERAL

The project consists of various structures. The new buildings shall be provided with a reinforced concrete slab foundation that is properly placed on a suitable compacted ground area and shall be in accordance with the recommendations from the geotechnical investigation. The reinforced concrete foundation shall be designed by the Contractor. Building foundations shall be founded a minimum of 800 mm below grade.

4.3. DESIGN

Design shall be performed and design documents signed by a registered professional architect and/or engineer. Calculations shall be in SI (metric) units of measurements. All components of the building shall be designed and constructed to support safely all loads without exceeding the allowable stress for the materials of construction in the structural members and connections. Coordination between the designer of the K-span roof system and the designer of the wall and foundation systems shall be established to ensure that the transfer of all loading between the systems is safely accounted for. All building exterior walls shall be constructed with reinforced CMU, shotcrete 3-D panels, or reinforced concrete unless otherwise stated in sections 1010 or 1015.

4.4. DEAD AND LIVE LOADS

Dead loads consist of the weight of all materials of construction incorporated in the buildings. Live loads used for design shall be in accordance with the Structural Load Data, UFC 3-310-01, Unified Facilities Criteria, May 25, 2005. Floor slabs for the warehouse structures at the NMAA facility shall be designed to accommodate a 7 ton military vehiclular loading.

4.5. WIND LOADS

Wind loads shall be calculated in accordance with ASCE 7 using a "3-second gust" wind speed of 137 km/hr.

4.6. STRUCTURAL CONCRETE

Concrete structural elements shall be designed and constructed in accordance with the provisions of the American Concrete Institute, Building Code Requirements for Structural Concrete, ACI 318, latest edition. A minimum specified compressive strength at 28 days (f'_c) of 21 MPa (3000 psi) shall be used for design and construction of all concrete, except that 28 MPa (4000 psi) shall be used for the warehouse slabs on grade and shotcrete applications. Reinforcing steel shall be deformed bars conforming to American Society for Testing and Materials (ASTM) publication ASTM a 615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement. Concrete at or below grade shall have maximum water-cement ration of 0.50. No concrete shall be placed when the ambient air temperature exceeds 32 degrees C (90 degrees F) unless an appropriate chemical retardant is used. In all cases when concrete is placed at 32 degrees C (90 degrees F) or hotter it shall be covered and kept continuously wet for a minimum of 48 hours. Concrete members at or below grade shall have a minimum concrete cover over reinforcement of 75 mm (3 inch). ACI cold weather requirements shall also be met as necessary.

4.7. CRACK CONTROL

The design and construction shall include crack control measures to minimize cracks in slabs on grade and concrete construction, such as crack control joints, expansion joints and isolation joints, as necessary. Expansion joints shall be determined and shown on the drawings.

4.8. MASONRY

Masonry shall be designed and constructed in accordance with the provisions of Building Code Requirements for Masonry Structures, ACI 530/ASCE 5/TMS 402, latest editions. Mortar shall be Type S and conform to ASTM C 270, latest edition. Masonry shall not be used below grade, unless for fully grouted and reinforced foundation stem walls. All cells of CMU walls shall be fully grouted and reinforced.

4.9. STRUCTURAL STEEL

Structural steel shall be designed and constructed in accordance with the provisions of American Institute of Steel Construction (AISC), Specifications for Structural Steel Buildings, 9th Edition. Design of cold-formed steel structural members shall be in accordance with the provisions of American Iron and Steel Institute (AISI), Specifications for Design of Cold-Formed Steel Structural Members.

4.10. K-SPAN BUILDING SYSTEM

The two warehouse type buildings to be located at the NMAA facility shall be comprised of insulated K-Span metal building roof systems supported by reinforced concrete stem walls 3.0 m in height. The floor slabs for the two structures shall be reinforced concrete with a minimum thickness of 150 mm placed on a clean vapor barrier above a capillary water barrier of 150 mm minimum thickness on properly compacted soil. Exterior walls and ceilings shall be insulated as required in the Mechanical sections of these Technical Requirements.

4.11. MODULAR CONEX UNITS

The shower and latrine temporary buildings at the Darulaman site shall be comprised of modular CONEX units. All Modular Containers shall have reinforced concrete foundations and connections designed to attach the units to each other and to their foundations. The floor slabs for these structures shall be reinforced concrete with a minimum thickness of 150 mm placed on a clean vapor barrier above a capillary water barrier of 150 mm minimum thickness on properly compacted soil. Minimum clear ceiling height shall be 2400 mm and walkways shall be a minimum of 1500 mm wide. The Contracting Officer Representative (COR) reserves the right to inspect and reject any Modular CONEX Containers not in good condition. All Modular Containers shall be inspected and accepted by Architect prior to leaving factory. See plans and these technical requirements for extent of work. Exterior walls and ceilings shall be insulated as required in the Mechanical sections of these Technical Requirements. All insulation in exterior toilet walls containing water pipes shall be rigid foam board insulation. Insulation in areas next to concrete or earth shall be rigid foam board insulation. Exterior metal Color: off white semi gloss. Doors shall be Hollow Metal and metal frame and have one (1) hour rating. All glazing shall 6mm laminate glass. The windows shall have screens and be capable of being opened from the inside. All walls shall be caulked at floor and ceiling prior to installing rubber base. All openings between rooms shall be caulked or sealed. Doors shall have seal around frames and threshold with rubber seal.

4.12. FOUNDATIONS

Foundations shall be in accordance with the Geotechnical requirements of this RFP.

5. GEOTECHNICAL

5.1. SOIL INVESTIGATION

Existing geotechnical information is not available at the project site. Any site-specific geotechnical data required to develop foundations, floor slabs, materials, earthwork, and other geotechnical related design and construction activities for this project shall be the Contractor's responsibility. The Contractor shall develop all pertinent geotechnical design and construction parameters by appropriate field and laboratory investigations and analyses. The Contractor shall produce a detailed geotechnical report containing field exploration and testing results, laboratory testing results (particle sizes and distribution, liquid and plastic limit test, and moisture and density test, etc.). Information in the report shall include, but not be limited to: existing geotechnical (e.g. surface and subsurface) conditions, location of subsurface exploration logs on site plan, exploration point, settlement analysis, amount of settlement and estimated time of occurrence, bearing capacity analysis, ultimate soil bearing capacity, allowable soil bearing capacity, foundation selection, foundation dimensions and recommendations, pavement design criteria (e.g. CBR values, modulus of subgrade reaction values, etc.), ground-water levels, and construction materials (e.g. concrete cement, asphalt, and aggregates). Foundation recommendations shall limit overall settlement to a maximum of 25 mm. Two copies of the detailed geotechnical report shall be submitted to the Contracting Officer.

5.2. SPECIALIST SUB-CONTRACTORS QUALIFICATIONS

A geotechnical engineer or geotechnical firm responsible to the Contractor shall develop all geotechnical engineering design parameters. The geotechnical engineer or geotechnical firm shall be qualified by: education in geotechnical engineering; professional registration; and a minimum of ten (10) years of experience in geotechnical engineering design.

5.2.1. HEATING & COOLING

Except for buildings with central Packaged A/C (heat-pump) Systems, and for buildings less than 250 m², all heating and cooling shall be with Heat-Cool-Units (diesel-burner-evaporative-cooler) as shown on Drawing "ANA HEAT-COOL DESIGN-01" dated 10 Dec 06 & 24 29 Mar 07. Drawing/s shall take preference over any conflict between drawing/s and SOW/RFP

5.2.2. DUCTWORK

Air shall be distributed from central air handling unit as necessary to achieve proper airflow throughout the facility by means of air distribution ductwork. Air distribution system shall be comprised of ductwork, fittings, grilles, registers, and/or diffusers. Ductwork shall be constructed of galvanized steel or aluminum sheets and installed as per SMACNA "HVAC Duct Construction Standards (Metal and Flexible)." Flexible non-metallic duct may be used for final unit/diffuser connection in ceiling plenums. These flexible duct run-outs shall be limited to 3 meters in length. All supply and return air ductwork shall be routed concealed in finished areas provided with drop ceiling or plenums. Duct insulation shall be provided for all supply ductwork and for return ductwork not located within the conditioned area.

5.2.3. DUCT INSULATION

All interior fresh air and supply ducts shall be insulated with a minimum of 50mm thick flexible mineral fiber with integral vapor barrier. Interior return ducts shall be insulated only when located inside unconditioned areas. Ducts exposed to weather shall be insulated with a minimum of 100mm insulation. The outside of the insulation shall be covered with a vapor barrier and then covered with an aluminum protective jacket. There shall be no breaks in vapor barrier. Air ducts from Heat-Cool-Units shall be installed exposed and not insulated, as indicated on Drawing. "ANA HEAT-COOL DESIGN-01", (Appendix-A11).

5.2.4. DIFFUSERS, REGISTERS AND GRILLES:

Shall be factory fabricated of steel or aluminum and distribute the specified air quantity evenly over the space intended. The devices shall be round, half round, square, rectangular, linear, or with perforated face as determined by the design. Units will be mounted in ceilings, high sidewalls, or directly to ductwork and shall be sized for the airflow to be delivered with a maximum NC rating of 35. Pressure loss through the diffuser shall be considered in sizing the duct system and the system static pressure calculations.

5.2.5. BRANCH TAKE-OFFS

Air extractors or 45° entry corners shall be provided at all branch duct take-offs. Manual volume control dampers shall be included at the branch duct take-offs as shown and where required to facilitate air balancing.

5.2.6. WALL PENETRATIONS

Building wall penetrations shall be carefully made so as not to deteriorate the structural integrity of the wall system.

5.2.7. CONTROL WIRING AND PROTECTION DEVICES

Control wiring and protection devices shall be the manufacturer's standard, pre-wired, and installed at the factory. Operation of the control system shall be manufacturer's standard configured for 220V/50Hz or 24V operation.

5.2.8. THERMOSTATS

All thermostats shall be located near the return grills and mounted 1.5 meters above the floor and shall be easily accessible. In lieu of a thermostat, a temperature sensor may be located in the room and connected to the control thermostat near the unit. Thermostats located inside occupied areas shall be provided with lockable covers.

5.2.9. ELECTRIC MOTORS

All HVAC motors shall be Totally Enclosed Fan Cooled (TEFC) type and rated for minimum 40 C ambient.

5.2.10. OUTDOOR EQUIPMENT

Screen walls or elevated platforms shall be provided for protection of outdoor HVAC

equipment from wind-blown sand and debris.

5.3. Wall Penetrations

Building wall penetrations shall be carefully made so as not to deteriorate the structural integrity of the wall system. The Contractor shall consult with the building manufacturer, if possible, to determine the best way to penetrate the wall. If the building manufacturer is not available, a structural engineer shall be consulted. In either case, the recommendations of the engineer shall be strictly adhered to.

5.3.1. CONTROL WIRING AND PROTECTION DEVICES

Control wiring and protection of the air conditioning units being offered must be the manufacturer's standard, pre-wired, installed in the unit at the factory or as recommended. Thermostats shall be located near the unit return. For units serving more than one area, the thermostat shall be located near the return of the space with the highest heat generation.

5.3.2. AIR FILTRATION

All supply air shall be filtered using manufacturer's standard washable filters mounted inside the unit. In addition, all outdoor air intakes, where required shall be equipped with 50 mm (2 inch) thick washable filters.

5.4. VENTILATION AND EXHAUST SYSTEMS

All fans shall be used for building ventilation and pressurization with capacities to be selected for minimum noise level generated. Unit mounted fans either used for supply or exhaust shall be centrifugal forward curved, backward inclined, or airfoil fans with non-overloading characteristics of high efficiency and quiet running design. The fans shall be of the heavy-duty type with durable construction and proved performance in a desert environment. Each exhaust fan shall be provided with motorized or gravity dampers which close automatically when the fan is not running. Also, each fan shall be complete with vibration isolator, external lubricators, and all accessories and sound attenuators as necessary. Supply intake openings shall be provided with motorized dampers which are interlocked with the exhaust fan. The dampers open or close when the exhaust fan is on or off respectively.

Maintenance shops and similar spaces that use solvents and oils shall be provided with mechanical exhaust air systems. Exhaust fans shall be centrifugal wall mounted type. Intake openings shall be provided with motorized dampers which are interlocked with the exhaust fans. Provide minimum of 16 ACH. The systems shall consist of centrifugal fan, ductwork, exhaust grills, and interlock controls. Comply with Industrial Ventilation UFC 3-410-04N.

Toilet and Wash Area: Minimum exhaust ventilation shall be the larger of 35 m³/h / m² floor or 85 m³/h / toilet (WC). At extreme cold in winter these values can be reduced for short periods to 10 m³/h / m² or 40 m³/h / toilet (WC) to conserve heat.

Kitchen Hood Exhaust and Make-up Air: As required and as per Kitchen design specialist and equipment supplier requirements. Provide minimum of 250 cfm per linear foot of hood length or 75 cfm per square area of hood per International Mechanical Code. The designer shall take special note that multiple large propane stoves will be installed in the kitchen. The steam generated by the local style of cooking with large pots is immense in comparison to western standards, and the additional need for ventilation must be accounted for in the design. Also, the cooks are accustomed to standing on top of the stoves in order to stir the large cauldrons of food. This common cooking practice should be taken into consideration when designing the exhaust hood. The height of the hood above the stovetop should be such that a man of average stature could stand upright without risk of hitting his head on the hood. Design per NFPA 92A, 96, 204, and 211. Make up air intake shall be integral with the hood system or be located as close to the exhaust intake to prevent cold drafts.

To reduce sand and dirt migration, outside air intakes shall be located as high as possible within architectural constraints. The intakes shall be sized so that free air velocities are below 2.5 m/s (500 fpm). For inhabited buildings locate all air intakes at least 1.5 (center-line of intake) meters above the ground. Each air intake shall be provided with a motorized damper which is interlocked with the exhaust fan.

5.4.1. SUBMITTALS

The Contractor shall submit the following for the equipment to be provided under this section of the specification: manufacturer's data including performance characteristics at design conditions; catalog cuts showing dimensions, performance data, electrical requirements, compliance with standards as stated in paragraph CODES, STANDARDS AND REGULATIONS; drawings indicating location and installation details.

5.5. ELECTRIC RESISTANCE HEATERS

- 5.5.1. Unit Heater. Electric resistance heaters shall be installed in small spaces where only heating is required. Provide a self-contained electric heating unit, suspended from ceiling or structure, with fan and heating elements. Provide control-circuit terminals and single source of power supply with disconnect. Heating wire element shall be nickel chromium. Include limit controls for overheat protection of heaters. Provide tamper resistant integral thermostat.
- 5.5.2. Cabinet Heater. Cabinet heaters shall be installed in small spaces where only heating is required. Provide a self-contained electric heating unit, recessed mounted in wall or structure, with fan and heating elements. Provide control-circuit terminals and single source of power supply with disconnect. Heating wire element shall be nickel chromium. Include limit controls for overheat protection of heaters. Provide tamper resistant integral thermostat.
- 5.5.3. Infrared Heaters. Infrared heaters shall be provided for spot heating of a large area such as maintenance bays and warehouses. Infrared heaters shall use electricity. Contractor shall position the infrared heaters to direct the radiant heat to only those areas where people normally work. Coordinate with User. Provide control-circuit terminals and single source of power supply with disconnect.

5.6. SUBMITTALS

The Contractor shall submit the following for the equipment to be provided under this section of the specification: manufacturer's data including performance characteristics at design conditions; manufacturer's certificate stating that each unit will perform to the conditions stated, catalog cuts showing dimensions, performance data, electrical requirements, compliance with standards as stated in paragraph CODES, STANDARDS AND REGULATIONS; complete shop drawings indicating location and installation details.

The manufacturer shall also submit a 2 year warranty for each of the units.

5.7. TEST ON COMPLETION

- 5.7.1. After completion of the work, the Contractor shall demonstrate to the Contracting Officer that the installation is adjusted and regulated correctly to fulfill the function for which it has been designed. The Contractor shall test, adjust, balance and regulate the section or sections of concern as necessary until the required conditions are obtained. Operational test shall be conducted once during the winter and once during the summer. Coordinate with the Contracting Officer on when the test shall be scheduled. Include tests for all interlocks, safety cutouts and other protective device to ensure correct functioning. All such tests shall be carried out and full records of the values obtained shall be prepared along with the final settings and submitted to the Contracting Officer in writing.
- 5.7.2. The following tests and readings shall be made by the Contractor in the presence of the Contracting Officer and all results shall be recorded and submitted in a tabulated form.
 - a. Ambient DB and WB temperatures
 - b. Room Inside Conditions:
 - 1. Inside room DB & WB temperatures
 - 2. Air flow supply, return and/or exhaust
 - 3. Plot all temperatures on psychrometric chart
 - c. Air Handling Equipment: Air quantities shall be obtained by anemometer readings and all

necessary adjustments shall be made to obtain the specified quantities of air indicated at each inlet and outlet.

Following readings shall be made:

1. Supply, return and outside air CMH (CFM) supplied by each air conditioning system.
2. Total CMH (CFM) exhausted by each exhaust fan
3. Motor speed, fan speed and input ampere reading for each fan
4. Supply, return and outside air temperature for each air-conditioning system.

d. Electric Motors:

- For each motor: (1) Speed in RPM
(2) Amperes for each phase
(3) Power input in KW

5.8. ELECTRICAL REQUIREMENTS FOR HVAC EQUIPMENT

a. Note that electrical requirements for all HVAC systems shall be designed and installed to operate on the secondary power standard required herein. The existing power distribution system may require modifications or upgrades to support the additional power required by the HVAC unit. The Contractor is responsible to field verify all the conditions and provide complete shop drawings showing any incidental power upgrades. All electrical work shall comply with the National Electric Code.

b. All thermostats shall be wall mounted near the return grilles in the room with the highest heat load generation and mounted 1.5 meters (5 feet) above the floor. In lieu of a thermostat, a temperature sensor may be located in the same location or in the return duct and connected to a thermostat located near the unit return. Thermostat shall be mounted 1.5 meters (5 feet) above the finished floor and be easily accessible. Thermostats for the latrine facilities shall be located near the unit return and mounted 1.5 meters (5 feet) above the finished floor. Operation of the control system shall be at the manufacturer's standard voltage for the unit.

c. The following are the minimum requirements for motors regarding enclosure, insulation and protection:

1. Compressor Hermetic: Provide inherent (internal) overload protection.
2. Condenser: Provide internal thermal overload protection.
3. Evaporator (Open Class "A") fan motor type provides internal thermal overload protection.

5.9. CEILING FANS

5.9.1. CEILING FAN

Provide 1320mm blade ceiling fans at one per 40 square meters of floor space. Fans shall have reversible motors. Center or distribute evenly in room. Coordinate placement with the lighting plan to prevent conflict or casting shadows. Fan mount shall be flush, standard, or angle mount depending on ceiling height. Fan shall be mounted such that the fan blade is approximately 2.44 meters above the finished floor. The fan shall be provided with out light kit. The finish shall be factory painted white. The controls shall be from either a single pole switch or from two 3 way switches to provide on/off operation. The electrical supply shall be 230volts, single phase, and 50 hertz. Install per manufacturers' instructions.

5.9.2. SUBMITTALS.

The Contractor shall submit the following for the equipment to be provided under this section of the specification: manufacturer's data including performance characteristics at design conditions; catalog cuts showing dimensions, performance data, electrical requirements, compliance with standards as stated in paragraph CODES, STANDARDS AND REGULATIONS; drawings indicating location and installation details.

6. PLUMBING

6.1. SCOPE OF WORK.

6.1.1. GENERAL

The Contractor shall design and build domestic cold and hot water systems, waste, drain and vent systems, waste-oil collection and storage and fuel-oil storage and distribution systems required in the facilities identified in Section 1010 Scope of Work and as described herein. The Contractor shall also be responsible for complete design and construction of all domestic and special plumbing systems required for full and safe operations in the Generator Plant, Water Storage and other facility or structures required in this contract.

The work covered in this scope also includes the delivery to site, erection, setting to work, adjusting, testing and balancing and handing over in full operating condition all of the plumbing equipment and associated plumbing works.

6.1.2. SUB-CONTRACTORS QUALIFICATIONS

The plumbing systems shall be executed by a plumbing specialist subcontractor experienced in the design and construction of these types of systems.

6.1.3. STANDARD PRODUCTS

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

6.2. CODES, STANDARDS AND REGULATIONS

The design and installation of equipment, materials and work covered under the plumbing services shall conform to the following standards, codes and regulations where applicable except where otherwise indicated under particular clause(s). The publications to be taken into consideration shall be those of the most recent editions. Standards other than those mentioned herein may be accepted provided that the standards chosen are internationally recognized and meet the minimum requirements of the specified standards. The Contractor shall submit proof of equivalency if requested by the Contracting Officer.

IPC – International Plumbing Code

NFPA - National Fire Protection Association

ASHRAE – American Society of Heating, Refrigeration and Air-Conditioning Engineers

ASME – American Society of Mechanical Engineers

ASTM – American Society for Testing and Materials

AWS – American Welding Society

6.3. PLUMBING SYSTEMS REQUIREMENTS

6.3.1. WATER

Domestic cold and hot water shall be provided in the facilities to serve the water usage and plumbing fixtures provided for the facility. Water service to each facility shall enter the building in a mechanical, toilet, storage, or similar type space. The building service line shall be provided with a shut off valve installed either outside in a valve pit or inside the mechanical room or similar spaces. Water piping shall not be installed in or under the concrete foundation. All water piping shall be routed parallel to the building lines and concealed in all finished areas. Insulation shall be provided where required to control sweating of pipes or to provide protection from freezing.

6.3.2. PIPING MATERIALS

Domestic water shall be distributed by means of standard weight (schedule 40) galvanized steel pipe. Waste and vent piping can be made of either galvanized steel pipe (schedule 40), or Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 2665. Corrosion protection shall be provided if galvanized piping comes in contact with earth or masonry floors, walls or ceilings.

6.3.3. PLUMBING FIXTURES

The following typical plumbing fixtures shall be provided:

a. Eastern Water Closet with flush tank assembly. . Provide acid resisting fired porcelain enameled cast iron water closet complete with rotating No-Hub 'P' trap and No-Hub coupling to meet piping requirements. Eastern Style water closet shall be furnished with integral non-skid foot pads and bowl wash down non-splashing flushing rim. The water closet shall be completely self supporting requiring no external mounting hardware and shall be flush with floor. The Eastern Style water closet shall incorporate waterproofing membrane flashing flange. Provide a cold water spigot 300mm above finished floor on the right (from a perspective of standing inside of the cubicle and looking out) sidewall of the cubicle. Spigot shall have a flexible hose and spray nozzle such that the occupant can wash over the water closet. Toilets shall be oriented north and south. Toilets shall not face east or west.
.Western style toilets shall be provided as requested by the User.

b. Lavatories. All sinks shall be trough type constructed of block and concrete with ceramic tile exterior and lining capable of withstanding abuse. Faucets shall be chrome plated brass single lever mixing type. Provide maintenance access to waste piping and P-traps from under the sink. Lavatories inside the prison cells shall be tamper-proof with integral spout, soap depression, and outlet connection to slip 40mm OD tubing.

Lavatories. Enameled cast iron, wall or counter mounted. Brass fittings provided for water supplies. (To be used in American or Afghan/American mixed facilities only.)

c. Janitor's Sink. Floor mount janitor, enameled cast iron with copper alloy rim guard. Provide hot and cold water valves with manual mixing. Faucet handles shall be copper alloy. Include a stainless steel shelf and three mop holders.

d. Shower. Showerhead and faucet handles shall be copper alloy. Provide for manual mixing with hot and cold water valves. In addition to a shower head, provide each shower stall with a threaded faucet approximately 1.2 m AFF with hot and cold-water controls, mixing valve and a diverter type valve so water can be directed to either the shower or to the lower faucet. Shower shall be provided with low flow shower head. The shower head shall be heavy duty type and securely fastened to the wall.

e. Service Sink. Standard trap type, enameled cast iron. Service sinks provided in maintenance areas shall be metallic, and in battery rooms acid resistant.

f. Kitchen Sink. Single Bowl corrosion resisting formed steel. Faucet bodies and spout shall be cast or wrought copper alloy. Handles, drain assembly, and stopper shall be corrosion resisting steel or copper alloy.

g. Floor Sink (P-13). Provide floor sink, circular or square, with 300mm overall width or diameter and 250 nominal overall depth. Acid resistant enamel interior with cast iron body, aluminum sediment bucket and perforated grate of cast iron. Outlet size as indicated on plans.

h. Floor or Shower Drain: Cast iron construction with galvanized body, integral seepage pan, and adjustable perforated or slotted chromium plated bronze, nickel-bronze, or nickel brass strainer consisting of a grate and threaded collar. Toilet room floor drains are similar except are provided

with built-in, solid, hinged grate.

i. Room hose bibs and floor drains shall be provided as required. Afghan dining facility kitchen area clean-up hose bib to be supplied with connecting hose on reel including approximately 12 meters of hose. Provide clean-up spray nozzle with hose assembly.

j. Provide P-Traps per International Plumbing Code IPC for all fixture drains, floor and trench drains, and shower drains. P-traps shall have minimum of 50 mm water seal.

6.3.4. HOT WATER

Hot water shall be provided for the facility to supply 49°C (120°F) hot water to fixtures and outlets requiring hot water. Hot water of a higher temperature shall be provided only where required for special use or process. Hot water piping shall be routed parallel to the building lines and concealed within finished rooms. All hot water piping shall be insulated. A hot water re-circulating pump shall be provided if hot water piping run exceeds 30m.

6.3.5. HOT WATER HEATERS

The hot water shall be generated by electric water heaters. The unit shall be typically located inside a mechanical room, storage room, toilet/janitor room or similar type space. The unit shall be of the commercially available tank type having low or medium watt density electric heating elements. Gas (natural or liquid propane) powered hot water generators shall be provided to satisfy large hot water requirements when economically justifiable and practical. In cases where the pressure of the water coming into the tank will violate manufacturer recommendations, a pressure reducer shall be installed in the line before the water heater. Also, all water heaters shall be equipped with a blow-off valve that will empty into a nearby floor drain or to the exterior of the building.

6.4. WASTE, DRAIN AND VENT SYSTEM

Floor drains shall be provided in each room that contains a water source. Floor drains shall be provided in the mechanical equipment and toilet rooms as required. Floor drains shall be provided next to the electric water heaters. In mechanical rooms, floor drains shall be provided to avoid running drain piping long distances above or over the floor. A trench drain shall be provided for the DFAC Kitchen. All waste and vent piping shall be provided in accordance with the latest edition of IPC. Drain outlet shall use p-trap system to trap sewer gases. P-trap drain should be a one-piece system without removable parts. Every trap and trapped fixture shall be vented in accordance with the IPC.

6.5. TESTING AND COMMISSIONING

The Contractor shall test all piping systems in accordance with IPC International Plumbing Code. The final test shall include a smoke test for drainage and vent system and pressure test for the domestic water piping. After completing the work, the Contractor shall demonstrate that all plumbing systems operate to fully satisfy the function for which these systems have been designed. The Contractor shall test, adjust, balance and regulate the system and its controls as necessary until the required designed conditions are met. The Contractor shall include tests for interlocks, safety cutouts and other protective devices to demonstrate safe operation. All such tests shall be carried out in the presence of the Contracting Officer and full written records of the test data and final settings shall be submitted to the Contracting Officer. After all tests are complete, the entire domestic hot and cold water distribution system shall be disinfected. The system shall not be accepted until satisfactory bacteriological results have been obtained.

7. FIRE PROTECTION

7.1. GENERAL

Facility construction and fire protection systems shall be installed in accordance with the publications

listed herein and the publications referenced therein. Where a conflict occurs among various criteria, the most stringent requirement shall take precedence.

7.2. BUILDING CONSTRUCTION

Building construction shall conform to fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements of the building code.

7.3. LIFE SAFETY

Facilities features will be provided in accordance with NFPA 101, among other references, to assure protection of occupants from fire or similar emergencies.

7.4. FIRE PROTECTION EQUIPMENT

All fire protection equipment shall be listed by Underwriters' Laboratories (UL) or approved by Factory Mutual (FM) or equivalent and shall be listed in the current UL Fire Protection Equipment Directory or Factory Mutual Approval Guide or equivalent.

7.5. WATER SUPPLY FOR FIRE PROTECTION

A dedicated fire protection water supply is unavailable. Therefore, alternate methods of design and construction are being instituted.

7.6. PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers shall be provided inside all facilities and at exterior locations as required in accordance with NFPA 10. Generally, extinguishers will be of the multi-purpose dry chemical type except for occupancies requiring a special type extinguisher (e.g., carbon dioxide portable fire extinguishers for electrical rooms).

8. FIRE PROTECTION

8.1. GENERAL

Facility construction and fire protection systems shall be installed in accordance with the publications listed herein and the publications referenced therein. Where a conflict occurs among various criteria, the most stringent requirement shall take precedence.

8.2. BUILDING CONSTRUCTION

Building construction shall conform to fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements of the building code.

8.3. LIFE SAFETY

Facilities features will be provided in accordance with NFPA 101, among other references, to assure protection of occupants from fire or similar emergencies.

8.4. FIRE PROTECTION EQUIPMENT

All fire protection equipment shall be listed by Underwriters' Laboratories (UL) or approved by Factory Mutual (FM) or equivalent and shall be listed in the current UL Fire Protection Equipment Directory or Factory Mutual Approval Guide or equivalent.

8.5. WATER SUPPLY FOR FIRE PROTECTION

A dedicated fire protection water supply is unavailable. Therefore, alternate methods of design and construction are being instituted.

8.6. PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers shall be provided inside all facilities and at exterior locations as required in

accordance with NFPA 10. Generally, extinguishers will be of the multi-purpose dry chemical type except for occupancies requiring a special type extinguisher (e.g., carbon dioxide portable fire extinguishers for electrical rooms).

9. ELECTRICAL

9.1. GENERAL

Contractor shall design and construct all necessary electrical systems for this project. This includes design, construction, all necessary labor, equipment, and material for a fully functional system. Secondary electrical distribution system shall be 220/380 volt, 3-phase, 4 wire, 50 hertz. Design of the electrical system within facilities shall include, but is not limited to interior secondary power distribution system and lighting and power branch circuit and devices. All systems shall be designed for the ultimate demand loads, plus 25% spare capacity.

9.2. DESIGN CRITERIA

9.2.1. APPLICABLE STANDARDS

- a. Design shall be in the required units as stipulated herein.
- b. Conflicts between criteria and/or local standards shall be brought to the attention of the Contracting Officer for resolution. In such instances, all available information shall be furnished to the Contracting Officer for approval.
- c. All electrical systems and equipment shall be installed in accordance with NFPA code requirements.
- d. Acceptance Testing: Contractor shall develop and submit for approval complete acceptance test procedures on all systems provided. As a minimum the testing procedures shall comply with the requirements of NFPA 70 (NEC) and International Electrical Testing Association Inc. (NETA).
- e. Any other applicable references listed herein, including the following:

ANSI/IEEE Std 81-1983

ANSI/NETA ETT-2000

ANSI/NETA MTS 7.2.2-2001

EIA ANSI/TIA/EIA-607: (1994) Commercial Building Grounding/Bonding Requirement Standard.

Factory Mutual (FM) Approval Guide-Fire Protection (2002).

IBC - International Building Code

IEEE C2 National Electrical Safety Code (NESC)

IEEE Std 81.2-1991

IEEE 100

IEEE 241 - 1990

IEEE 242 - 2001

IEEE standard 519-1992

IEEE C57.12.22

IEEE C57.12.34

IEEE C57.12.28

IESNA Lighting Handbook

International Electrical Testing Association Inc. (NETA) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

NFPA 10, Portable Fire Extinguishers

NFPA 70, National Electrical Code

NFPA 101, Life Safety Code

TM 5-811-1 Design: Electrical Power Supply and Distribution

UFC 3-520-01 Interior Electrical Systems, 10 June 2002

UFC 3-550-03FA Electrical Power Supply and Distribution

UFC 3-600-01 Fire Protection Engineering for Facilities

Underwriters' Laboratories (UL) Fire Protection Equipment Directory (2002).

9.3. Material:

9.3.1. GENERAL:

Unless noted otherwise, all material used shall be in compliance with the requirements of UL standards. In the event that UL compliant materials are not available, Contractor may then select applicable British Standards (BS), IEC, CE, CSA, GS, DIN listed material (or equivalent), but the contractor must prove equivalence and must provide the government with a full copy of the relevant specification(s)/standard(s). Material and equipment installed under this contract shall be for the appropriate application and installed in accordance with manufacturers recommendations.

Equipment enclosure types shall be in compliance with the National Electrical Manufacturer's Association (NEMA) or the International Electro-Technical Committee (IEC) standards.

Material and equipment installed under this contract shall be for the appropriate application. Materials and equipment shall be installed in accordance with recommendations of the manufacturer. Major components of equipment shall have the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a non-corrosive and non-heat sensitive plate, securely attached to the equipment. All equipment delivered and placed in storage, prior to installation, shall be protected from the weather, humidity and temperature variation, dirt and dust, and any other contaminants. All equipment shall be in new condition, undamaged and unused.

9.3.2. STANDARD PRODUCT:

All 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 two (2) years prior to bid opening.

9.3.3. DESIGN CONDITIONS:

All equipment shall be rated and designed for 49 degrees Celsius (120 degrees Fahrenheit) and minimum elevation of 1790 meters (5876 feet) above sea level.

9.3.4. RESTRICTIONS:

Aluminum conductors shall not be specified or used.

Comment [DJK1]: Elevation of Kabul is approx 1800m or 6000ft. Edit for other locations.

9.4. Design Requirements

9.4.1. ELECTRICAL DISTRIBUTION SYSTEM

Contractor shall perform necessary load calculations to determine if existing power supplies to all facilities are sufficient for existing loads plus 25% spare capacity. Should the existing electrical supply be insufficient to power the new demand loads plus spare capacity, the contractor shall notify the COR. In such instances, the contractor shall provide all the information regarding the required number of new feeders and panels to the Contracting Officer. Design and installation of any additional feeder required from any panel will be the responsibility of the contractor. Contractor shall coordinate power needs with the Contracting Officer relative to needs met by each new panel, and limit power interruption to other services already connected.

Where required, the contractor shall provide and install properly sized service entrance feeder from each power source to the service entrance equipment located inside of each facility.

All panel boards shall be circuit breaker 'bolt-on' type panels. Minimum size circuit breaker shall be rated at no less than 20-amperes. Circuit breakers shall be connected to bus bars within the panel boards. Daisy chain (breaker-to-breaker) connection(s) are not acceptable. Indoor distribution panels shall be flush mounted in finished areas and surface mounted in unfinished areas. All circuit breakers shall be labeled with an identification number corresponding to the panel schedule. Three poles circuit breaker shall be a single unit and not made up of three single pole circuit breakers connected with a wire or bridged to make 3-pole breaker. All wiring shall be copper, minimum 4mm² (12 AWG) installed in metal conduit.

Wiring shall be recessed in finished areas and surface mounted in unfinished areas. Flush mounted panels shall be provided with spare empty conduits from the panel to unfinished area for future use. All new panels shall be provided with a minimum of 25% spare capacity for future load growth. Receptacles shall be duplex type 220 V, 50 hertz, with Earth Ground rated for 20A or better and shall be compatible with the required secondary power. All splicing and terminations of wires shall be performed in junction or device boxes. Proper wire nuts/connectors shall be used for splicing wire. No twist-wire connections with electrical tape wrapped around it shall be acceptable. All electrical installations shall be in accordance with the NEC. For panels 225 Amperes and above, provide an ammeter, voltmeter and kilowatt-hour meter to monitor energy usage. A selector switch shall be provided for reading all 3 phases. Circuits shall be provided for all mechanical equipment and final connections made. Receptacle locations shall be coordinated with architectural requirements.

Contractor shall provide (design and install) circuits for all mechanical equipment and any other equipment that requires power and make the final connections. The contractor shall provide dedicated electrical circuits for the refrigerator(s) and electrical heaters.

All loads shall be coordinated to provide balanced loading. Phase imbalance at each panel shall not exceed 5%. Voltage Drop for branch circuits shall not exceed three percent. Voltage drop for the combination of branch and feeder circuits shall not exceed five percent. All circuit breakers shall use down-stream coordination to ensure that the breaker nearest a fault or overload is the first to trip.

9.4.2. LIGHTING

Design levels shall be per IES standards as a minimum. For convenience, the following lighting level table is listed. Note: all spaces listed below may not be within the work required within this contract.

Living room/Quarters	30 FC (320 Lux)
Toilets, Showers, Latrines, washrooms	20 FC (200 Lux)
Corridors, Stairways	20 FC (200 Lux)
Offices	30 FC (320 Lux)
Reading	30 FC (320 Lux)
Egress path	01 FC (10 Lux)
Areas adjacent to egress path	0.05 FC (0.5 Lux)
Warehouses	10 FC (110 Lux)

FC = footcandle

Indoor lighting for all areas shall consist of fluorescent light fixtures. Exterior lighting will be installed as referenced. Moisture resistant/waterproof fluorescent light fixtures shall be provided in high humidity and wet areas such as latrines and showers. Battery powered 'emergency' and 'exit' lights shall be provided within each building, as applicable, for safe egress during a power outage. All light fixtures shall be factory finished, complete and operational, to include but not be limited to, lens, globe, lamp and ballast. Industrial type fluorescent light fixtures shall not be used. Every room shall be provided with a minimum of one light switch. Light fixtures shall be mounted approximately 2.5-meters (8 feet) above finished floor (AFF), minimum. Fixtures may be pendant or ceiling mounted, depending on the ceiling type and height.

9.4.3. LIGHT FIXTURES

Lighting fixtures shall be a standard manufacturer's product. Fluorescent light fixtures shall be power factor corrected and equipped with standard electronic ballast(s). All light fixtures shall properly operate using standard lamps available locally. Fixtures shall be fully factory wired and designed for appropriate application, i.e. appropriate for that location where installed.

9.4.4. ABOVE MIRROR LIGHTS

Above mirror lights shall be provided in toilet rooms.

9.4.5. EMERGENCY LIGHTING

Battery powered emergency lights shall be provide within each building per NFPA 101 for safe egress

during power outage. Fixtures shall be provided with self-contained nickel cadmium battery pack to operate on standby for a minimum of 90 minutes. Unit shall have test, reset and lamp failure indication buttons. Primary operating voltage shall be 220 volts.

9.4.6. LIGHT SWITCHES

Light switches shall be single pole. A minimum of one light switch shall be provided in every room. Lighting in large rooms/areas may be controlled from multiple switches. In all rooms/areas with multiple entrances, the contractor shall provide three-way switching for lighting control.

9.4.7. RECEPTACLES

General-purpose receptacles shall be as required herein. All receptacles shall be duplex, unless otherwise specified in this section, section 01010, the NEC, or other referenced standard.

In new spaces, receptacles shall be placed at 3-meter (10 feet) intervals (maximum) in general. Existing receptacles in areas slated for remodeling shall be relocated as necessary and in accordance with applicable standards to serve the needs of the areas being served. Countertop outlets shall be provided in accordance with the NEC. Areas with computer workstations or similar equipment will have additional receptacles. Sinks will have a receptacle above, with one duplex receptacle serving dual sinks. Receptacles in wet/damp areas or within 1 meter (~3 feet) of sinks, lavatories, or wash-down areas shall be ground fault circuit interrupter (GFCI) type or Residual Current Disconnect (RCD) type, with the trip setting of 10 milliamperes or less. Total number of duplex receptacles shall be limited to six (6) per 20-ampere circuit breaker.

9.4.8. CONDUCTORS

All cable and wire conductors shall be copper. Conductor jacket or insulation shall be color coded to satisfy NEC requirements. The use of 75 or 90 degree C (minimum) terminals and insulated conductors is required. Use of 75 degree C conductors on circuits with protective device terminals rated for 60 degree C will not be accepted.

9.4.9. GROUNDING AND BONDING

Grounding and bonding shall comply with the requirements of NFPA 70. Underground connections shall be exothermal weld. All exposed non-current carrying metallic parts of electrical equipment in the electrical system shall be grounded. An insulated grounding conductor (separate from the electrical system neutral conductor) shall be installed in all feeder and branch circuit raceways. Grounding conductor shall be green-colored, unless the local authority requires a different color-coded conductor. Ground rods shall be copper-clad steel. Final measurement of the ground resistance shall be in compliance with the requirements of the local authority but shall not exceed 25 ohms when measured less than 48 hours after rainfall.

9.4.10. ENCLOSURES

Enclosures for exterior and interior applications shall be NEMA Type 3S (IEC Classification IP54) and NEMA Type 1 (IEC Classification IP10), respectively.

9.4.11. CONDUIT RACEWAY SYSTEM

A metal conduit system shall be complete, to include but shall not be limited to, necessary junction and pull-boxes. The smallest conduit size shall be 20mm (0.75 inch) in diameter. All empty conduits shall be furnishing with pullwire. Conduit shall be recessed in finished areas and surface mounted in unfinished areas. System design and installation shall be per NFPA 70 requirements. Exterior underground conductors shall be installing in PVC conduit at a depth of 24 inches (610 mm).

9.4.12. IDENTIFICATION NAMEPLATES

Major electrical equipment, such as transformers, panelboards, load centers, etc. shall be provided with permanently installed engraved identification nameplates.

9.4.13. SCHEDULES

All panel boards and load centers shall be provided with a panel schedule. Schedule shall be typed

written in English.

9.4.14. SINGLE LINE DIAGRAM

Complete single line diagrams shall be provided for all systems installed. All major items in each system shall be identified and labeled for respective rating. Single line diagrams for each system, installed in a clear plastic frame, shall be provided.

-- END OF SECTION --

6 NOV 2007

Darulaman Area



Camp Julian

Proposed Fence & Gates

Existing Fence

Item-3: Vehicle Parking Lot
Note: Existing Area is already Graveled.
Contractor shall Remove Vegetation & Expand Gravel as Needed.

Existing Wall

Site of Future K- Spans (Not in This RFP)

Darulaman Garrison

Item-2: Temporary Bath Facilities at Darulaman Garrison

Item-2: Temporary Bath Facilities & Item-3: Vehicle Parking Lot

Appendix-B1