

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			1. CONTRACT ID CODE J	PAGE OF PAGES 1   80
2. AMENDMENT/MODIFICATION NO. 0003	3. EFFECTIVE DATE 09-Sep-2007	4. REQUISITION/PURCHASE REQ. NO. W26WKS70847004		5. PROJECT NO.(If applicable)
6. ISSUED BY AFGHANISTAN ENGINEER DISTRICT US ARMY CORPS OF ENGINEERS KABUL APO AE 09356	CODE W917PM	7. ADMINISTERED BY (If other than item 6) <b>See Item 6</b>		
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		X	9A. AMENDMENT OF SOLICITATION NO. W917PM-07-R-0109	
		X	9B. DATED (SEE ITEM 11) 09-Aug-2007	
			10A. MOD. OF CONTRACT/ORDER NO.	
			10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE			
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS				
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input checked="" type="checkbox"/> is extended, <input type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.				
12. ACCOUNTING AND APPROPRIATION DATA (If required)				
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.				
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.				
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).				
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:				
D. OTHER (Specify type of modification and authority)				
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.				
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)  The purpose of this amendment is to incorporate a revised Bidding Schedule Section 00010, a revised Statement of Work Section 01010, a revised Requirements Section 01015, and to extend the due date to no later than 5 p.m. Kabul time 25 September 2007.				
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.				
15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
		TEL:	EMAIL:	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA		16C. DATE SIGNED
_____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)		09-Sep-2007

## SECTION SF 30 BLOCK 14 CONTINUATION PAGE

**SUMMARY OF CHANGES**

## SECTION 00010 - SOLICITATION CONTRACT FORM

The following have been added by full text:

SECTION 00010 REVISED 0003

**SECTION 00010**  
**Revised 9 September 2007**  
**PROPOSAL SCHEDULE**

The Contractor shall provide a price for all items, including those labeled, "Optional Items." The Government will evaluate the Contractor's entire proposal to determine which CLINs represent the best value to the Government.

No.	Description	Qty	Unit	Unit Price	Total Amount
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## 1. Base Proposal

## 1.1. Planning/Design

0001	Architecture and Engineering Design for the base items	LS	xxx	\$ _____
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Sub-Total Design only

\$ \_\_\_\_\_

## 1.2. Site Development (Construction)

0002	Grading and Storm Drainage System for the construction site	LS	xxx	\$ _____
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0003	Water Storage and Distribution System	LS	xxx	\$ _____
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0004	Sewage and Treatment System	LS	xxx	\$ _____
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0005	Electric generators, Tanks and The Distribution System	LS	xxx	\$ _____
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Sub-Total Site Development only

\$ \_\_\_\_\_

## 1.3. Buildings (Construction)

0006	DFAC Building Without Heat	LS	xxx	\$ _____
0007	Barracks For 750 personnel			
0007AA	10 Type-A Barracks Without Heat	EA	10 x \$ _____	\$ _____
0007AB	2 Type-B Barracks Without Heat	EA	2 x \$ _____	\$ _____
0008	Shower and Latrines Facility Without Heat	LS	xxx	\$ _____

Sub-Total Buildings only

\$ \_\_\_\_\_

## TOTAL BASE PROPOSAL ITEMS

\$ \_\_\_\_\_

(total of all above costs - includes design and construction)

## 2. Option Items (options are not necessary listed in order of award)

0009	Architecture and Engineering Design for the option items	LS	xxx	\$ _____
0010	Gravel Parking, Roads, and Walks	LS	xxx	\$ _____
0011	Backup Water Well and Pump House	LS	xxx	\$ _____
0012	Refurbish an Office Building	LS	xxx	\$ _____
0013	Refurbish four(4) Barrack Building	LS	xxx	\$ _____
0014	Repair Perimeter Wall	LS	xxx	\$ _____
0015	Motor Pool facilities	LS	xxx	\$ _____
0016	Pave Gravel Parking & Roads	LS	xxx	\$ _____
0017	Construct Five(5) Guard Towers	LS	xxx	\$ _____

0018	Refurbish one ECP	LS	xxx	\$ _____
0019	DFAC Building Heating Module	LS	xxx	\$ _____
0020	Barracks For 750 personnel			
0020AA	10 Type-A Barracks Heating Modulal	EA	10 x \$ _____	\$ _____
0020AB	2 Type-B Barracks Heating Modulal	EA	2 x \$ _____	\$ _____
0021	Shower and Latrines Facility Heating Modulal	LS	xxx	\$ _____

## TOTAL COST - OPTION ITEMS

\$ \_\_\_\_\_

(total of all above costs - includes design and construction)

## TOTAL PROPOSAL

\$ \_\_\_\_\_

(Base Proposal and Options)

## PROPOSAL SCHEDULE NOTES

1. Offeror shall submit prices on all items.
2. Only one contract for the entire schedule will be awarded under this solicitation. This project will be awarded as a lump sum contract. This Proposal Schedule is an accounting tool for allocating funds to applicable budget.
3. Costs associated with this project shall include design and construction costs for site development, facilities and utilities.
4. DESIGN COSTS DEFINITION: Design costs shall consist of preparation of master planning and site designs, plans, drawings, and specifications, and also shall include the following: initial site visits; field, topographic, property, boundary, utility, and right-of-way surveys; subsurface explorations and borings; feasibility, functional, and economic studies and other investigations; flow gauging and model testing; preparation or verification of as-built drawings; preparation of general and development criteria; preparation of general and feature design memoranda; services of consultants where not specifically applied to the preparation of working drawings or specifications; construction phase services; models, renderings, or photographs of completed designs; reproduction of designs for review purposes; and travel and per diem allowances in connection with the above excludable services.
5. SEPARATION OF WORK: All work for Design and Construction shall be included in all Proposal Items.
6. EVALUATION OF ITEMS: The award will be made to the offeror whose proposal represents the best

overall value to the Government. For pricing purposes the Government will evaluate both the Base Proposals and Option Proposals, but not necessarily equally. The government is not obligated to exercise the options. In order to accomplish the purpose of the contract, the government may choose to weigh far more on the base items to ensure the essential mission will be accomplished.

7. EXERCISE OF OPTIONAL BID ITEMS: Optional bid items are not in priority order. The government, can add all or any numbers of option items to the contract at any time within 120 calendar days after award of Base Proposal.
8. Period of performance is 240 calendar days from receipt of notice to proceed and liquidated damages are assessed at \$2,025.00 per day.

END OF SECTION

## SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS

The following have been added by full text:

SECTION 01010 REVISED 0003

**SECTION 01010  
REVISED 9 September 2007  
SCOPE OF WORK**

### 1. GENERAL

The project consists of the design and construction of new camp facilities, and rehabilitation of existing facilities within the ANA Compound Jalalabad, Afghanistan. Project site is located adjacent to Jalalabad Road about 2 km West of the Jalalabad Airport, and is also known as the Nangarhar Province Garrison. Refer to appendices for approximate site location. The project is to provide design, materials, labor, and equipment to construct and rehabilitate buildings, utilities, and other infrastructure for the station of 750 ANA soldiers. The work within this contract shall meet and be constructed in accordance with current International Building Codes (IBC) and Life Safety Codes (NFPA-101).

#### 1.1 ENGLISH LANGUAGE REQUIREMENT

All information shall be presented in English. The Contractor shall have a minimum of one English-speaking representative on site to communicate with government representatives at all times when work is in progress. Contractor shall also provide one copy of all documents translated into Pashtu/Dari.

#### 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 as 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](mailto:mharis@afghanreconstruction.org)  
Telephone: 0700 08 0602

Pervaiz  
e-mail: [adpzmuj@yahoo.com](mailto:adpzmuj@yahoo.com)  
Telephone: 0700 61 3133

## 2. LOCATION

The site is located in Jalalabad, Afghanistan. Site maps are attached as part of appendix. The site is within following coordinates:

Point 1	70° 20' 54.341" E, 34° 31' 35.767" N
Point 2	70° 21' 33.556" E, 34° 31' 35.292" N
Point 3	70° 21' 32.976" E, 34° 31' 2.838" N
Point 4	70° 20' 53.765" E, 34° 31' 3.313" N

## 3. UNEXPLODED ORDNANCE (UXO) and De-mining

UXO removal and de-mining work will be carried out by another government contract prior the start of this project.

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 with, 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 with 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 with 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 within 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 for all facilities unless otherwise stated in Section 1010 or 1015. Do not provide cooling for facilities unless otherwise stated in Section 1010 or 1015. All toilets shall be eastern style. All eastern toilets shall face north or south.

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 or Appendix.

#### **4.1.2 Base Bid Items for this project**

1. Architecture and engineering design required to construct the base items.
2. Site Development (Construction)
  - 2-1 Grading and storm drainage system for the construction site.
  - 2-2 Water Storage and Distribution System to all constructed facilities with the capability specified herein.
  - 2-3 Sewage and treatment system with discharge channel with the capability specified herein
  - 2-4 Electric generators, fuel tanks and the distribution system for with the capability to support all base and option item specified in this contract plus 25% additional reserve.
3. Buildings (Construction)
  - 3-1 DFAC facility
  - 3-2 Barracks for 750 soldiers of 10 Type-A Barracks and 2 Type-B barracks
  - 3-3 Shower and Latrines Facility

#### **4.1.3 Option Items**

- 4-0 Architecture and engineering design required to construct the base items.
- 4-1 Gravel parking, roads, and walks
- 4-2 Backup water well and pump house
- 4-3 Refurbish an Office Building
- 4-4 Refurbish four(4) Barrack Building
- 4-5 Repair Perimeter Wall
- 4-6 Motor Pool facilities
- 4-7 Pave Gravel Road
- 4-8 Construct Five(5) Guard Towers
- 4-9 Refurbish ECP
- 4-10 Heating for DFAC
- 4-11 Heating for Barracks
- 4-12 Heating for Shower and Latrines

#### **4.2 MASTER PLANNING**

The Contractor shall prepare a site Master Plan based on information contained in the Request For Proposal (RFP). The development of the master plan will include participation in a design charrette that will be conducted at the Corps of Engineers Headquarters Office in Kabul. The contractor must verify the requirements, site condition, and code compliance in accordance of section 1010 and section 1015 of this contract.

#### **4.3 WATER SYSTEM**

Design a water system, to include the connection to city water source, water pump, hydro-pneumatic water storage tank, and underground pipe distribution system. The water storage bank shall have storage capacity of one day demand based on 155 liters per person of total 750 soldiers. The storage

tank and distribution system shall be designed to provide a minimum 276 kPa (40 psi) at ground level at all points in the systems and minimum pressures of 207 kPa (30 psi), under peak domestic flow conditions in small sections. Maximum water pressures in distribution mains and service lines shall not exceed 517 kPa (75 psi) at ground elevation. Weather exposed water storage tanks and pipes shall be insulated to prevent freezing during winter

#### **4.3.1 BACK UP WATER WELL AND PUMP HOUSE (option item)**

Design and construct a backup water system to include development of a ground well water source; water well pumps and service booster pumps, chlorination and water storage tank(s) sized for the entire concept plan of 2,000 occupants with one day of storage; and water distribution system to serve the entire installation in case of the failure of the city water supply with a minimum of 40 psi pressures throughout.

#### **4.4 SANITARY SEWER SYSTEM**

Sanitary sewer collection and treatment system shall be designed and constructed by contractor. Sewer collection system shall consist of gravity sewer pipe and appurtenances such as manholes, cleanouts, a grease trap for the DFAC, and building service connections. The gravity sewer collection system shall connect to the sewage treatment and effluent disposal system. The wastewater treatment system shall be underground. The treatment system capacity shall be sized to 150,000 Liter/per day. The sewage treatment system shall be pre-engineered and pre-manufactured type (except the tanks) by a well known manufacturer in the industry. The treated water effluent disposal system shall be designed and constructed with sound environmental consideration. No sewer holding tanks allowed.

#### **4.5 GRADING AND GRAVEL WORK**

The user will demolish and remove any existing structures and debris at the sites designated for new building construction above surface grade. The Contractor shall be responsible for grading and earth work for the foundations. The Contractor shall perform complete final site grading and installation of all required drainage structures per the Drainage Plan.

Native 25mm crushed stone shall be placed around all buildings to a depth of 100 mm. Gravel shall extend from the building wall or building landscaping out 2m. All sub-base for graveled areas must be compacted to at least 95% proctor density.

#### **4.6 SITE ELECTRICAL DISTRIBUTION SYSTEM**

**POWER SYSTEM:** The contractor shall design a power source with capacity to support all base items only in this contract. The system includes generator(s), fuel storage, and underground electrical distribution to include manholes, connection point for option items. All electrical design and installation shall meet NEC (NFPA 70) requirements. Electrical receptacles shall be provided as indicated in section 01015, Technical Requirements. Conductors and circuits shall be sized for the specific loads. All wiring shall be run and pulled through properly sized conduits. The power plant shall include prime power generator and a backup generator, switchgear, and all appurtenances necessary to meet the electrical demand. Provide a properly ventilated generator shack over generators.

Contractor shall provide generators based on the N+1 concept. Where 'N' would be the required number of generator(s) and '1' being a 'stand-by' unit. Generation shall supply 125% of the maximum calculated demand load plus the stand-by generator in reserve. Contractor shall design and all interior electrical systems as described in section 01015 Technical Requirements and shall design and install any required exterior lighting, as described in section 01015.

#### **4.7 FORCE PROTECTION MEASURES**

##### **4.7.1 Refurbish the ECP and construct five (5) Guard towers (option items)**

Entry Control Points (ECP) force protection design shall be in accordance with Joint Security Directorate Antiterrorism/Force Protection Guide, March 2002. Entry control point shall be provided with a passive ram barrier or drop arm gate capable of stopping a large truck traveling at 60kph. Provide jersey barriers in a serpentine pattern to slow the traffic. Allow an area where trucks/vehicles can be blocked from movement while they are being inspected. Allow a turn out point where a vehicle being rejected from entering the compound can turn around and drive out without blocking the other vehicles behind. Install sufficient lighting to allow for close inspection of all sides of vehicles to include the inside. Install high intensity lighting directed outward as to illuminate all external approaches to the ECP while not backlighting the ECP or having light shine into the ECP

Guard tower design and construction shall be done according to the drawing provided in the appendix-D. Guard tower shall be a minimum of 3m x 3m in size. The floor height shall be elevated as to allow the window sill to be 0.5m above the top of the wall. The guard tower shall be constructed of reinforced CMU walls with a metal door and horizontal sliding windows with metal window frame, 800mm high x 1000mm wide. Glazing for the windows shall use laminated shattering resistant glass. Windows shall be located on all 4 sides to provide a 360 degree viewing area. Windows shall not be screened (but should be tinted). Window sills shall be adequately reinforced with metal to allow for mounting of crew served weapon pintel's. Open window shall be wide enough to allow for crew served weapons to be swung in an arc of no less than 120 degrees. The stairs and platforms shall be constructed per OSHA Standards, with entry to the tower through a lockable security door. Guard Tower shall have heating and cooling with split pack HVAC unit. Guard towers shall be provided with general lighting and shall be fitted with one 360-degree omni-directional searchlight. One weather-resistant duplex receptacle shall be provided as required for general use. The area in the immediate exterior vicinity of the guard tower shall be provided with an all weather non-slip surface and shall be graded to sufficiently drain away from structure.

#### **4.7.1 Repair perimeter wall (option item)**

Repair the damaged and deteriorating sections of the Perimeter Wall to match existing good section wall profile or better. The amount of repair work to be provided shall be equal to 2100 meters new wall construction (excluding wall foundation work but including related demolition work).

#### **4.8 ROAD NETWORK, SIDEWALK, AND PARKING (option item)**

The Contractor shall design and construct the entire road and parking network. Gravel walkways shall be installed between buildings and cover all areas of anticipated foot or vehicle traffic to reduce erosion and to provide dust control. The roads shall be designed to carry traffic of a 52 ton tractor trailer vehicle (belonging to the garrison) with the road having a minimum 7 meter width and 400 meters in total length for the base bid. Provide temporary gravel parking areas of for total 20 vehicles. Vehicles must be accessible to all buildings. Sub-base for graveled areas must be compacted to 95% proctor density. A storm drainage system shall also be included. Base bid includes gravel paving, option bid include the asphalt paving over all roads and parking, and concrete sidewalks. Road shall be designed per Section 01015, Technical Requirements.

#### **4.9 Not used**

#### **4.10 BARRACKS**

The Contractor shall design and construct ten (10) Type A barracks and two (2) Type B barracks shown in Appendix A.

The Contractor shall incorporate the following special features into the Type A barracks:

- 1) Provide 6 ceiling fans and 48 power outlets evenly located in each barrack building.
- 2) Concrete stoops shall be provided at all exterior doors.
- 3) Provide evaporative cooling/diesel fired burner unit. The diesel fired burner module shall be an optional bid item.
- 4) Maintain a building envelop of R-22 wall insulation, R-30 roof insulation, double insulated windows, and insulated metal doors.
- 5) Select the optimal construction method proved to be economic, durable, and fast-erecting.
- 6) The floor is smooth concrete finished with gray colored sealer.
- 7) Provide 10% exterior area for window with double insulated glass glazing.
- 8) Flat ceilings shall be located 3m above finish floor. Sloped ceilings shall be located at an average height of 3m above finished floor, with the lowest point no less than 2.6m above finished floor.
- 9) Provide at least two pair of RJ45 outlets (for telephone and data) in the building with wires connected to central location in the DFAC.

The Contractor shall incorporate the following special features into the Type B barracks:

- 10) Provide split HVAC unit for VIP rooms in each barrack.
- 11) Bath, toilets and shower rooms are finished with ceramic wall and floor. Provide proper ventilation systems in those rooms.
- 12) Provide power outlets in each bedroom so the distance between two outlets will not exceed 3 m.
- 13) Provide a ceiling fan in each bedroom.
- 14) Concrete stoops shall be provided at all exterior doors.
- 15) Provide evaporative cooling/diesel fired burner unit. The diesel fired burner module shall be an optional bid item.
- 16) Maintain a building envelop of R-22 wall insulation, R-30 roof insulation, double insulated windows, and insulated metal doors.
- 17) Select the optimal construction method proved to be economic, durable, and fast-erecting.
- 18) The floor is smooth concrete finished with gray colored floor sealer. The VIP rooms are provided with mid-grade carpet.
- 19) Provide 10% exterior area for window with double insulated glass glazing.
- 20) Flat ceilings shall be located 3m above finish floor. Sloped ceilings shall be located at an average height of 3m above finished floor, with the lowest point no less than 2.6m above finished floor.
- 21) Provide at least one pair of RJ45 outlets (for telephone and data) at each VIP room and Bedroom in the building with wires connected to central location in the DFAC.

One of the construction method recommended here is the 3-D Wall Panel System, which consists of a polystyrene panel core, welded wire mesh and shotcrete thick skin on both side of the insulation core. The Type A Barracks can be built entirely by the 3-D Panel System. The government can provide partial construction drawings that will allow the construction work to start immediately. Type B Barracks can be built with 3-D Panel System for envelops (roof and exterior walls). Interior partitions can be built with metal studs with drywall system, masonry, or the 3-D system whichever is more economic.

#### **4.11 DFAC, DINING FACILITY AND STORAGE YARD**

The contractor shall design and construct a Dining Facility (DFAC) providing cafeteria-style feeding and local style meals. Spaces include dining areas and kitchen facilities outfitted with propane-burning built-in stoves in accordance with local practice. The schematic layout is shown in Appendix-B. The contractor shall incorporate the following special features into the DFAC:

- 1) Provide a dinning area of 8m x 28m area with entry and exit vestibules. Provide 6 hand wash stations in the entry vestibule. Trough type sinks shall be used.
- 2) Provide 5 gas fired cooking stoves and 2 tea brewing stoves. Cooking Stove information is attached in Appendix J. Provide a ventilation system (hood) over stoves that is capable of preventing smoke and steam generated during cooking from entering other areas.
- 3) All floors in buildings shall be terrazzo finished with clear stone sealer. Floor drains shall be incorporated in the dining areas with the floor sloped to drain.
- 4) Provide at least 4 floor drains in Kitchen common area. A grease trap shall be installed to prevent undesirable discharge into the sewer system.
- 5) Provide one walk-in cooler and one walk-in freezer per Section 01015. Provide other electrical outlets for other mobile refrigerators/freezers and cooking equipments.
- 6) Provide 10% exterior area for window with double insulated glass glazing.
- 7) Provide a depressed door mat for mud removal at the entrance.
- 8) Provide evaporative cooling/diesel fired burner unit. The diesel fired burner module shall be an optional bid item.
- 9) Provide one large pot washing sink with a low rim/curb height, one two compartment sink, one three-compartment sink, and one mop sink at the cooking and preparation area. Provide one two-compartment sink at Rough Preparation Room. Provide hot water to kitchen sinks, hand wash stations, and the shower unit through electric water boiler(s).
- 10) Provide Propane Storage shack with capacity for four (4) weeks operation. Install a canopy and partition to protected propane tanks used for stoves at connection point exterior to the building.
- 11) Provide an office, a bathroom with one shower, one toilet, and a hand sink, and storage rooms shown in the Appendix. Provide at least one pair of RJ45 outlets (for telephone and data) in the office, with wires connected to the corner room to a central connection point for all communication service connection.

#### **4.12 RENOVATE ONE OFFICE BUILDING (Option Item)**

Renovate one of the existing buildings as administrative offices. The existing building measures approximately 9.5m x 27m and is two-story high.

- 1) Replace all windows with insulated double pane windows.
- 2) Provide interior fluorescent lighting with uniform level of minimum lighting in accordance with Section 01015 throughout the buildings. Provide electrical outlets on each wall of every room and ensure they are spaced no more than 4m apart. Provide at least one pair of RJ45 outlets (for telephone and data) at each power outlet location in offices, with wires connected to one central location in the building convenient for service connection.
- 3) Refinish existing concrete floors with slip-resistant ceramic tiles.
- 4) Repair, patch, smooth, and paint walls and ceilings. Provide tile wall base to match the floor material.
- 5) Provide new doors for all rooms
- 6) Provide HVAC split unit for all spaces
- 7) Clean, repair, patch, and paint all exterior surfaces of the building to include soffits and roof.
- 8) At the side of the building provide small independent latrine unit with 3 toilets, two urinals, and one sink for man; and two toilets, one sink for women, and a deep sink/tub with faucet for cleaning buckets.
- 9) Replace or install new hand railings for the stairway.
- 10) Install walls or partitions as needed to support installation of doors and segregation of existing rooms.
- 11) Install one lockable storage room for supplies on each floor.

#### **4.13 RENOVATE 4 BARRACK BUILDINGS (Option Item)**

Renovate four existing buildings as officer quarters. Existing buildings measure approximately 9.5m x 27m and are two-story high.

- 1) Replace all windows with insulated double pane windows.
- 2) Provide interior fluorescent lighting in accordance with Section 01015 throughout the buildings. Provide at least three electrical outlets in each room.
- 3) Repair, Patch, smooth, and refinish existing concrete floors with gray-colored floor sealer.
- 4) Repair, patch, smooth, and repaint walls and ceilings. Provide tile wall base.
- 5) Provide new doors for all rooms.
- 6) Provide evaporative cooling/diesel fired burner unit. The diesel fired burner module shall be an optional bid item.
- 7) Clear, repair, patch, and paint all exterior surfaces of the building to include soffits and roof.

- 8) At one side of the building provide total two independent latrine/shower units with 4 toilets, 4 showers, two ablutions, one sink in each unit, and one deep sink or tub for cleaning buckets.
- 9) Repair or replace deteriorated stairways and hand rails.
- 10) Provide one pair of RJ45 outlets (for telephone and data) at each room in the building with wires connected to central location in the building convenient for service connection.

#### **4.14 LATRINE AND SHOWER FACILITIES**

The Contractor shall design and construct one central latrine and shower facility, containing 30 toilets, 30 showers, 16 ablution, and 20 sinks. The schematic layout is shown in Appendix-C. The latrine and shower facility will be closely located to 10 Type A barracks.

- 1) Shower stalls shall close and shall have a door. Showers shall contain a single valve for hot and cold water mixing and a wall mounted shower head.
- 2) Electric hot water heaters and storage shall be installed to service all showers and sinks.
- 3) Provide evaporative cooling/diesel fired burner unit. The diesel fired burner module shall be an optional bid item.
- 4) The building shall be constructed with exhaust fans with sufficient ventilation.
- 5) Accessories shall include: soap dishes, curtains with curtain rods, robe hooks, and mirrors.
- 6) All toilets shall be eastern style units and be facing north and south.
- 7) All floors will be finished using ceramic tiles and all walls will have ceramic tile wainscots extending 1.8m above the finish floor.
- 8) Design and construct the floors to be sloped to floor drains.
- 9) Ablution areas shall be provided with low flow water devices. There shall be a built-in seating design with ceramic tile measuring 300mm x 300mm x 300mm. The drain areas shall be recessed below the floor level 200mm and lined with ceramic tile.
- 10) Wall surfaces above wainscot and all ceiling areas shall be finished with gloss water-resistant paint.
- 11) The lowest ceiling height shall be no less than 3.3m above finished floor.
- 12) The partition for the toilets and showers can be any durable and tamper-resistant opaque material with less thickness considered better.

#### **4.15 Not Used**

#### **4.16 MOTOR POOL (option item)**

The Contractor shall design and construct a motor pool gravel holding area of 60m x 60m, and a maintenance garage shall be included.

- a. After leveling, grading, and compacting the holding yard, the contractor shall overlay the entire graded area with 15cm of compacted 25mm gravel/crush stone.
- b. Construct 2.4 meter high chain link fence with barbed wire and vehicle gates surrounding the vehicle holding yard. The contractor shall install barbed wire on supporting arms above the fence posts.
- c. Construct entry control points each consisting of a vehicle gate and a pedestrian gate. Extend each end member of the gate frames sufficiently above the top member to carry three strands of barbed wire in horizontal alignment.
- d. The contractor shall construct one three bay vehicle maintenance facility, each bay shall have dimensions 5 m (width) x 12 m (depth) x 6 m (height). Ground slab for garage shall be 300 mm thick to support seven ton vehicles. All concrete shall be reinforced with deformed steel rebar. Provide garage doors measuring at least 4.5 meter in height and 3 meter in width.
- e. A proper drainage plan shall be incorporated into the maintenance building and exterior concrete finish which shall both slope away from the facility. There shall be a sub-base course installed and compacted to 95% compaction prior to pouring any concrete.
- f. Provide within this facility office space large enough to accommodate 5 people comfortably (4 m x 5 m) as well as a tool room (3 m x 4 m). Provide at least one pair of RJ45 outlets (for telephone and data) at each power outlet location in offices, with wires connected to one central location in the building convenient for service connection. Provide a toilet, a sink and a shower unit inside the building.
- g. Provide HVAC split unit to the office and toilet room.
- h. Provide a 6sm roofed structure with chain link fence walls and topped with concertina wire for POL storage, which is located at least 10m away from the building and is securely lockable.
- i. Provide two bollards located at each side of the entrances to the rollup door.
- j. Preferred building type is pre-engineered metal assembly.
- k. A maintenance pit shall be provided with steps into the pit. The Pit shall not be more than 100mm in width and to have concrete safety curbs.
- l. Provide an exhaust fan system for maintenance bay to provide adequate ventilation for vehicle exhaustive fume.
- m. Provide evaporative cooling/diesel fired burner unit. The diesel fired burner module shall be an optional bid item.

#### **4.17 HVAC, HEATING VENTILATION AIR-CONDITIONING**

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

#### **4.18 LIFE SAFETY**

Design and Construct circulation pathways and exit stairs in accordance with building code references herein. Fire sprinkler system is not required. The facility shall comply with all other safety requirements

as required within references. Smoke detectors shall be installed in accordance with requirements herein.

#### **4.19 LIGHTING**

General lighting shall be provided as indicated and shall meet recommendations from IESNA for each building type and function within each building. Design and installation shall meet NEC 70 requirements.

#### **4.20 ELECTRICAL**

Design and construct a power system for supply and distribution to all to include generation with fuel storage, and underground electrical distribution. All electrical design and installation shall meet NEC (NFPA 70) requirements. Electrical receptacles shall be provided as indicated. Conductors and circuits shall be sized for the specific loads.

#### **4.21 FOUNDATION DESIGN**

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

#### **4.22 SITE DESIGN**

The contractor will propose alternatives for general site layout and coordinate with the government to achieve optimal solution. General areas of usage are indicated in the Appendix-E. Relationship of Barracks, Shower/Latrine facility, and DFAC is shown in Appendix -F.

### **5. COMPLETION OF WORK**

All base items required under this contract shall be completed within 240 calendar days from Notice to Proceed for site work.

All renovation option works shall be completed within **120** days after exercise/award of the option items. All other option works except motor pool shall be finished within 180 days, and Motor Pool Facility shall be completed no later than 240 calendar days after exercise/award of the option items.

### **6. SPARE PARTS**

Refer to other sections herein for requirements.

### **7. REFERENCES**

Refer to Section 01015 for required references.

-- End of Section --

SECTION 01015 REVISED 0003

**W917PM-07-R-0109  
Amendment 0003 SECTION 01015  
TECHNICAL REQUIREMENTS**

#### **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 combination of cost, construction efficiency, system durability, ease of maintenance and environmental compatibility. The Contractor is responsible for master planning and site design; site development, including grading and storm water management; water line, sanitary sewer, and storm sewer construction; road construction; electrical, security systems, communications systems and all facilities as described in this Request for Proposal (RFP).

1.2 These design and product requirements are minimum standards. The Contractor is encouraged to propose alternate design or products (equipment and material) that are more commonly used in the region; equipment and materials 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. Life expectation for this facility is for twenty-five (25) years. Material and methods used for this project must meet this design requirement. All requirements set forth in the RFP, but not included in the Scope of Work (SOW) shall be considered as set forth in both, and vice versa. Any time two or more statements in the RFP, building codes, or standards are in conflict; the most stringent shall apply. This project consists of new construction of the infrastructure and buildings as defined in Section 01010 SCOPE OF WORK and shall be executed in accordance with the following requirements. All submittal and construction requirements are typical for each site. The site for this contract is at Jalalabad, Afghanistan.

### 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 materials 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 UXO/MINE DISCOVERY DURING PROJECT 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, after the entire site has been cleared of UXO/mines per the International Mine Action Standards (IMAS) and clearance is done to the anticipated foundation depth, the Contractor becomes aware of or encounters UXO or potential UXO during construction, the Contractor shall immediately stop work at the site of the encounter, move to a safe location, notify the COR, and mitigate any delays to scheduled or unscheduled contract work. The Contractor shall remove and dispose of UXOs per the International Mine Action Standards (IMAS). These standards can be found at <http://www.mineactionstandards.org>. The Contractor assumes the risk of any and all personal injury, property damage or other liability, arising out of and resulting from any Contractor action hereunder. In these cases, the Contractor shall be required to identify and dispose of the ordnance.

#### 1.4.2 ACTIVITY HAZARD ANALYSIS (AHA)

a. Activity Hazard Analysis shall be prepared in accordance with the Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.

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.

#### 1.5 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.

#### 1.6 WARRANTY

The Contractor shall repair and/or replace all defective materials or workmanship, except for roofs, at his own cost for a warranty period of one (1) year commencing upon the date of final acceptance of the project. See roof construction under RFP for warranty.

#### 1.7 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.

#### 1.8 MAN-HOUR EXPOSURE REPORTING REQUIREMENTS

Prime Contractors are required to maintain records for both prime and subcontractor employees to include exposure work hours, a log of occupational injuries and illness and local/international economic data. The Prime Contractor shall submit the information on CEAED Form 385-1-1 to the COR by the 25<sup>th</sup> of each month. The COR shall submit the information to the Chief, Safety, and the AED Economist by the end of the month. The COR shall assure that the form is properly filled out and that the complete contract number or task order number are clearly indicated. Section III of the form is the Economic Analysis Report and it must contain data itemized by location if the contract has more than one work location. It is extremely important that the economic data be broken out by work location. The contractor may develop their own spreadsheet for a contract with multiple work sites provided the spreadsheet includes the basic information detailed on the Economic Data Report. Accident exposure data does not need to be itemized by location and should be submitted as a total for the entire contract.

#### 1.9 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

DCID 6/9 Physical Security Standards for Sensitive Compartmented Information Facilities

DCID 1/21, Manual for Physical Security Standards For Sensitive Compartmented Information Facilities (SCIF).

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)

IFGC – International Fuel Gas Code

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 (NEC), Institute of Electrical and Electronic Engineers (IEEE C2), 2002 edition

NFPA 10, Portable Fire Extinguishers, 2002 edition

NFPA 54, National Fuel Gas Code, 2002

NFPA 58, Liquefied Petroleum Gas Code, 2004

NFPA 70, National Electrical Code, 2002 edition

NFPA 72, National Fire Alarm Code, 2002 edition

NFPA 75, Standard for the Protection of Information Technology Equipment

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

NFPA 101, Life Safety Code, 2003 edition

NFPA 110, Standard for Emergency and Standby Power Systems, 2005 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

International Mine Action Standards, latest edition; (see <http://www.mineactionstandards.org> for copy of standards)

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 3-230-03a, Water Supply, 16 Jan 2004

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 3-230-08a, Water Supply: Water Treatment, 16 Jan 2004  
UFC 3-230-09a, Water Supply: Water Storage, 16 Jan 2004  
UFC 3-230-10a, Water Supply: Water Distribution, 16 Jan 2004  
UFC 3-230-13a, Water Supply: Pumping Stations, 16 Jan 2004  
UFC 3-230-17FA, Drainage in Areas Other than Airfields, 16 Jan 2004  
UFC 3-240-03N, Operation and Maintenance: Wastewater Treatment System Augmenting Handbook, 16 Jan 2004  
UFC 3-240-04a, Wastewater Collection, 16 Jan 2004  
UFC 3-260-01, Airfield and Heliport Planning and Design, 1 Nov 2001 with changes dated 19 May 2006  
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 3-540-04N Design: Diesel Electric Generating Plants, 16 Jan 2004  
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  
UFC 4-021-01, Design and O&M: Mass Notification Systems, draft 1 May 2006  
Underwriters' Laboratories (UL) Fire Protection Equipment Directory (2002)  
UL Standards (as applicable)  
UL 710, Exhaust Hood for Commercial Cooking Equipment, latest edition  
UL 737, Fireplace Stoves, latest edition  
UL 752, Bullet Resisting Equipment, 2000 or later  
USCINCCENT OPORD 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 should 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.

### 2.3.4 PAVING

#### Roads

Paved roads are required within the base camp area. All roads shall be of wearing surface 7 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 compound (containment area) roads sections shall have the subgrade scarified and compacted to 95% maximum laboratory density for a minimum 300mm (12 inches). The roads sections shall have minimum 200 mm (8 inch) base course compacted to 100% of maximum density and shall be surfaced with minimum 50 mm (2 inch) hot mix asphalt concrete, unless otherwise noted. 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, unless otherwise noted. 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.

#### 2.3.4.1 Bridges and Site Grading Plan

Preliminary investigation indicates no need for bridges or major drainage structures. The Contractor shall notify the Contracting Officer immediately if initial site survey determines that area hydrology requires major drainage structures or bridges. The contractor shall design a site grading plan that provides positive drainage and minimizes the requirement for major structures in a cost effective manner.

#### 2.3.4.2 Parking Areas and Motor Pools

Contractor shall construct parking and storage areas using aggregate surface. Subgrade shall be 150mm (6 inches) minimum in depth scarified and compacted to 95% proctor density. Aggregate base shall be 150mm (6 inches). 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.

#### 2.3.4.3 Sidewalks

Contractor shall provide sidewalks to connect parking areas with buildings and adjoining buildings where foot traffic is anticipated. The subgrade shall be 150mm (6 inches) in depth scarified and compacted to 95% proctor density. Sidewalks shall be constructed of aggregate surface 150mm (6 inches) thick compacted at 95% proctor density. Sidewalks shall have a minimum width of 1.5m, unless rated for vehicular traffic. Sidewalk used subject to vehicular traffic shall be 200mm thick.

### 2.3.5 Survey Requirements

2.3.5.1 Horizontal and Vertical Control The mapping shall be based on the base coordinate system. If the base system cannot be found, the surveyor shall use any established monuments. If monuments have been destroyed or do not exist an assumed horizontal and vertical datum shall be established, using arbitrary coordinates of 10,000N and 10,000E and an elevation of 1,000 meters. The horizontal and vertical control established on site shall be a closed loop with third order accuracy and procedures.

2.3.5.2 Provide three (3) concrete survey monuments at the survey site.

2.3.5.3 All of the control points established at the site shall be plotted at the appropriate coordinate point and shall be identified by name or number, and adjusted elevations.

2.3.5.4 The location of the project site, as determined by the surveyor shall be submitted in writing to the Contracting Officer. The site location shall be identified by temporary markers, approved by the Contracting Officer before proceeding with the surveying work.

### 2.3.6 Topography Requirements

2.3.6.1 A sufficient quantity of horizontal and vertical control shall be established to provide a detailed topographic survey at 1:500 scale with (25) centimeter contour intervals. Intermediate elevations shall be provided as necessary to show breaks in grade and changes in terrain.

2.3.6.2 The contours shall accurately express the relief detail and topographic shapes. In addition, 90 percent of the elevations or profiles interpolated from the contours shall be correct to within one-half of the contour interval and spot elevations shall be correct within plus or minus 2 centimeters.

2.3.6.3 Spot elevations affecting design of facilities shall be provided. Specifically, break points or control points in grades of terrain such as tops of hills, bottoms of ditches and gullies, high bank elevations, and so forth.

2.3.6.4 All surface and sub-surface structures features within the area to be surveyed shall be shown and identified on the topographic maps. In addition, these features shall be located by sufficient distance ties and labeled on the topographic sheets to permit accurate scaling and identification.

2.3.6.5 The location and sizes of potable, sanitary, electrical and mechanical utilities within the survey site shall be shown on the survey map. Sanitary manholes and appurtenances shall show top elevations and invert elevations.

## 2.4 CIVIL UTILITIES

### 2.4.1 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, disinfection systems, 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.

### 2.4.2 Water

#### 2.4.2.1 General Water

Infrastructure design and construction shall serve the demand. The Contractor shall install water distribution mains, 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. The required Average Daily Demand (ADD) approximation is derived from **190** liters per capita per day (lpcd) or **50** gallons per capita per day (gpcd). In the event potable or non-potable use water is required prior to completion of the water facilities infrastructure the Contractor may be issued a Request for Proposal to provide non-potable (tank truck) and potable (bottled or other reliable source) consumption. Provide a minimum of one (1) outside water hydrant (hose spigot) for any building or facility for which a water supply is provided for landscaping purposes.

#### 2.4.2.2 Water Quality Sampling and Analysis

The Contractor shall perform water quality sampling and testing at the source. The Contractor shall utilize well-qualified and equipped testing capability in the project site area, if available. If professional testing services are not available in the area, the Contractor will submit an alternative practical testing source for approval. Raw water quality criteria for Water Quality and Criteria Standards, and shall address the following: PH, turbidity, conductivity, oxidation reduction potential, total dissolved solids, color, odor, total coliform/fecal coliform (bacteria) an indicator of the presence of E. coli. These baseline parameters are a partial list as presented in TM5-813-3/AFM 88-10 APPENDIX A.

#### 2.4.2.3 Water Filtration

The Contractor shall install an in-line, fully automatic, self-cleaning, sediment filtration unit. The filter shall be able to meet or exceed applicable standards for water quality. The Contractor shall install and use filtration unit in accordance with manufacturer's recommendations.

#### 2.4.2.4 Service Booster Pumps (Direct Pressure System Pending Engineering Site Investigation)

If required, the Contractor shall provide a booster pump station with end suction or split case double suction horizontal split case (frame mounted) centrifugal pumps arranged in parallel for pumping water storage into the main distribution system. The pumps and controls shall be designed to supply and maintain acceptable system pressure throughout the distribution network given the full range of flow conditions (low flow to peak). For conditions of low demand and to prevent short cycling of primary pumps, provide a low demand jockey pump with capacity of one-third (1/3) of the Average Daily Demand (ADD) and hydro-pneumatic tank to maintain system pressure in times of low demand. The design will be such that the pump can supply water to the system by isolating the booster pumps, storage reservoirs and hydro-pneumatic tank individually or bypassing the entire booster pump and storage facility. Each booster pump, two (2), shall be capable of delivering 2 times (2x) the ADD. Provide suitable hydro-pneumatic expansion tank. Minimum Expansion-Tank size is:  $V(m^3) = Q_{ADD}(m^3/h) * 1.1 / (1 - (P_{on} + 1) / (P_{off} + 1)) / N_{st}/h$ .  $V$  = Volume of tank,  $m^3$ ,  $Q_{ADD}$  = Average Daily Demand,  $m^3/h$ ;  $P_{on}$  = tank pressure (bar) to start pump/s, (typically 1.5 bar);  $P_{off}$  = tank pressure (bar) to stop pump/s (typically 4.0 bar);  $N_{st}/h$  = Number of pump starts per hour (4 to max 15). If pressure is in Kpa, then(  $P_{on} + 100$ ) & (  $P_{off} + 100$ ) The suction side of the service booster pumps shall have an eccentric reducer and gate valve installed. The discharge side shall have a gate valve, check valve (between the pump and the gate valve and concentric reducer, pressure gauge and air relief valve).

2.4.2.5 Water Storage Tank(s) Contractor shall provide a circular steel or circular concrete ground storage reservoir (GST) to be located on the ground surface. Volume of the GST shall be a minimum storage volume of a full days' demand. The Contractor shall verify storage volume requirements based on final design population. The storage facility shall be located above drainage areas and locations subject to flooding as approved by the Contracting Officer. The storage facility shall be located on the highest elevations of the site to promote gravity flow and reduce pumping requirements. Overflow and air vents shall be screened so that birds, rodents and debris cannot enter the reservoir.

#### 2.4.3 WATER DISTRIBUTION SYSTEM

2.4.3.1 General The Contractor shall provide a water distribution system described as follows: Pipe diameters used in the network shall be 300mm, 250mm, 200mm, 150mm and 100mm, 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 276kPa (40psi) to 350kPa (50psi). Minimum pressure is 207kPa (30psi) to all points of the distribution system, under peak domestic flow conditions in small sections. Maximum water pressures in distribution mains and service lines shall not exceed 517 kPa (75 psi) at ground elevation. If high pressures (greater than 517kPa) 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. Dead end sections shall not be less than 150mm 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 in diameter. Water supply distribution shall connect to a building service at a point approximately 1.5m outside the building or structure to which the service is required. Adequate cover must be provided for frost protection. A minimum cover of 80cm is required to protect the water distribution system against freezing. Water lines less than 1.25 meters deep under road crossings shall have a reinforced concrete cover of at least 150 mm thickness around the pipe.

2.4.3.2 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, et al. 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, et al, 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, 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 1.03Mpa (150psi) working pressure and 1,38Mpa (200psi) hydrostatic test pressure.

2.4.3.3 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.

2.4.3.3.1 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 (150psi). 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.

2.4.3.3.2 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 (5psi) 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:  $L = 0.0001351ND \sqrt{P}$  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 Metric :  $Q(\text{liter/sec}) = 8.95 \times 10^{-7} * N * D(\text{mm}) * \sqrt{P(\text{Kpa})}$

$\sqrt{P(\text{Kpa})}$

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.

#### 2.4.3.4 Bacteriological Disinfection

2.4.3.4.1 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 either 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.

2.4.3.4.2 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.

2.4.3.4.3 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.

2.4.3.5 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.

2.4.3.6 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.

2.4.3.7 Valves Valves (Gate valves with 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 300m. Gate valves shall be in accordance with AWWA C 500 and/or C509. Butterfly valves (rubber seated) shall be in accordance with C504 et al. 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 square, for all valve boxes.

2.4.3.8 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.

2.4.3.9 Blow-off valves The Contractor shall provide 40-50mm 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.

2.4.3.10 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.

#### 2.4.4 SANITARY SEWER

2.4.4.1 General There are no functional or salvageable sanitary sewer collection, treatment or disposal facilities existing. 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 collection system. 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 under road crossings shall have reinforced concrete cover at least 150 mm thick around the pipe.

Exterior sanitary sewer line construction shall include service to all buildings as described in the Scope of Work Section 01010. Contractor shall design sanitary sewer collection system 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. Main collection sewers will follow the most feasible route to the point of discharge. The sewer collection system shall be designed to accommodate a total occupant load of (750) persons. 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 outside the building, to which the sewer collection system is to be connected.

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 and maintaining them.

2.4.4.2 Protection of Water supplies – The Contractor shall ensure that the sewer design meets the following criteria:

2.4.4.3 Sanitary sewers will be located no closer than 25m horizontally to water wells or reservoirs to be used for potable water supply.

2.4.4.4 Sanitary sewers will be no closer than 3m horizontally to potable water lines; where the bottom of the water pipe will be at least 305mm above the top of the sanitary sewer, horizontal spacing shall be a minimum of 1.8m.

2.4.4.5 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 on each side of the crossing. Pressure pipe will be as required for force mains in accordance with building codes and shall have no joint closer than 0.9m horizontally to the crossing, unless the joint is encased in concrete.

2.4.4.6 Quantity of Wastewater The Contractor shall verify the average daily flow considering both resident (full occupancy) and non-resident (8hr per day) population. The average daily flow will represent the total waste volume generated over a 24-hour period, and shall be based on a population of 750 troops and usage rate of 190 liters per capita day (water usage). The wastewater flow rate shall be calculated as 80% of average daily flow. Design criteria guideline shall be based on an average influent wastewater characteristics as BOD of 400mg/l, SS of 400mg/l, BOD load of 750ppd, and SS load of 750ppd.

2.4.4.7 Gravity Sewer Sanitary sewers shall be designed to flow at 90 to 95 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, (1.0fps) 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 80cm will be required to protect the sewer against freezing.

2.4.4.8 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 pre-cast manhole option shall taper to a 75cm (30-inch) cast iron frame that provides a minimum clear opening of 600mm (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.

2.4.4.8.1 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.

#### 2.4.4.8.2 Spacing

The distance between manholes must not exceed 120m (400 ft) in sewers of less than 460mm (18 inches) in diameter. For sewers 460mm (18 inches) and larger, and for outfalls from wastewater treatment facilities, a spacing of up to 180m (600 ft) is allowed provided the velocity is sufficient to prevent the sedimentation of solids.

2.4.4.8.3 Pipe connections The crown of the outlet pipe from a manhole shall be on line with or below the crown of the inlet pipe.

2.4.4.8.4 Frames and Covers Frames and covers shall be cast iron, or ductile iron, traffic rated in any case to an H-20 load rating. Cast iron frames and covers shall be traffic rated, circular with vent holes.

2.4.4.8.5 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 300mm (12 inches) on center.

#### 2.4.4.9 Grease Interceptor

All Dining Facilities (DFACs) shall incorporate preliminary treatment with use of grease interceptor prior to the sewer collection system. Grease interceptor shall be of reinforced concrete, precast concrete or equivalent capacity commercially available steel, with removable three-section, 9.5mm (3/8 inch) checker-plate cover, and shall be installed outside the building. Steel grease interceptor shall be installed in a concrete pit and shall be epoxy-coated to resist corrosion as recommended by the manufacturer. Interceptors shall be tested and rated in accordance with PDI G 101. Concrete shall have 21 MPa (3,000 psi) minimum compressive strength at 28 days. Grease trap will connect to the sanitary sewer collection system.

2.4.4.10 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 380mm (15inch) or less in diameter. PVC shall be certified as meeting the requirements of ASTM D 1784, cell Class 12454 B.

2.4.4.10.1 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. 2.4.4.10.2 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. 2.4.4.10.3 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. 2.4.4.10.4 The minimum depth of cover over the pipe crown shall be shall 0.8m.

2.4.4.11 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 will be a minimum of 100mm diameter and laid at a minimum 1% grade, but up to 2% as design parameters dictate. Service laterals shall be 150mm and sloped to maintain the minimum velocity as described in paragraph "Gravity Sewer."

2.4.4.12 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. The cleanout shall be of the same diameter as the building sewer, and never be smaller than 100mm.

2.4.4.13 "P" S-Traps: Provide and include in all grey and waste water pipe systems to prevent sewer gases from entering any habitable spaces.

2.4.4.14 Field Quality Control

2.4.4.14.1 Field Tests and Inspections

2.4.4.14.2 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.

2.4.4.14.3 Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show 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.

2.4.4.14.4 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.

2.4.4.14.5 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.

2.4.5 Wastewater Treatment The wastewater treatment system and effluent disposal shall be designed to accommodate the compound's current and expected future demand, as specified in the initial survey report and verified by the Contractor. The Contractor shall use a pre-engineered wastewater treatment system. Design requirements and criteria for treatment systems shall be in accordance with guidelines outlined in TM 5-814-3/AFM 88-11, Volume III Domestic Wastewater Treatment and UFC 3-240-02N Wastewater

## 2.5 Storm Sewer Systems

### 2.5.1 Design Storm Return Period (baseline frequency)

Developed portions of the site installation such as administration, industrial and barracks areas, shall be based on a rainfall of 10-year frequency. Basic system design shall be in accordance with UFC 3-230-17A, Chapter 2. Potential damage or operational requirements may warrant a more severe criterion or in

certain areas a lesser criterion may be appropriate. The design of roadway culverts and other on-site storm drainage features & structures will normally be based on 10-year rainfall event. Protection of installations against flood flows originating from areas exterior to the base installation shall be based on a 25-year or greater rainfall depending on cost-benefit considerations.

### 2.5.2 Storm Drainage System Design

The Contractor shall be responsible for the complete design of the storm drainage system. Drainage of runoff from turf areas onto pavements shall be minimized. If storm drain piping is required it shall comply with the requirements in this section. Where storm drain pipes are of different diameters, the pipe crown elevations should be matched at the drainage structure. Storm drain lines shall be located outside of paved areas to the extent possible. Under no circumstance shall storm drain lines be located beneath buildings. Erosion control shall be provided for all storm drain structures during construction. Water from roof down spouts shall be drained off building site. All storm drain pipe and structures shall comply with the requirements specified in UFGS Section 02630A STORM-DRAINAGE SYSTEM.

### 2.5.3 Hydraulic Design

New storm drain pipes shall be designed for gravity flow during the design storm baseline unless otherwise approved by the Government. The hydraulic grade line shall be calculated for the storm drain system and all energy losses accounted for. Design computations shall adhere to procedures contained in UFC 3-230-17A. Storm drain systems shall be designed to provide a minimum flow velocity of .75 meters per second when the drains are one-third or more full.

### 2.5.4 Area Inlets

Area inlets shall be properly sized and designed to accommodate the design flows. All grates shall be of a "bicycle safe" design.

### 2.5.5 Concrete Pipe

Reinforced concrete pipe shall be a minimum Class III. Type I cement may be used only when sulfates in the soil are 0.1 percent or less and dissolved sulfates in the effluent are 150 ppm or less. Type II cement may be used only when sulfates in the soil are 0.2 percent or less and dissolved sulfates in the effluent are 1,500 ppm or less. Only Type V cement may be used if sulfates in the soil exceed 0.2 percent or dissolved sulfates in the effluent exceed 1,500 ppm. Concrete pipe shall be assumed to have a minimum design service life of 50 years unless the Contractor determines that conditions at the site will reduce the service life. Concrete culverts and storm drains shall be protected by a minimum of 1 meter of cover during construction to prevent damage by heavy construction equipment.

### 2.5.6 Corrugated Metal Pipe

Corrugated Metal Pipe shall not be used.

### 2.5.7 Plastic Pipe

Stiffness of the plastic pipe and soil envelope shall be such that the predicted long-term deflection shall not exceed 7.5 percent. Plastic culverts and storm drains shall be protected by a minimum of 1 meter of cover during construction to prevent damage by heavy construction equipment. Split couplers shall not be allowed for corrugated high-density polyethylene pipe. Plastic pipe shall be assumed to have a minimum design service life of 50 years unless the Contractor determines that conditions at the site will reduce the service life (Then plastic pipe shall not be used).

### 2.5.8 Oil/Water Separators

Oil/water separators shall be utilized for all drains from industrial sites, such as, garages, car washes, and etc. 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.

## 2.6 SOLID WASTE MANAGEMENT AND DISPOSAL

Provide and install collection points for solid waste until it is picked up and removed to the landfill/burn site.

2.6.1 Design and construct 2 collection points for living quarters suitable for solid waste temporary storage areas with a 2 meter high wall and metal roof, enclosure shall have two metal gates in a 2 meter opening. Storage area shall be 4 meters X 5 meters with reinforced concrete slab and CMU or stone walls and metal roof on metal trusses. Eave shall match typical buildings. The Contractor shall prepare design plans showing location of collection points. Indicate locations on site plan. Provide 25 meters from inhabited buildings.

2.6.2 Design and construct 1 collection point suitable for solid waste disposal temporary storage area. with a 2 meter high wall and metal roof on metal trusses. Eave shall match typical building profiles. Enclosure shall have two metal gates in a 2 meter opening. Storage area shall be 4 meters X 5 meters with reinforced concrete slab and CMU with plaster or stone walls. The Contractor shall prepare design plans showing location of collection point adjacent to the DFAC...

## 2.7 FORCE PROTECTION PERIMETER FENCE

All foundations shall extend below the frost line to frost depth (min 800 mm)

2.7.1 Design and construct a Force Protection Perimeter Fence per Scope of Work Section 01010 and RFP. Note: Coordinate the height and the repair of stone masonry wall to match the existing perimeter wall at the site.

2.7.2 Design and construct a Force Protection entry gates heavy steel frame

2.7.3 Entry Control Point (ECP)

2.7.3.1 Position the ECP in front of the entry to the main gate. The entry will have a tire spike gate that can be inserted into the ground across the entry of the ECP. Frontal gate barriers shall consist of reinforced concrete for added blast protection. Each gate shall have a metal control pole gate to prevent unintended access to the compound. A guard post for inspectors and a guard tower for critical observation of the ECP shall be constructed. Provide a search area next to the guard post. Design the frontal entry way to accommodate large long vehicles that may need to access the compound especially if there are turns or curves to negotiate.

- a. The Entry Control Point (ECP) will include a manually operated heavy duty swing steel gate for vehicles and a separate gate for personnel. The separate gate for personnel will have a peep hole to view visitors before opening the gate door. Barb wire will be placed on the top of the gates.
- b. Swing gates shall be a pair of 3.65m wide x 2.4m 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.
- c. Provide a passive arm barrier in back of the gate to stop a 20,000 pound vehicle going at 40MPH.

## 3. ARCHITECTURAL

### 3.1 GENERAL

3.1.1 The Scope of Work is stated in Section 01010. All materials approved shall become standardized material to be used throughout the facilities under contract. Different sub-contractors shall not use different materials or standards under the contract.

3.1.2 Intent of the project is to meet the requirements per the RFP as a useable facility, Codes and Standards, and if possible use locally procured materials and labor to the maximum extent possible.

3.1.3 The site is located on developed land. Reference the site map for the project location.

3.1.4 The Contractor shall survey and produce detailed documentation of the site utilities, buildings, and systems for the entire compound. Contractor shall perform detailed site measurement as needed to verify available printed and electronic documentation. Drawings shall clearly distinguish existing conditions for work performed under this contract. Documentation work shall be performed on computer assisted design and drafting (CADD). New documentation shall be performed on AutoCAD version 2006, conforming to A/E/C Tri Services standards. Units shall be metric. Language for all documents shall be in American English.

### 3.2 DESIGN PRODUCTS

#### 3.2.1 General

The following are contract deliverables which expound upon and finalize the Design parameters/requirements outlined within the contract documents. They shall be prepared in such a fashion that the Prime Contractor is responsible to the Government and not as an internal document between the Prime Contractor and its Sub-Contractors, Vendors, Suppliers, etc.

#### 3.2.2 Design Analysis

The design analysis should be written in the English Language for review by the Government for all buildings and to have indexes, table of contents and each page numbered. Each building shall be listed as indicated in Section 01010. The design analysis is a written explanation of the project design which is expanded and revised (updated) as the design progresses. The design analysis shall contain all explanatory material giving the design rationale for any design decisions which would not be obvious to an engineer reviewing the final drawings and specifications. The design analysis contains the criteria for and the history of the project design, including criteria furnished by the Government, letters, codes, references, conference minutes, and pertinent research. Design calculations, computerized and manual, are included in the design analysis. Narrative descriptions of design solutions are also included. Written material may be illustrated by diagrams and sketches to convey design concepts. Catalog cuts and manufacturer's data for all equipment items required, shall be submitted. Copies of all previous design phase review comments and the actions assigned to them shall be included with each submission of the design analysis. Specific requirements for the design analysis, listed by submittal phase, are contained hereinafter. Provide Code Analysis for each building based on the following items and code sections.

#### 3.2.3 Code Analysis

The following analysis information is required for all buildings submitted in this proposal. List: Seismic Design Category, Wind Speed, and Snow Load.

Analysis Items	Code References – International Building Code (IBC) 2003
1. Type of Construction	IBC Chapter 6
2. Occupancy Classification	IBC Chapter 3 and Table 302.3.2

3. Actual Allowable Area	IBC 503, 505-508 & Table 503
4. Actual Allowable Height	IBC 504 & Table 503
5. Occupant Load (per use)	IBC 1004 & Table 1004.1.2
6. Exits Required/Provided	IBC 1004 & Table 1004.1.2 IBC 1014, 1018, and 1018.2
7. Required Opening Protection	IBC Table 602
8. Fire Resistive Construction	IBC Table 601

### 3.2.4 Design Calculations

When design calculations are voluminous, they shall be bound separately from the narrative part of the design analysis. The design calculations shall be presented in a clean and legible form incorporating a title page and index for each volume. A table of contents, which shall be an index of the indices, shall be furnished when there is more than one volume. The source of loading conditions, supplementary sketches, graphs, formulae, and references shall be identified. Assumptions and conclusions shall be explained. Calculation sheets shall carry the names or initials of the computer and the checker and the dates of calculations and checking. No portion of the calculations shall be computed and checked by the same person. Either the designer or the checker shall be a licensed engineer.

### 3.2.5 Specifications

Specifications shall be prepared in accordance with the Construction Specifications Institute (CSI) format. The Design-Build Contractor prepared specifications shall include as a minimum, all applicable specifications sections referenced by the CSI. Where the CSI does not reference a specification section for specific work to be performed by this contract, the Design-Build Contractor shall be responsible for creating the required specification. All materials specified shall use CSI Standards and shall be listed in Section 1.1 References of each Specification Section. It shall be the Contractor's responsibility to show that equivalency requirements are met if the Standard is not per (CSI) format. Designer shall not edit out any references, standards, etc. relating to any materials used in the project. There shall be a Title page, index page and all sections clearly marked with pages associated within those CSI sections.

### 3.2.6 Ambiguities and indefinite specifications

Ambiguities, indefinite specification requirements (e.g., highest quality, workmanlike manner, as necessary, where appropriate, as directed etc.) and language open to interpretation is unacceptable. Any conflicts between sections 01010 and 01015 about RFP requirements, the more stringent criteria shall be used.

### 3.2.7 Colors

Designer of record shall provide one Color Board comprised of all finishes to be used on project and submit at 65% for approval. Upon approval two Color Boards shall be submitted for record. Color Boards shall be kept at job site for approval of materials used at jobsite.

## 3.3 DEMOLITION

3.3.1 Exterior site clearing is required; site preparation is required.

3.3.2 As all buildings to be constructed under this Contract are new, there maybe minor interior demolition

required.

### 3.4 EXCAVATION AND FILL

3.4.1 Trench excavation shall be made for concrete footings. Trenches shall be a minimum of .8 meter deep or below the frost depth, whichever is greater. Trenches deeper than 1.5 meters shall have protective shoring to protect workers or have the sides of the trench layed back at a slope of 1.5:1.

3.4.2 Care shall be taken when backfilling of foundation trenches to avoid damage to walls.

3.4.2.1 Fill in existing anti-vehicle trench that will be in the new compound area with clean and draining gravel (no rocks larger than 50mm diameter) compacted to 95% proctor density.

3.4.3 Any excess gravel or excavated material shall become the property of the Contractor and shall be removed from the site to a location approved by the Contracting Officer.

### 3.5 CONCRETE

3.5.1 Place 150 mm (6") of crushed stone capillary water barrier below areas to receive a concrete slab on properly compacted soil free of organic material.

3.5.2 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.

3.5.3 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.

3.5.4 See paragraph 4 for structural characteristics of concrete and reinforcing steel for foundations and slabs.

### 3.6 MASONRY

3.6.1 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.

3.6.2 Concrete masonry units (CMU) shall be 20cm x 40cm x 20cm high plastered on each side. They shall be installed in running bond level and plumb. Mortar joints shall be 9mm on all sides between CMU. Install only quality units. All materials of structural (bearing) masonry wall assemblies shall be rated at a minimum of 105 kg/cm<sup>2</sup> (1,500 psi) compressive strength. 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. Local building material can be used instead of CMU block; however, use of local building material still requires meeting seismic building code and mortar mix shall be in accordance with paragraph 4, Structural. **For force protection, all masonry shall be fully grouted, and reinforced to resist the design loads.** Note exterior wall insulation requirements of R 13 per paragraph 3.9.8 of this section.

### 3.7 METAL

3.7.1 Steel roof joists shall be placed according to the roof design and roof manufacturer specifications. Steel purlins shall be installed perpendicular to the steel beams. Use continuous metal roof sheets from ridge to eave to avoid constructing roof seams. In lieu of the continuous metal roof sheets, the Contractor can submit a plan for roofing seams; however, the plan must show details of how leaks will be avoided, and the Contracting Officer before application must approve the plan. Steel "hat channels" shall be

installed on the bottom side of steel beams for the installation of gypsum board with screws. Provide all necessary metal framing for roof fascia, gable, and soffits.

3.7.2 See paragraph 4 for structural characteristics of steel joists.

3.7.3 Galvanized metal window sills, 1mm (20 gauge), shall be installed on the exterior of all windows. The metal window sills shall have a turn down of 5cm 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 window sill a minimum of 2 cm 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.

3.7.4 Roof flashings and Fascia, see 3.9 Roof Construction.

### 3.8 PRE-ENGINEERED METAL BUILDING

Pre-engineered Metal Building if used shall conform to all requirements in Uniform Facility Guide Specification (UFGS) SECTION 13120 PREENGINEERED METAL BUILDINGS

Steel Framing: Steel framing shall conform to American Iron and Steel Institute (AISI), Cold Formed Steel Design Manual, American Institute of Steel Construction (AISC) ASD, Manual of Steel Construction, Allowable Stress Design, and TI 809-07, Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls. Cold-formed framing shall consist of steel studs, top and bottom tracks, runners, horizontal bridging, and other cold-formed members and other accessories. All members and components made of sheet steel shall be hot-dip galvanized in accordance with ASTM A 653/A 653M with a minimum coating thickness of G 60. This framing shall be used only in framing the exterior steel stud wall system. Design metal siding and flashing to overhang CMU wall or concrete 50 cm.

### 3.9 ROOF CONSTRUCTION

3.9.1 If SSMR system is used, roofing system shall include all edge, ridge and penetration flashings necessary for a watertight installation. Provide continuous soffit and ridge vents meeting the venting requirements of the IBC Code on all roofs. Roof slopes shall be continuous to the perimeter of the building, without interior valleys or depressions where ponds can form.

3.9.1.1 Overflow Scuppers shall be provided on all roofs that have interior roof drains designed into the roof plan.

3.9.2 Sloped roofs using SSMR system shall be standing seam metal roofing. Roof slopes shall be 3 in 12 minimum. Roof Panels: Panels shall be 22 – 24 gauge standing seam metal. Roof deck assemblies shall be Class 90 as defined in UL 580. Length of sheet shall be sufficient to cover the entire length of any unbroken roof slope when such slope is 9.000 mm or less. When length of run exceeds 9000 mm and panel splices are provided, each sheet in the run shall extend over three or more supports. Sheets longer than 9.000 mm may be furnished if approved by the Contracting Officer. Width of sheets shall provide not more than 450 mm of coverage in place. SSMRS with roofing panels greater than 300 mm in width shall have standing seams rolled during installation by an electrically driven seaming machine. Height of standing seams shall be not less than 60 mm. All sheets shall be cut in the shop to correspond to the roof slope and may have a horizontal joint at the eave line.

Steel Panels: Zinc-coated steel conforming to ASTM A 446, G 90 coating designation. Panels shall be 22 – 24 gauge.

3.9.3 Performance Standards: The SSMRS shall be tested for wind uplift resistance in accordance with ASTM E 1592. The uplift resistance of the SSMRS shall be established as indicated in the "STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR

PRESSURE DIFFERENCE". The SSMRS design shall be adequate for uplift if the established allowable pressure from testing causes no failure as defined in the Corps of Engineers' STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE. Testing to ultimate capacity is not required.

3.9.4 Accessories: Accessories shall be furnished with the Standing Seam Metal Roof System. Flashing, gutters, fascias, trim; metal closure strips, caps, and similar metal accessories shall be not less than the minimum thickness specified for roofing panels. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride; premolded to match configuration of the covering and shall not absorb or retain water. Thermal spacer blocks and other thermal barriers at concealed clip fasteners shall be as recommended by the manufacturer.

Fasteners: Concealed fasteners for steel roof panels shall be zinc-coated steel, aluminum, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Concealed fasteners for aluminum roof panels shall be aluminum or corrosion resisting steel. Fasteners for structural connections shall provide both tensile and shear strength of not less than 350 kilograms per fastener. Fasteners for accessories shall be the manufacturer's standard.

**Exposed roof fasteners shall not be used or welded to the metal roofing.**

Screws: Screws shall be as recommended by the manufacturer to meet the strength design requirements of the panels.

Bolts: Bolts shall be not less than 6 mm diameter, shouldered or plain shank as required, with locking washers and nuts.

Structural Blind Fasteners: Blind screw-type expandable fasteners shall be not less than 6 mm diameter. Blind rivets shall be .28 mm minimum diameter.

3.9.5 Thermal resistance of insulation shall be not less than the R-30. R-values shall be determined at 75 degrees F in accordance with ASTM C 518. Insulation shall have a flame spread not in excess of 25 and a smoke developed rating not in excess of 50 when tested in accordance with ASTM E 84. Insulation shall be a standard product of a manufacturer, factory-marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Facing shall be white, either of reinforced foil with a vinyl finish or sheet vinyl except unreinforced foil with a natural finish may be used in concealed locations. Insulation shall have a facing providing a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be of 2 mil thick white vinyl backed with 150 mm by 150 mm glass scrim and 0.7 mil thick metal foil laminate. Reinforced foil with a natural finish may be used for facing in concealed locations. Facings and finishes shall be factory applied.

Rigid or Semi-rigid Board Insulation: Rigid board insulation shall conform to ASTM C 612, Form A, Class 1. All foam plastic insulation shall have a thermal barrier per IBC. Insulation shall not be exposed; any covering required shall meet the life expectation for this facility.

Blanket Insulation: Blanket insulation shall conform to FS HH-ISS8, Form B, Type I, Class 6. Insulation shall not be exposed; any covering required shall meet the life expectation for this facility.

Insulation Retainers: Insulation retainers shall be type, size, and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams shall have a fire resistance classification not less than that permitted for the insulation.

**Concealed Anchor Clips:** Concealed anchor clips shall be as recommended by the manufacturer for the roofing system furnished. Clip bases shall have factory punched or drilled holes for attachment. Clips used with panel width greater than 300 mm shall be made from multiple pieces with the allowance for the total thermal movement required to take place within the clip.

**Sealant:** Except as stated below, sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall cure to a rubber like consistency. All sealants shall be the non-hardening type. Roof panel standing seam ribs shall have continuous sealant that is factory installed.

**Gaskets and Insulating Compounds:** Gaskets and insulating compounds shall be non-absorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be non-running after drying.

**Sub-purlins:** Sub-purlins, when required by the system design, shall be formed from steel sheet as standard with the manufacturer. The uncoated thickness may be a minimum of 1.5 mm if bolts or structural blind fasteners are used for attachment of the concealed anchor clips to the sub purlins.

**Vapor Retarder:** Vapor retarder material shall be polyethylene sheeting conforming to the requirements of ASTM D 4397. A fully compatible tape shall be provided which has equal or better water vapor control characteristics than the vapor retarder material. A general-purpose tape, which has some resiliency and cushioning abilities, shall also be provided.

**EPDM Rubber Boots:** Flashing devices around pipe penetrations shall be flexible, one-piece devices molded from weather-resistant EPDM rubber. Rubber boot material shall be as recommended by the manufacturer. The boots shall have base rings made of stainless steel that conform to the contours of the roof panel to form a weather-tight seal.

**Gutters and Downspouts:** Provide eave-mounted gutters on all roof sections over doors and openings, extend gutter 1,200 mm past door opening or walk surface whichever is greater. Provide downspouts for all gutter locations. Roof water shall be channeled away from building thru 22 ga downspouts with cast iron boots (at grade) and slope grade 2 %. Water from downspouts shall not drain onto or across walkways due to winter ice conditions.

Provide roof coverings, roof gutters or roof water diverter's at all exterior door entry ways to keep rain water off of these walking surfaces.

**Warranties:** The SSSMR system shall be warranted as outlined below. Any emergency temporary repairs conducted by the owner shall not negate the warranties. Such warranties shall start upon final acceptance of the work or the date the Government takes possession, whichever is earlier.

**Ventilation:** A minimum of 25 mm of airspace shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than 1/300 of the area of the space ventilated, with 100 percent of the required ventilating area provided by ventilators located in the upper portion of the space.

**3.9.6 Contractor's Weather Tightness Warranty:** The SSSMR system shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including, but not limited to, the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, and skylights; gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within the contract to

provide a weather tight roof system; and items specified in other sections of the specifications that are part of the SSSMR system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified design loads, water leaks and wind uplift damage shall be repaired. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in the Corps Of Engineers Guide Specifications for WARRANTY FOR STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM, and shall start upon final acceptance of the facility. It shall be required that the Contractor provide a separate bond in an amount equal to the installed total roofing system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five-year Contractor's warranty period for the entire SSSMR system as outlined above.

**Manufacturer's Material Warranties:** Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashing, accessories, and trim, fabricated from coil material.

A manufacturer's 2 year material warranty guaranteeing that the aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.

A manufacturer's 20-year exterior material finish warranty on the factory finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight as determined in ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.

A roofing system manufacturer's 20-year system weather tightness warranty.

3.9.7 Sheet Metalwork: Flashing shall be installed in conformance with the SMACNA Architectural Sheet Metal Manual.

3.9.8 Insulation Provide the minimum insulation values as follows:

Metal walls R Value of  $R = 13$  (3.5 m<sup>2</sup>-°K / watt)

Roof R Value of  $R = 30$  (5.3 m<sup>2</sup>-°K / watt)

### 3.9.9 SIGNAGE

**Exterior Signs:** Exterior signage shall be provided so that a person entering the facility would be able to use them to find a given destination. The contracting officer shall approve signage. Exterior signs are to be provided as follows:

**Identification Directory.** Facility Directory shall consist of a permanent header panel with a map of facility indicating location of building or function on site. Each building or function shall be labeled in Pashto and Dari with a building Number. Directory shall be 2000 mm Sq, constructed of a durable material mounted per contracting officer's direction. Provide one inside main entry and at DFAC NO. 1.

Service identification signs are used to identify toilet rooms, janitor and other like services. The standard pictograph symbols shall be used. Service name shall be labeled in Pashto and Dari. The contracting officer shall approve signage.

Building signs shall be readable from 175 meters and shall be labeled in Pashto and Dari with a building Number at top.

Signs: Provide signs that comply with the sign standards provided in TM 5-807-10; "Signage". Contractor shall provide drawings indicating Sign Placement Plan and details of signs.

### 3.10 DOORS and WINDOWS

3.10.1 Provide horizontally sliding aluminum windows in all buildings to fit the masonry openings, with factory baked finish off-white to match doors. All windows shall be double 6mm laminated glazed unless otherwise noted (U.O.N) such as for all guard towers and houses. Windows openings shall be provided with insect screening permanently fixed to the exterior frame u.o.n. 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, 2 top and bottom. Provide weather stripping system for all exterior windows and doors.

3.10.2 Insulation Provide the minimum insulation values as follows:

Exterior Doors R Value of  $R = 4$

Exterior Roll-up Doors R Value of  $R = 11$  Min.

3.10.3 Interior Steel Doors: All Interior doors shall be 44 mm hollow metal 20 gauge steel. Hollow metal frames shall be 18 gauge steel comply with ASTM A-366 cold rolled 3-piece knock down or equal Steel doors, frames, and steel glazing frames shall be painted. Door lites on interior doors shall be sized in accordance with building codes and positioned at a height above finished floor to allow vision on both sides. All doors in corridors shall have 150 mm X 600 mm X 6 mm minimum tempered glass lites 150 mm from door edge at lock side. 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.

3.10.4 Exterior Steel Doors: All exterior doors shall be 44 mm hollow metal 18 gauge steel with rigid foam core insulation. Hollow metal frames shall be 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. Door glass on guard houses and towers shall use 16mm plexiglass or lexan.

3.10.5 Toilet Compartment Door: Provide a durable non wood water/rust proof door and frame in all Toilet Compartments that will not rust or delaminate for life of building. Install bottom of door and frame 100 mm off above finish floor. Provide a standard toilet compartment latch. Provide robe hooks to all these doors.

3.10.6 Overhead Rollup Door: Provide all steel overhead roll up doors at all locations per RFP. Roll-up doors shall be 20-gauge galvanized steel, Standard springs 25,000 cycles, Styles 16-gauge min, Weather-stripping bottom and jambs, Chain hoist operator, and heavy duty hasp at each door with padlock keyed to a master key system.

3.10.7 Metal Doors and frames shall be used throughout the entire project.

### 3.11 WEATHERPROOFING

3.11.1 Caulk all joints between masonry/stucco and metal window and doorframes and metal sills and metal window frames to prevent the passage of wind and water. Material shall be a 100% silicone, white or clear, applied with a caulking gun, if painting is not required. Where caulk is to be painted, siliconized acrylic or siliconized acrylic latex shall be used. Surfaces must be clean, dry, and free of dirt. Caulking

bead should be 6mm. Smooth to produce a concave fillet between the adjoining 90-degree angle surfaces. Allow to cure 2-4 days before painting.

3.12 HARDWARE. All finish hardware in this building shall be consistent throughout and shall be a brushed stainless steel # 4 or satin-chrome finish.

3.12.1 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; antifriction 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.

3.12.2 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. Closers: Closers shall be provided on all exterior doors and fire-rated doors. Closers shall conform to ANSI/BHMA A156.4, Grade 1. Closers shall be surface-mounted, modern type, with cover.

3.12.3 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.

3.12.4 All hardware required for exiting, etc. shall be per Codes for exiting and shall comply with ANSI/BHMA and finishes shall match hardware specified above.

3.12.5 Kick Plates and Mop Plates: Metal Kick plates or mop plates shall be provided on all wood doors if used. Match metal finish with door hardware finish as specified in this section. Kick plates and mop plates shall comply with ANSI/BHMA A156.6, shall be 400 mm high by 50 mm less than width of door. Edges shall be beveled.

3.12.6 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.

#### 3.12.7 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

### 3.13 FINISHES

3.13.1 EXTERIOR of all new buildings shall be painted.

### 3.13.2 INTERIOR WALLS

3.13.2.1 Buildings shall be plaster applied in a similar manner as exterior stucco with smooth finish and paint with 2 coats of semi-gloss off-white with less than .06% lead by weight.

3.13.2.2 Walls in wet areas shall be tiled with 150mm x 150mm glazed ceramic tile up to 1.8 meters above the floor to include interior of toilet stalls, showers and behind sinks. Joints shall be 2-3mm. Waterproof gray grout shall be applied full depth of the tile. Grout shall cure for 72 hours and then be sealed with a commercial grout sealant in two coats. Color of tile shall be selected by the Contracting Officer from samples provided by the Contractor.

### 3.13.3 CEILINGS

3.13.3.1 New Ceilings of all buildings shall be plastered and painted with 2 coats of flat white, with less than .06% lead by weight. Gypsum board may be used in lieu of plaster but framing supports for Gypsum board shall be as follows: For ½" thick gypsum board structural fastener supports shall be not further apart than 40 cm. If gypsum board is thicker, follow guidelines in ASTM C 840 for supports and fastener frequency.

3.13.3.2 Ceilings of Dining Facility shall be painted with 2 coats of gloss white, with less than .06% lead by weight.

3.13.4 Paint all doors and frames with 2 coats of semi-gloss enamel, off white.

3.13.5 The abluion drain areas shall be recessed below the floor level 200 mm and lined with ceramic tile. Ceramic tile shall extend up the wall past the water spigots to a height of 1.8 m above finished floor. Seats shall be formed concrete with terrazzo tile finish to match the floor, 300 mm x 300 mm x 300 mm high finished dimensions. Color of ceramic tile shall be selected by the Contracting Officer from samples provided by the Contractor. Spacing between tiles shall be similar to terrazzo tile.

### 3.13.6 FLOORS

3.12.6.1 Shall be ceramic tile with thin set mortar or high quality in-place terrazzo with copper divider. For ceramic tile, the Joints shall be 2-3mm. Waterproof tan grout shall be applied the full depth of the tile. Floors shall slope to floor drains. Color of tile shall be selected by the Contracting Officer from samples provided by the Contractor.

3.12.6.2 All floors in utility rooms, storage rooms, warehouses, garages, and utility buildings shall be completely cleaned and smoothed and the concrete surface coated with a gray-colored concrete sealer.

3.12.6.3 All other floors in Storage buildings and maintenance rooms, shall be completely cleaned and the concrete painted with an epoxy floor paint formulated for that application. Color to be selected by the Contracting Officer from samples provided by the Contractor.

3.13.6.4 Kitchen Facility shall be covered with slip-resistant flooring. Walls in kitchen shall be ceramic tile up to 1.8 meters above finished floor.

3.13.7 Provide and install propane burning cooking stoves in DFAC. Stove is to be site built of masonry and faced with thermal resistant quarry tiles color to match flooring. Provide 1cm steel cooking top as described in paragraph 3.7.4. See Appendix J for propane design guidance. Ceiling and roof shall be not less than 3.3 M high with openable windows and an exhaust fan for the room.

3.13.8 Provide one full length Dish Table with in DFAC for food distribution per Appendix-B : 1.9mm (14 gauge) stainless steel dish table. Provide 2cm rolled front rim on 3cm high drip guard on front and sides.

Provide 25cm high rear splash.

3.13.9 Provide one large Pot stainless steel sinks one (1) Meter Square each and ½ Meter deep for oversized pots and pans with the same material specifications as the dish tables. Provide two (2) two-compartment sinks with drain boards on both sides and one (1) three-compartment sink with same material specified here.

3.13.10 Provide four (4) Stainless Steel Worktables in DFAC: Provide 14 gauge stainless steel worktables. Front and rear to have bull nose edges with square ends. Legs are 3cm diameter, 16-gauge stainless steel with adjustable feet. Provide shelf under table. Tables are 1500 mm x 500 mm.

3.13.11 Provide stainless steel open slotted shelves, 1.9mm (14 gauge). Each set of shelves is 100cm wide x 50cm deep x 1.8m high, 4 tier, with 3cm diameter adjustable stainless steel legs. Shelves are adjustable. Provide 8 of the sets with lockable 12.5cm diameter swivel rolling casters. Provide 20 each in DFAC.

3.13.12 Contractor shall provide the Contracting Officer shop drawings for approval with one minimum size of 5 m2 walk-in refrigerator and one minimum size of 5 m2 walk-in cooler and to include proposed manufacturer, construction details.

3.13.12 Not used

3.13.14 Refrigeration piping shall be annealed or hard drawn seamless copper tubing in conformance with ASTM B280. Refrigeration systems shall be remote type. Provide security fence or wall to protect outside refrigeration units.

3.13.15 Electrical characteristics shall match local power 400v/3ph/50Hz and 220v/1ph/50Hz.

3.13.16 Preservation and packing shall be commercial grade.

3.13.17 Provide a recording thermometer and temperature alarm with connector to temperature alarm.

3.13.18 Provide outdoor condensing unit cover and security fence or wall to protect outside units. Provide condensing unit outdoors controls for operation down to –18 degrees C ambient temperature.

3.13.19 Refrigeration Equipment: Refrigeration equipment shall be designed for remote installation. Design units for 16 to 18 hour operation at the indicated interior temperature in –18 degree C ambient temperature. Capacities, air delivery, and dimensions shall be as indicated. Remote condensing units shall be factory fabricated and rated in accordance with UL303 and ARI 365. Provide with motor, air-cooled condenser, receiver, compressors, mounted on a common base. Compressors shall be hermetic type. Evaporators shall be factory fabricated and rated in accordance with UL 412 and ARI 420. Forced convection, unit cooler type, made to suspend from the ceiling panels, with forced air discharged parallel to the ceiling. Provide with air-circulating motor, multi-fin tube-type coil and grille assembled within a protective housing. Air circulation motors shall be lifetime sealed, and the entire unit-cooler assembly shall be accessible for cleaning. Provide a drip pan and drain connection. When the cold storage room is used for freezing, provide an automatic electric heat defrosting system. Provide a timer type defrost controllers.

3.13.20 Provide condensate drains lines and drains below freezer floors with electric heating cable, thermostatically controlled to maintain 10 degrees C at zero flow rate. Cable shall be sized in accordance with manufacturer's recommendations.

3.13.21 Submit a copy of installation instructions to the Contracting Officer covering both assembly and installation of the refrigeration equipment prior to start of work. Start up and initially operate the systems upon completion of the installation of the equipment and refrigerant piping. Adjust the safety and

automatic controls to place them in operating sequence. Record manufacturer's recommended readings hourly. Operational test shall cover a period of not less than 24 hours. Upon completion of Operational test the systems shall be performance tested. Test duration shall not be less than 8 hours. Test shall include the following information to be in the report with conclusions regarding the adequacy of the systems:

Time, dates and duration of tests:

- Inside dry-bulb and wet-bulb temperatures maintained in each room during the tests employing recording instruments calibrated before the tests.
- Outside dry-bulb and wet-bulb temperatures obtained from recording instruments calibrated and checked hourly with a sling psychrometer.
- Evaporator and condenser entering and leaving temperatures taken hourly with the compressors in operation.
- The make, model, and capacity of each evaporator and condensing unit.
- Voltmeter and ammeter readings for condensing units and evaporators.

3.13.22 Provide chart showing the layout of the refrigeration systems, including piping, valves, wiring, and control mechanisms. Submit printed instructions covering the maintenance and operation of refrigeration equipment. Tag shutoff valves in accordance with the instructions. Provide any special tools necessary for repair and maintenance of the systems.

3.13.23 Remove any packing material. Wash and clean floors, walls, ceilings and equipment inside of cool rooms. Wash and clean exposed surfaces on outside.

### 3.14 SPECIALTIES

3.14.1 Mirrors, .6m x .9m, 6mm plate glass, shall be mounted above all lavatories. Mount bottom of mirrors 1.1m above finished floor and to have a stainless steel shelf below the mirror.

3.14.2 Toilet paper holders, stainless steel, shall be installed in all Toilet stalls. Toilet paper holders, stainless steel, shall be installed approximately 20 cm above floor.

3.14.2.1 Robe Hooks shall be provided and installed in all toilet and shower stalls.

3.14.4 Shower curtain rods, stainless steel, heavy duty, 18 gauge shall be mounted between the screens walls of each shower stall. Mount rod at 2 meters above finished floor. Provide a shower curtain with support rings for each shower stall.

### 3.15 DESIGN-BUILD GUIDANCE

3.15.1 It is the intent of these RFP notes to cover the major items and leave many of the details to be completed by the contractor's designer. Under the design-build concept, the responsibility to identify these details is that of the contractor and not the Government. Note the contractor will be evaluated for his performance on how well these details are handled for future government work.

While all facilities under this Contract are design-build, several buildings will be required under this Contract for which there are minimal conceptual drawings provided. These will be design-build buildings based on requirements developed for site utilities by the Contractor.

3.15.2 Water Treatment plant is to be pre-engineered package.

### 3.15.3 Sewage Aerated Stabilization Pond

This aerated stabilization pond is envisioned to be located on the lower elevation of the site. The discharge shall be into a holding pond with subsequent drainage to an adjacent wadi/dry creek bed. See paragraph 2. CIVIL for further details.

## 3.16 SIGNAGE

3.16.1 Exterior Signs: Exterior signage shall be provided so that a person entering the facility would be able to use them to find a given destination. The Contracting Officer shall approve signage. Exterior signs are to be provided as follows:

3.16.2 Identification Directory. Facility Directory shall consist of a permanent header panel with a map of facility indicating location of building or function on site. Each building or function shall be labeled in Pashto and Dari with a building number. Directory shall be 2,000 mm sq, constructed of a durable material mounted per Contracting Officer's direction. Provide one inside main entry and at DFAC.

3.16.3 Service identification signs are used to identify toilet rooms and other like services. The standard pictograph symbols shall be used. Service name shall be labeled in Pashto and Dari. The Contracting Officer shall approve signage.

3.16.4 Building signs shall be readable from 175 meters and shall be labeled in Pashto and Dari with a building number at top.

3.16.5 Signs: Provide signs that comply with the sign standards provided in TM 5-807-10; "Signage". Contractor shall provide drawings indicating Sign Placement Plan and details of signs.

## 4.0 STRUCTURAL

### 4.1 GENERAL

Most of the facilities will be single-story construction. The single-story buildings will be constructed using CMU (concrete masonry units) load bearing walls with steel beams supporting the roofing system (except recommended as 3-D Building System or equivalent). Several new facilities could be constructed using pre-engineered metal building systems with metal roof deck and siding and with reinforced CMU exterior masonry walls. The ground floor slab shall be minimum 150 mm thick. Slab shall be placed on clean vapor barrier over 150 mm thick capillary water barrier on compacted soil.

### 4.2 DESIGN LOADS

The facilities shall be designed by using service gravity loads and considering basic combinations of appropriate service loads, wind and seismic.

4.2.1 Basic wind speed, using 3-second gust, of 135 Km/h (85 mph).

#### 4.2.2 Seismic Loads

The computations of seismic loads shall be based on UFC 3-310-01, Structural load Data, 25 May 2005, using Spectral Ordinates  $S_S = 1.28g$  &  $S_1 = 0.51g$ .

### 4.3 CRACK CONTROL

The work shall include crack control measures to minimize cracks in slab-on-grade, concrete

construction, such as crack control joints, expansion joints and isolation joints, as necessary. Expansion joints shall be determined and shown on the drawings.

#### 4.4 FORCE PROTECTION

All required force protection/anti-terrorism where required shall be followed and incorporated into this project in accordance with CENTCOM AT/FP regulations or DOD Regulation UFC-4-010-01, 31 Jul 2002, whichever is more stringent. Information on force protection can be found at [www.tisp.org/files/pdf/dodstandards.pdf](http://www.tisp.org/files/pdf/dodstandards.pdf).

#### 4.5 DESIGN CRITERIA

The Contractor shall be familiar with codes/standards. the use of American codes/standards, etc., to include but not be limited to:

Structural Design Criteria	IBC 2003
Concrete	American Conc. Institute (ACI) 318-99
Structural Steel	AISC MANUAL, 9 <sup>th</sup> Edition
Masonry	Technical Manual, TM5-809-3 (working stress)
Seismic	UFC 3-310-01, Structural Load Data, 25 May 2005.

#### 4.6 MATERIALS

The followings are few typical American Standards. The Contractor should use these standards to provide sound structural. The Contractor shall follow American Concrete Institute Standards for design and installation of all concrete structures.

Concrete	210 kg./sq.cm cylinder strength @ 28 days.
Steel Reinforcing	4218.0 kg./sq.cm (Fy= 60.0 ksi), yield strength.
Welded Wire Fabric	ASTM A185
Anchor Bolts	ASTM A307 using A36 steel.
Concrete Masonry Units	ASTM C90, Type I (normal wt, moisture Cntrl). 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). Joint Reinforcements: Standard 9 gauge minimum Ladder Type
Structural Steel.	ASTM A36: 2530.0 kg./sq.cm (Fy = 36,000psi) Welding: AWS (American Welding Society) D1.1-2002.

#### 4.7 FOUNDATIONS

The foundations, and stem walls shall be constructed by using reinforced concrete materials. The foundations shall be strip-footing type for continuous walls and spread type for individual column footings and shall be reinforced as required per design. Minimum strip footing width shall be 80cm and minimum depth shall be 80cm to meet frost requirement. The allowable bearing pressure shall be determined by the Contractor and be put in accordance with the Contractor's Geotechnical Investigation.

#### 5. GEOTECHNICAL

## 5.1 Site Specific Information.

Site specific geotechnical information necessary to design and construct the foundations, pavements and other geotechnically related items contained in this project shall be the Contractor's responsibility. The Contractor shall determine all necessary geotechnical conditions by appropriate field and laboratory investigations and supporting calculations.

## 5.2 Geotechnical Report.

The Contractor shall produce a detailed geotechnical report containing field exploration and testing results, laboratory testing results, evaluations, recommendations, calculations and descriptive supporting text. Information in the report shall include, but not limited to: existing geotechnical (e.g. surface and subsurface) conditions, location of subsurface exploration logs, exploration point, foundations selected, bearing capacity, pavement design criteria (e.g. CBR values, K values), ground-water levels, and construction materials (e.g. concrete cement, asphalt, and aggregates). Two copies of the detailed geotechnical report shall be submitted to the Contracting Officer.

## 5.3 Geotechnical 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.

## 5.4 Design Certification.

The Contractor shall certify in writing that the design of the project has been developed consistent with the site-specific geotechnical conditions. The certification shall be stamped by the geotechnical engineer of the geotechnical firm and shall be submitted with the final design.

# 1. MECHANICAL

## 1.1 GENERAL

The work covered by this section consists of design, supply, fabrication and installation of new building heating, ventilation and air-conditioning (HVAC) systems. It also includes the delivery to site, erection, setting to work, adjusting, testing, balancing and handing over in perfect operating and running condition all of the HVAC equipment including all necessary associated mechanical works.

## 1.2 SPECIALIST SUB-CONTRACTORS QUALIFICATIONS

The heating, ventilation, and air-conditioning works shall be executed by an air-conditioning specialist experienced in the design and construction of indirect and direct evaporative cooling systems and knowledge in fabricating specialized units consisting of supplemental direct expansion (DX) cooling coils in satisfying the specified indoor design conditions. The HVAC design shall be prepared using recognized HVAC load analysis programs such as Trane "Trace" or Carrier "HAP". The HVAC specialist shall submit the complete HVAC analysis at the 65% design submittal. The HVAC analysis shall clearly state what type of systems are to be used and how the system will satisfy the specified indoor design conditions. Provide related psychrometric charts showing the air wet bulb and dry bulb temperatures at each section of the heat/cool unit.

Provide complete, edited specifications using the UFGS specs for evaporative cooling. The edited specifications shall be submitted along with the 65% design submittal. The specifications shall be coordinated with the manufacturer of the evaporative cool/heat units.

## 1.3 CODES, STANDARDS AND REGULATIONS

The equipment, materials and works covered under the heating, ventilation and air-conditioning services shall conform to the referenced standards, codes and regulations where applicable except where otherwise mentioned under each particular clause.

#### 1.4 DESIGN CONDITIONS

##### 6.4.1 Outside Design Conditions

**Contractor shall verify the ambient conditions with available and reliable local weather data.**

[Latitude – (approx.) 34 deg. North

Longitude – (approx.) 70 deg. East

Elevation – (approx.) 565 M (1853 ft.)

Summer – 40.5 deg C (105 deg F) Dry Bulb (DB) [& 19.4 deg C (67 deg F)] Wet Bulb (WB)]

Winter – (2.2 deg C/36 deg F)

Daily Range – data unknown]

##### 6.4.2 INDOOR DESIGN CONDITION

Barracks	Cooling maximum 27.8 C (82 F), Heating 20 C (68 F)
Administrative buildings	Cooling 25.6 C (78 F), Heating 20 C ( 68 F )
DFAC	Cooling 25.6 C (78 F), Heating 20 C ( 68 F )
Bathroom/Shower bldgs	Cooling maximum 30 C (85F), Heating 20 C (68 F )
Maintenance facilities	Cooling maximum 30 C (85F), Heating 12.7 C (55 F )
Warehouses	Cooling maximum 30 C (85F), Heating 12.7 C (55 F )
Workshops	Cooling maximum 30 C (85F), Heating 12.7 C (55 F )

##### 6.4.2 NOISE LEVEL

Noise levels inside occupied spaces generated by HVAC systems shall not exceed NC 35

##### 6.4.3 INTERNAL LOADS

- a. Occupancy: Use ASHRAE standards to calculate sensible and latent heat from people
- b. Lighting (Fluor.): 21.5 W/m<sup>2</sup> (2 W/Ft<sup>2</sup>) maximum (however lighting levels shall meet minimum requirements)
- c. Outdoor Air: 34 CMH/Person (20 CFM) or “51 CMH/bedroom (30 CFM/bedroom)”; Latrine – 85 CMH/WC or Urinal (50 CFM) exhaust.
- d. Building Pressurization: 1.3 mm W.G. (0.05 in W.G.); Maintain negative pressure in latrine areas

##### 6.4.4 THERMAL PERFORMANCE

Assemblies shall meet the requirements of TI-800, Design Criteria, UFC 3-400-01 Design: Energy Conservation, and ASHRAE Standard 90.1, latest editions, but shall meet the following minimum requirements:

Assembly	Minimum Thermal Value
exterior walls (above grade)	RSI 3.52 (R 20)
ceilings/roof	RSI 5.28 (R 30)
basement wall	
floor	RSI 5.28 (R 30)

(over unheated space)

exterior doors	RSI 0.25 (R 1.43)
exterior windows/ (glazing within doors)	RSI 0.308(R 1.75)
Skylights	RSI 0.18 (R 1.02)

## 6.5 NEW AIR CONDITIONING EQUIPMENT

Heating/Refrigeration Equipment:

Environmental control of the facilities shall be achieved by HVAC equipment as listed below and approved by the U.S. Government. Unless otherwise noted, the Contractor may choose any combination of equipment to achieve the inside design conditions specified for the floor plans.

(Note: The heating module is an optional item in this contract. However, the evap heat/cool unit shall be provided with space in the unit to retrofit the heating module if the option is exercised.)

Facility Type	Cooling	Heating	Type of HVAC System	Remarks
Barracks	82 F	68 F	Evap Cooling/ diesel fired burner	Heating is optional
Bathroom/Shower	82 F	68 F	Evap Cooling/ diesel fired burner	Heating is optional
DFAC	78 F	68 F	Evap Cooling & DX cooling coil/ diesel fired burner	Heating is optional

## 6.6 EVAPORATIVE COOLING/HEATING UNITS

This is a package unit, consisting of modules: indirect evaporative unit, direct evaporative unit, DX cooling coil, and heater fitted with a diesel atomized burner; intake hood, blower with dampers & filters, all mounted on a steel chassis with a double-wall 500 liter fuel tank mounted underneath. The supplemental DX cooling coil module shall be installed with the direct or indirect evaporative cooling module to maintain spaces requiring 78 F indoor conditions. Evaporative units without the supplemental DX cooling coils qualify for facilities such as bathroom/shower buildings, maintenance facilities and general spaces which do not require the stringent 78 F indoor conditions. The Heat-Cool Unit has supply and return insulated air ducts to connect to the building duct system. Evaporative cooling (swamp-cooler) cooling efficiency shall be 82% for direct type and 65% for indirect type and the heating efficiency shall be 80%. The diesel burner shall conform to UL 296, and the heater shall be suitable for Type I (duct system, UL 727) or Type II (direct diffusion, UL 731). The Heat-Cool Unit shall be suitable for outdoor mounting on a concrete slab.

The evaporative cooling unit may consist of a combination of indirect evaporator module, direct evaporator module and/or direct expansion (DX) cooling coil module to satisfy the specified indoor conditions. The HVAC specialist shall prepare a detailed analysis and determine the best combination of the modules with the lowest operating cost.

The Heat-Cool Unit shall be installed exterior to the building, with sheet-metal ducts of calculated size to evenly distribute the heated/cooled air to all conditioned parts of the building. For small rooms, flexible

metal branch ducts may be used from the central duct system. Flexible ducts must be limited to 3 meters in length. Exterior ducts shall be insulated, interior ducts generally will not be insulated. Duct air velocity shall be between 3.0 and 6.0 m/s. Minimum galvanized duct sheet-metal thickness shall be 0.85 mm (22g). Duct sheet-metal quality shall be according to SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) manual for air conditions ducts. Supply and return ducts shall be provided for each room and space. If a direct evaporative unit can satisfy the specified indoor conditions, then all the air can be discharged through the building openings.

Water for the evaporative coolers shall be taken from the nearest water main or building Service line. Water supply for the evaporative coolers shall not tie into a small branch line such that it affects the water supply to the fixtures on that line. The Contractor shall field verify the water distribution system for the facility and recommend the most appropriate line to tie into.

Contractor shall procure and install duct-work to supply warm/cool air to all areas of each building which are retrofitted under this Contract. Example of duct-work is shown on Dwg. "ANA HEAT-COOL DUCTS-01". Contractor shall specifically design the duct-work to meet the requirements of each individual building (site adapt). Air ducts shall conform to Paragraph 3.4.2.

The contractor shall be responsible for all the materials, equipment, labor and supplies to design and construct an underground piping/fuel delivery system for the diesel fired heating units. The system shall incorporate all necessary pumps, valves, manifolds and valve chambers as required by the approved design. Fuel oil piping shall be doubled walled with leak detection and alarm system. The fuel oil piping system shall incorporate tamper proof features such as alarm systems and fuel pump shut out features in the event the fuel lines are breached.

The contractor shall be responsible for ensuring the pipes are placed in excavated trenches with proper bedding material and thrust blocks. Bedding material shall be select granular material as required by the approved design. All trenches shall be backfilled in lifts not to exceed 30 cm and compacted to a minimum of 90% compaction ratio. All trenches traversing existing concrete or asphalt roads shall be saw cut, excavated and repaired to their original conditions using only approved materials as predicated by design. The contractor shall restore all drainage structures, ditching or wadi crossings disturbed during the construction to their original conditions.

The contractor shall be responsible for the design and installation of all modifications to the existing fuel tank farm. The existing tank farm shall be utilized as the fuel storage and source. These modifications shall include a manifold system; isolation valves; water separators/filters; metering equipment (pressure and discharge quantity) and pressurized fuel delivery system, compatible with the designed diesel fired heating units as per the intended design.

This system shall contain adequate shut off valves, pipes, and pumps to allow isolation and continued operations and insure that repairs can be performed without disruption to the entire base in the event that maintenance is required. All below grade valve chambers shall be constructed with reinforced concrete and steel lids.

The contractor shall insure that there is adequate redundancy in the manifold/pumping system to allow for redundant pump(s) to insure that the system is pressurized at all times and fuel available. All pipes above ground shall be fully insulated to prevent freezing. All below grade pipes shall be installed at the minimum depth to ensure they are below the frost line. These depths may vary from project site. It shall be the contractor's responsibility to determine this minimum depth to prevent freezing at their respective sites.

The contractor shall be responsible for designing, supplying and installing all electrical components necessary to make the system operational. These shall include but are not limited to pumps, wiring, disconnects, etc and shall be the contractor's responsibility.

Main power supply and panel connections are available near the fuel tank farm. The contractor shall be responsible for all work, including the final tie in at the generator plant. The contractor shall be responsible for proper coordination with the Operations and Maintenance Contractor to ensure that the tie-ins at the power plant are completed as required to make the system operational.

6.6.1 Temperature control for heating shall be by a thermostat which can modulate the diesel burner rate (including turning the burner on/off) and/or starting/stopping the blower. Temperature control for cooling shall be by turning on/off the evaporative-cooler water-pump and/or starting/stopping the blower. Temperature controls shall be securely mounted to the building surface and protected from any abuse and damage.

#### 6.6.2 Unitary (ductless split) Heat Pump Units

Ductless split units shall be unitary in design and factory manufactured ready for installation. Heat pump units shall provide cooling during summer and heating during winter. Evaporator unit shall consist of a DX evaporator cooling coil, blower, supplemental electric heater elements and washable filter all mounted in a housing finished for exposed installation. Cooling coil condensate piping shall route to and discharge to the sanitary sewer system. The condensing unit will contain compressor, condenser coil, and all internal controls/fittings complete to include a weatherized housing. Outdoor condensing unit shall be mounted on steel supports or on a concrete pad. Copper refrigerant suction and liquid piping shall be sized, insulated and installed in accordance to unit manufacture recommendations. Unit temperature control shall include wall mounted adjustable thermostat, blower on-off-auto switch and heating-cooling change over control.

#### 6.6.3 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.

#### 6.6.4 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.

#### 6.6.5 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.

### 6.7 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.

### **6.7.1 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; 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.

### **6.8 TEST ON COMPLETION**

6.8.1 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.

6.8.2 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

### **6.9 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.

## **6.10 CEILING FANS**

### **6.10.1 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.

### **6.10.2 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.

### **6.10.3 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; drawings indicating location and installation details.

## **6.11 PROPANE COOKING STOVE**

Cooking area shall be provided canopy type exhaust only kitchen hoods and associated exhaust fans. These exhaust hoods shall include baffle type aluminum filters to trap grease/oil. The exhaust fan sizing calculations should recognize the use of propane stoves in the kitchen. Sizing should accommodate all propane burning stoves running simultaneously. Additionally, the placement of the exhaust hood should allow enough clearance for an average sized male to stand on top of the stove platform unobstructed, for standing on the stove is common local cooking practice. The higher than average placement of the hood will require the extension of the lip of the hood out further than normal, in order to catch the majority of the smoke and adequately vent the area. Propane tank shall be located out the DFAC covered in the fenced storage yard

New propane stoves shall be installed with consideration to ease of cooking operation and daily cleanup. The new propane stoves shall be set into a formed concrete opening such that it can easily be removed for replacement, maintenance and cleaning.

Each propane stove shall be provided with three burners. The propane stoves shall be of commercial quality and be capable of producing the highest BTU heat output with all three burners on. The center burner is low heat, center and middle burner is medium heat and all three burners is high heat. A shut off valve for each burner shall be provided at the face of the propane appliance.

Piping from the propane tanks to the respective propane stoves shall be wrought iron, ASTM B36.10M or steel (black or galvanized), ASTM A53. The steel piping shall terminate in front of the propane stoves with a shut off valve and quick disconnect nipple. A stainless steel flexible hose shall connect from the propane stove to the steel piping. Each end of the flexible hose shall be provided with quick disconnect fittings.

The propane piping shall not be embedded in the concrete floor. Installation of the propane piping in concrete trenches is highly recommended. The piping may be surface mounted provided that it is not susceptible to damage or causes any safety hazards.

Piping passing through the exterior wall shall be provided with pipe sleeves.

6.11.1 Propane Fuel Storage/Distribution. Propane Storage and Distribution shall be provided to support operation of the propane stoves for cooking and boiling tea. The bulk storage of fuels shall consist of above-ground horizontal steel tanks sized to store a 30-day supply of fuel. These tanks shall be complete with fill fittings, tank gauge, vent, and other fittings and appurtenances required for full and safe operation. Tanks shall be provided with support saddles, platform/stair and concrete pad.. Bulk storage capacity shall be based on minimum four-week full load operation of the kitchen. Metal fuel tank saddles should not be placed directly on fuel containment area slabs. They should be elevated on piers to avoid moisture corrosion. Propane storage tanks shall be provided and installed in accordance with NFPA 58. The propane storage tanks shall be installed on a concrete pad, and provided within an enclosure to protect the tanks from the elements. The Contractor shall coordinate with the User and the Contracting officer in determining the capacity of propane fuel required. The propane fuel capacity shall be based on frequency of cooking, consumption of fuel every cooking cycle, frequency and availability of replacement fuel tanks and spare capacity. This project will require that the Contractor provide the agreed to amount of fuel tanks filled with propane fuel at time of completion.

Provide chain link fence and gates around entire propane storage facility. Fence shall match perimeter Force protection fence with lockable gates, and concertina wire etc. Provide fuel filling system for unloading fuel from fuel tanker into individual bulk storage tanks comprising of truck pad(s), duplex fuel transfer pumps, piping manifold and valves as required for a complete system.

## 7. PLUMBING

### 7.1 SCOPE OF WORK.

#### 7.1.1 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.

#### 7.1.2 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.

### 7.1.3 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.

## 7.2 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

## 7.3 PLUMBING SYSTEMS REQUIREMENTS

### 7.3.1 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.

### 7.3.2 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.

### 7.3.3 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.

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. Emergency Shower and Eye Wash Assembly. Provide emergency shower and or eye wash assembly in Power Plant and in other facilities where appropriate. Provide a floor drain in the area, if appropriate (where emergency water flowing on the floor may lead to additional safety or operational complications).

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

g. 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.

h. Ablution Trench. See building floor plans for size and construction of trench and number of stations. Provide trench drain with brass grating and strainer. Provide each station with hot and cold water valves with manual mixing. Faucet handles shall be copper alloy.

i. Grease Interceptor . Steel construction, manual cleaning type with removable checker-plate cover, complete with flow control valve. Tested and rated in accordance with PDI G-101. Concrete shall have 21 MPa (3045 psi) minimum compressive strength in 28 days. Kitchen use only.

j. 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.

k. 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.

l. Floor Trench : Floor trench shall be concrete construction with a cast iron grate. The cast iron grate shall be sectionalized and hinged so that it can easily be opened to clean out the trench. The floor trench shall be provided with perforated aluminum pan inserts which can be removed to clean out large food particles. The floor trench drain shall be an adjustable perforated or slotted chromium plated bronze, nickel-bronze, or nickel brass strainer consisting of a grate and threaded collar. This style of floor trench shall be installed in the kitchen area of the DFACs in response to kitchen cleaning practices of the local national staff.

m. 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.

n. Drinking Water Fountain: Non-refrigerated with enamel cast iron or corrosion resistant bowl with brass fittings and faucets.

o. 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.

p. Large Pot sink, provide clean-up spray nozzle with hose assembly.

#### 7.3.4 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.

#### 7.3.5 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.

### 7.4 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.

**7.5 SPECIAL PLUMBING SYSTEMS.** Contractor shall design and construct compressor air storage and distribution, waste-oil collection and storage, fuel-oil storage and distribution other plumbing systems that are required for full performance of equipment and operations and for maintenance in the Power Plant and Vehicle Maintenance facilities. These systems shall be designed and built in accordance with codes and publications referenced herein before and in compliance with equipment manufacturer recommendations.

**7.5.1 Compressed Air Systems.** Compressed air shall be provided using a packaged air-cooled electric motor driven compressor and ASME rated receiver with air cooler and moisture separator to remove moisture and oil. Compressed air system shall be capable of operation up to 200 psig maximum for 125 psig normal units. High-pressure system (above 200 psig) shall be provided to supply compressed air to equipment where required. Provide an engine driven air compressor where needed for operation during electrical power outages. The air distribution system shall be provided with necessary regulator valves to maintain desired pressure. Where required, line filters, lubricators, and/or hose reels shall be provided. Compressed air piping shall be black steel pipe and painted to match wall color. Noise level of air compressor should not exceed acceptable db limits.

**7.5.2 Waste or hazardous drainage from battery repair/charging areas** shall be treated prior to entering the base general waste drainage system. Hazardous waste drainage piping shall be acid resistant. Smaller battery rooms shall have waste treatment available using an acid neutralizing tank. Waste oil storage tanks shall be provided for collection of waste oil in the power plant and vehicle maintenance facilities. Waste oil storage tank shall be underground double-wall fiberglass or double-wall steel. Provisions should be made in the design of the underground storage tank that enable manual detection of leaks, prevent overfilling, facilitate liquid level detection, and allow for vapor release.

**7.5.3 Drainage from maintenance areas, fueling areas, POL areas, etc.,** shall be treated prior to entering the base general waste drainage system. Treatment shall consist of sand and oil separators as required by facility function. Buried oil storage tanks shall be provided where required.

**7.5.4 Generator Fuel Storage/Distribution.** Fuel Oil Storage and Distribution shall be provided to support operation of diesel engine generators at the Power Plant, emergency generators and other locations. The bulk storage of fuels shall consist of above-ground horizontal steel tanks sized to store a 28-day supply of fuel, with containment dikes. These tanks shall be complete with fill tube and cap, suction tube, tank gauge, vent, and other fittings and appurtenances required for full and safe operation. Tanks shall be provided with support saddles, platform/stair and concrete pad. Fuel shall be transferred from the bulk storage tanks by duplex transfer pumps into individual day tanks. Fuel piping shall be fiberglass for underground and steel for piping located above grade. Bulk storage capacity shall be based on minimum four-week full load operation of the plant. Metal fuel tank saddles should not be placed directly on fuel containment area slabs. They should be elevated on piers to avoid moisture corrosion. Fuel containment area should have a sump or manually controlled water release valves for water removal.

**7.5.4.1** Provide fuel filling system for unloading fuel from fuel tanker into individual bulk storage tanks comprising of truck pad(s), duplex fuel transfer pumps, piping manifold and valves. The system shall provide remote fuel level monitoring panels at the pad(s).

## **7.6 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.

## 8. FIRE PROTECTION

### 8.1 SCOPE OF WORK

8.1.1 Fire protection for these buildings will be limited to Architectural features such as providing adequate means of egress. Provide rated exit corridors, doors, and hardware per IBC and all other requirements developed in the Design Analysis.

8.1.2 Exit doors shall be 90cm wide providing a minimum clear opening of 82cm and having exit closers hardware. The egress path to each exit door shall be maintained clear and unobstructed. Exit signs shall be in the language most understood in the area.

### 8.2 LIFE SAFETY ISSUES:

8.2.1 Provide the following as minimum requirements for Life Safety code requirements;

- a. Two exits doors for all inhabited buildings.
- b. Each exit door must have at least one leaf minimum wide 90cm.
- c. All exterior doors shall swing out.
- d. Doors and walls in corridors shall be fire rated.
- e. Fire rated doors shall be Hollow Metal or minimum Solid Core Wood doors with metal frames and have automatic door closer.
- f. All stairways shall be enclosed and located at the ends of the corridors.
- g. Do not allow Dead-End corridors. (20 feet max.)
- h. Panic hardware for DFAC, Training facilities, and assembles spaces with 100 or more occupancy.
- i. Any doors with glazing shall have 6mm laminated glass with the exception of the guard tower.

### 8.3 DESIGN CRITERIA

The requirements of the following codes shall be followed as for the installation of equipment, materials and works covered for Fire Protection.

IBC – International Building Code

NFPA – National Fire Protection Association

## 9. ELECTRICAL

### 9.1 SCOPE OF WORK

9.1.1 General. Contractor shall design and construct all electrical systems for the modular housing structures, and shower and toilet buildings. 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 (a) Prime Power Generation (b) Power Distribution System, (c) Interior Secondary Distribution System (d) Lighting and power branch circuitry, and (e) Premise telephone and network/data wiring. All of the systems shall be designed for the ultimate demand loads plus 25% spare capacity.

9.1.2 All equipment shall be tested, commissioned, and operational at time of turn-over to the government. Contractor shall provide all necessary operating instructions, commissioning reports, and related items at time of turn-over.

## 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/TIA/EIA-568 Commercial Building Telecommunications Cabling Standard

ANSI/TIA/EIA-569 Commercial Building Standard for Telecommunication Pathways and Spaces

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

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

IBC - International Building Code

IMC – International Mechanical Code

IPC – International Plumbing Code

IESNA Lighting Handbook

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

MIL-HDBK-1003/11 Diesel-Electric Generating Plants

MIL-HDBK-1004/21 Power Distribution Systems

MIL-HDBK-1012/3

NFPA 10, Portable Fire Extinguishers

NFPA 70, National Electrical Code

NFPA 72, National Fire Alarm Code, 2002 edition

NFPA 101, Life Safety Code, 2003 edition

NFPA 110, Emergency and Stand-by Power Systems, 2005

NFPA 780, Lightning Protection

TM 5-688 Foreign Voltages and Frequencies Guide

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

TM 5-811-3 Electrical Design: Lightning and Static Electricity Protection

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 3-540-04N Design: Diesel Electric Generating Plants 16 Jan 2004

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

UFC 3-550-03N Power Distribution Systems

9.2.2 Design shall be in metric units.

### 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, or DIN listed material, but the contractor must prove equivalence and must provide the government with a full copy of the relevant specification(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 All generators and other equipment shall be de-rated for temperature and elevation of Jalalabad.

9.3.4 Restrictions: Aluminum conductors shall not be used. Aluminum windings shall **NOT** be used in transformers.

Any references to 120/208/220/277/480 volt, 60Hz systems in any code or standard shall be interpreted as 220/380 volt, 50Hz systems, unless otherwise modified or directed in this RFP. References in the National Electrical Code to 120 or 125 volt receptacles shall be taken to mean 220v receptacles.

### 9.4 DESIGN REQUIREMENTS

#### 9.4.1 Generators

Contractor shall supply a new generator with this contract. Generators shall be pad mounted within an enclosure rated for exterior use. Generators shall be fitted with load banks matched to the load. Generator shall be sized to support the full load of the new facilities and all option items plus 25 percentage additional capacity as the base load capacity. Defined in the NEC, the based load capacity shall be provided 25% spare capacity. Contractor shall also provide a synchronizing-switch to synchronize the existing generator with the new generator. Synchronizing-switch shall also allow for one generator to shut down automatically during periods of low electrical demand load and for the entire compound (new and old facilities) to run from a single generator. When demand load increases, the synchronizing-switch shall automatically start the second generator to supplement the first generator.

Contractor shall connect the existing generator and the new generator via the synchronizing switch and shall provide a new Main Distribution Panel (MDP) of sufficient ampacity that both generators operating together can power the entire (existing and new) facility. The contractor shall provide and install properly sized service entrances from the generator system to the service entrance equipment located inside of each facility. Service entrance equipment shall include a distribution panel board properly sized to feed each facility.

Provide refueling point adjacent to exterior stone wall and near a guard tower so tanker truck does not have to enter base. Provide a road to the fueling point and a place for the truck to turn around.

The generator shall have a roof cover and if located close to any habitable facility, a cmu wall is to be constructed as to mitigate the generator sound.

When sizing the generator, ensure it is de-rated for altitude and temperature in accordance with manufacturers' recommendations for the site conditions

All equipment items should have brief instructions posted on them in English and Afghan languages. All cabling within the Power Plant associated with Power Generation (Generator to Transformer to Switchgear) shall be installed underground.

9.4.1.1 Generators shall be skid mounted standard industry size, 1,500 RPM, diesel-engine Prime Power rated units. Generating voltage shall be 3 phase, 380 volts, and 50 hertz

##### 9.4.1.2 Generator Synchronizing Equipment

Generator synchronizing/paralleling equipment shall be provided, in order for the generator(s) to synchronize with an operating generator, prior to coming on-line. Minimum of one (1) prime power generator shall be on line at all times. With an increase in the demand load, all stand-by generator(s) shall start and the generator that synchronizes first with the operating generator shall come on-line and share load equally. The other generator(s) shall run through a complete cool-down cycle and then stop. Similarly, with the decrees in the demand load, the generator(s) shall drop-off line, one at a time, keeping a minimum of one generator operating on-line. All generator(s) shall go through a cool down cycle prior to coming to stop. All relaying shall be automatically reset for automatic restart and stopping of generators as the load demands increases or decreases. Load sharing by the stand-by generator(s) shall be adjustable between 50% to 85% load on the operating generator(s). Synchronizing/ paralleling of generators shall be automatic and manual.

9.4.1.3 Fuel Storage / Distribution System: Refer to mechanical section for generator fuel storage/distribution system requirements.

##### 9.4.1.4 Operating Instructions

Contractor shall provide, mounted in a frame, a complete electrical one-line diagram of the power generation system with detail operating instruction. Instruction shall be mounted on a wall. Similarly, complete fuel and cooling system schematic diagrams shall also be provided. Brief operating instructions shall be posted on major components. These instructions shall be written in English and Afghanistan languages.

#### 9.4.2 Site Power Distribution System

Power distribution shall be underground. Design and installation of power distribution system shall be complete and in compliance with the requirements of the UFC 3-550-03FA (also called Army TM 5-811-1), National Electrical Code (NFPA 70), and other electrical references listed in this RFP.

##### 9.4.2.1 Raceways

Exterior raceways (conduits) shall be installed at a slope towards a manhole or hand-hole to avoid collection of water in the raceway. Conduit shall be PVC, thin-wall for concrete encasement and hard-wall (Schedule 40) for direct burial. Direct buried conduit shall only be installed for street lighting circuits. Direct buried conduits shall be encased in concrete, when under paved areas or under road crossings. High voltage and secondary cables shall be installing in concrete encased conduit no less than 100mm (4 inch) in diameter. Direct buried conduit shall be installed 800mm (32 inch) below grade.

9.4.2.2 All underground conduits shall use long-sweeping elbows. All communications conduits shall use long-sweeping elbows.

#### 9.4.3 Existing Services / Building Loads

9.4.4 Provide telephone/data outlets to the DFAC/Admin, barracks, guardhouse and towers, office and holding cell buildings.

9.4.5 Underground Conductors: All underground conductors shall meet the requirements of the codes and standards listed in this RFP, including but not limited to: NEC, UFC 3-550-03FA, and related.

#### 9.4.6 Secondary Power Distribution System

Secondary Power shall be 380/220 volts, 3 Phase, 4 wire, 50 Hz. Building secondary power distribution system shall include main distribution, lighting and power panels as required. All panel boards shall be circuit breaker 'bolt-on' type panels. In large buildings separate lighting and power panels shall be provided. It is recommended that minimum size circuit breaker be rated at 20 amperes. Circuit breakers shall be connected to bus bar(s) within the panel boards. Daisy chain (breaker-to-breaker) connection(s) shall not be acceptable. Indoor distribution panels and load centers shall be flush mounted in finished areas. All circuit breakers shall be labeled with an identification number corresponding to the panel schedule. A 3-pole circuit breaker shall be a single unit and not made up of 3 single pole circuit breakers connected with a wire or bridged to make a 3-pole breaker. All wiring shall be copper, minimum # 12 AWG (4mm sq), recessed in finished areas and surface mounted in metal conduits in unfinished areas. All panels shall be provided with a minimum of 25% spare capacity for future load growth. Power receptacles (outlets) shall be duplex, 240 volts, 50 HZ, German (DIN) Standard. All splicing and terminations of wires shall be performed in a 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 installation shall be in accordance with the requirements of NFPA 70 (National Electric Code). Main Distribution Panel shall be provided with an ammeter, voltmeter and kilowatt-hour meter. Selector switch shall be provided for reading all 3 phases. All service entrance cables and equipment, such as main distribution panels etc., to the facilities shall be sized for the ultimate facility loads, to include any heating loads (infrared heating), initial and future provided by others.

##### 9.4.6.1 Receptacles

General purpose receptacles shall be duplex, grounding (earthed) type, "flush" or "semi-flush" wall mounted type, color ivory and installed 450 mm above finished floor (AFF). In office or similar area, receptacles shall be provided at every 3 meter (10 feet) intervals. Areas with computer work stations or similar equipment will have additional receptacles. In maintenance buildings, 3-duplex receptacles shall be providing at each vehicle maintenance bay. In storage buildings, receptacles shall be provided in 5 m intervals. In communications rooms, receptacles shall be provided at 1 m intervals or closer. CEE Type receptacles with plugs 2P+E (240v) or 3P+E (380v) and with appropriate rating, shall be provided for, but not be limited to, washers, dryers, kitchen equipment and any other type of large plug-able equipment. Receptacle shall be complete to include box, cover plate and necessary screws/connectors and of the type most commonly used in Afghanistan. Receptacles near sinks or lavatories shall be switch operated and Ground Fault Circuit Interrupter (GFCI), or Residual Current Disconnect (RCD) type, with the trip setting of 10 milliampere or less.

Sinks will have a receptacle above, with one dual receptacle serving two sinks that are side-by-side. 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.

#### 9.4.6.2 Lighting

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 be capable of receiving standard lamps used locally. Light fixtures shall be mounted at 2.5M, minimum, AFF. Fixtures may be pendant or ceiling mounted, depending on the ceiling height. Lighting levels for the areas for which no design has been provided shall be calculated for the values given below. All fixtures shall be fully factory wired.

General Office Space / Computer Rooms	30 FC (300 Lux)
Conference Rooms	30 FC (300 Lux)
Dining Rooms	30 FC (300 Lux)
Laundry Rooms	30 FC (300 Lux)
Maintenance Shop	30 FC (300 Lux)
Bed Rooms	30 FC (300 Lux)
Kitchen	70 FC (700 Lux)
Lobbies	15 FC (150 Lux)
Lounges	15 FC (150 Lux)
Mechanical & Electrical Equipment Rooms	15 FC (150 Lux)
Stairways	20 FC (200 Lux)
Toilets	20 FC (200 Lux)
Kitchens (commercial)	70 FC (700 Lux)
Dining Areas	20 FC (200 Lux)
Living room/Quarters	30 FC (300 Lux)
Egress Path	(10 Lux)
Area adjacent to egress path	(0.5 Lux)
Corridors	10 FC (100 Lux)

Indoor lighting for all areas shall consist of fluorescent surface mounted light fixtures. Exterior lighting will be installing 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, ballast etc. Industrial type fluorescent light fixtures shall not be use. Every room shall be providing

with a minimum of one light switch.

#### 9.4.6.2.1 High Ceilings

Contractor may provide high bay High Pressure Sodium (HPS) vapor light fixtures in facilities with high ceilings, provided that the replacement lamps for the fixtures are available locally.

#### 9.4.6.2.2 Light Switch

Light switch shall be single pole. Minimum of one light switch shall be provided in every room. Lighting in large rooms/areas may be controlled from multiple switches. Lighting contactors may be used to operate lighting in open or large bay areas.

#### 9.4.6.3 Emergency "Exit" Light Fixtures

Emergency "Exit" light fixture shall be provided in accordance with NFPA requirements. Fixture shall be single side and for wall/ceiling mounting. Unit shall illuminate continuously and be provided with self-contained nickel cadmium battery pack, to operate on floated-battery or trickle charge circuit. Fixture shall operate satisfactorily for 90 minutes during power outage. Unit shall have test/re-set and lamp failure indication buttons. Primary operating voltage shall be the same as the provided service. Lettering "Exit" shall be color red and not less than 6 inches (150 mm) in height and on matte white background. Illuminations shall be with LEDs.

#### 9.4.6.4 Emergency Lighting

Battery powered emergency lights shall be provide within each building per NFPA for safe egress during power outage. Fixtures shall be providing with self-contained nickel- cadmium battery pack to operate on stand-by circuit for 90-minute minimum. Unit shall have test/re-set and lamp failure indication buttons. Primary operating voltage shall be 220 volts. Emergency lighting fixtures shall be connecting to normal lighting system.

### 9.5 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 is inappropriate. Conductors shall be sizing in accordance with the listed codes and standards.

### 9.6 GROUNDING AND BONDING

In general, grounding and bonding shall comply with the requirements of NFPA 70 and NFPA 780. Underground connections shall be exothermal welded. All exposed non-current carrying metallic parts of electrical equipment in the electrical system shall be grounded. 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. Ground resistance shall not exceed 25 ohms when measured more than 48 hours after rainfall using the fall of potential method outlined in IEEE 81.

Generator: Grounding and Bonding shall meet the requirements of NEC and other applicable standards listed in this RFP. Ground resistance shall not exceed 5 ohms when measured more than 48 hours after rainfall using the fall of potential method outlined in IEEE 81. A ground ring shall be installed around the generators.

#### 9.6.1 Lightning Protection

Communications Room and Generators shall have a lightning protection system installed per the NEC and NFPA 780, as well as other applicable standards listed in this document.

#### 9.7 ENCLOSURES

Enclosures for exterior and interior applications shall be NEMA Type 4X (IEC Classification IP56) and NEMA Type 1 (IEC Classification IP10), respectively.

#### 9.8 FIRE DETECTION & ALARM SYSTEM

Per directions from the Host Nation, no Fire Detection and Alarm System shall be provided in the facilities to be used by the Host Nation's personnel.

#### 9.9 TELEPHONE/COMPUTER NETWORK SYSTEM

Telephone/data System shall include cross-connect boxes, duplex RJ-45 telephone outlets with a minimum of 4 pair Category 5 Enhanced (CAT 5e) cable terminating at each outlet (jack). The Contracting Officer shall determine outlet locations for individual rooms. Telephone wiring shall be recessed in finished areas and surface mounted in metal conduits in unfinished areas. Two 103 mm (4 inch) empty conduits shall be providing from the cross connect box to the outside communication hand-hole.

#### 9.10 IDENTIFICATION NAMEPLATES

Major items of electrical equipment, such as the transformers, manholes, hand holes, panel boards and load centers, shall be provided with a permanently installed engraved identification nameplate.

#### 9.11 SCHEDULES

All panel boards and load centers shall be provided with a panel schedule. Schedule shall be typed written in English and Dari language.

#### 9.12 SINGLE LINE DIAGRAM

Complete single line diagram shall be provided in every transformer distribution panel and in Main Distribution Panel in each building. Single line diagram shall show all panels serviced from the generator distribution panel and the MDP respectively.

Note: Any discrepancies between sections 01010 and 01015 of the RFP, the most stringent criteria will be applied to this contract.

-- End of Section --

(End of Summary of Changes)