

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES
2. AMENDMENT/MODIFICATION NO. 0004		3. EFFECTIVE DATE 31-Aug-2011	4. REQUISITION/PURCHASE REQ. NO.	
6. ISSUED BY AFGHANISTAN DISTRICT SOUTH (AES) US ARMY CORPS OF ENGINEERS APO AE 09355		CODE W5J9LE	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. W5J9LE-11-R-0087
			X	9B. DATED (SEE ITEM 11) 11-Aug-2011
				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 type="checkbox"/> is extended, <input checked="" 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.)  Project Number W&I 029 Shindand District Hospital, Herat Province. Solicitation W5J9LE-11-R-0087 1. <input type="checkbox"/> The purpose of this Amendment is to update C3 Clauses, add new required Clauses, provide drawing sheet DP01-HH-G2 and sample Electrical Symbols Sheet, provide Questions and Answers (Q&A), and update the specifications associated with the Q&A. 2. <input type="checkbox"/> The Due Date for proposals remains unchanged as 10 Sep 2011 2:00 PM Local Afghan Time. 3. <input type="checkbox"/> All other terms and conditions remain unchanged. POC Ray Greenheck at Raymond.r.greenheck@usace.army.mil				
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  _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED  31-Aug-2011

## SECTION SF 30 BLOCK 14 CONTINUATION PAGE

**SUMMARY OF CHANGES**AMENDMENT 4

1 Q - Section 00100, "Bidding Schedule/Instructions to Bidders", on page 11 includes a DBA Form. Is this form to be included in our proposal and, if so, in which section?

1 A: No, the DBA form is only to be filled out at time of award buy the winning contractor.

2 Q - Section 00600, "Representations & Certifications", contains a number of blanks to be filled in but does not appear to be included in the Proposal Submission Requirements. Is this section to be included in our proposal and, if so, in which section?

2 A: Yes, the "Representations & Certifications" are to be filled out and returned with Volume I. This will not count against the page limit of Volume I.

3.Q - Section 00555, "Design Concept Documents", paragraph 1.1, "Engineering And Design Criteria" states "The Specifications Divisions 02 thru 46 is the primary specifications criteria for the design and construction of the project." We could not locate Specifications Divisions 02 thru 46 in the Solicitation package. Please provide.

3 A: The "Specification Divisions 02 thru 46" are the categories of the standard format to be for specifications. These specifications are to written by the design team in support their overall construction documents. The specifications provide additional information to describe the materials and systems used to construct the facilities and site of the project. Simply put, these are provided by you as part of your construction documents.

4.Q - Section 00555, "Design Concept Documents", paragraph 1.3, "Specifications" states "The Government will provide Division 1 specifications sections as required, to the successful Offeror; and these sections shall be included in the final construction specifications without change." USACE is requested to provide any additional specifications that will be required such that we can factor that into our proposal cost estimate.

4. A: Division 1 specification sections shall only be provided to the successful bidder/Offeror. Your scope of work is to provide, as part of your design work, the appropriate specifications to support your design drawings.

5.Q - Section 01010, "Scope of Work", Part 2.3.5.1, "Well House", states "Construct a well House in accordance with the provided architectural and structural Well House Building drawings." Appendix\_A\_Part3.pdf Sheets 27-29 & Appendix\_A\_Part4.pdf Sheets 1-6 provides nine (9) drawings for Well House Building #5818; Appendix\_A\_Part4.pdf Sheets 7-22 provides sixteen (16) drawings for ANP Standard Building Designs Well House. Which set of drawings should be used?.

5. A: All of the drawings included should be used as a reference or concept guide in YOUR design of the "Well House". Information not included in the "reference" drawings and is required for proper and complete construction of the "Well House", shall be provided by the design team that you select.

6.Q - Section 01010, "Scope of Work", Part 2.3.5.4, "Well Drilling", states "The Well Drilling shall be priced, by unit price per linear-meter depth of well, as "Well Drilling" in the 00010 Proposal Schedule." What depth should be used in preparing our estimate?.

6. A: The section states that the well shall be drilled to bedrock. Your GeoTechnical Engineer is the person that you should ask for this information and it is your responsibility to develop a depth and cost for providing the drilling and the water well.

7.Q - Section 01010, "Scope of Work", Part 2.3.6, "Sanitary Sewer System", states "The sanitary sewer system shall be designed to accommodate the maximum facility population of 150 people, which includes all Option items." However, Part 1.5, "General Requirements", states "The utilities for the hospital complex shall be designed for an ultimate population of 200 people." Should we use 150 or 200 people as our design basis?

7. A: The design population is 150 people.

8.Q - Section 01010, "Scope of Work", Part 2.3.7, "Leach Fields & Septic Tanks", states "Septic Tank and Absorption Field designs shall include a complete design of a traditional septic tank and absorption field effluent disposal system which shall be based on the percolation test results and a population of 150 occupants." However, Part 1.5, "General Requirements", states "The utilities for the hospital complex shall be designed for an ultimate population of 200 people." Should we use 150 or 200 people as our design basis?

8. A: The design population is 150 people.

9.Q - Section 01015, "Technical Requirements", Part 2.2.3, "Site Grading & Drainage", states "The Contractor shall 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." This Part also states "Protection of facilities from flood waters originating offsite of an installation shall be based on a rainfall for a 25-year frequency event." Part 2.3.6.1, "Design Storm Return Period (Baseline Frequency)", states "The design of roadway culverts and other on-site storm drainage features & structures will be based on 20-year rainfall event". Please clarify if the design basis is to be a 10-year, 20-year or 25-year frequency event.

9 A: The correct design values are for rainfall of a 10 year frequency for Parts 2.2.3, "Site Grading & Drainage" and 2.3.6.1, Design Storm Return Period (Baseline Frequency). Part 2.3.6.1, Design Storm Return Period (Baseline Frequency) was missed in the revision to 10-year frequency.

10.Q - Section 01015, "Technical Requirements", Part 6.9.1, "Compressed Air Systems", states "Compressed air system shall be in accordance with UFC 3-420-02FA" and "Compressed air drops shall be provided in each maintenance bay, tire shop, tool room, paint shop and other areas requiring compressed air service." Where is Compressed air required to be provided?

10. A: "Compressed Air Systems" are not required on this project.

11 Q.- Section 01335, "Submittal Procedures", Part 3.6, "Submittal Procedure" as written (including size, number of copies, etc.) implies use of paper submittals. Due to the remote areas of work and requirements for timeliness, is it fair to assume please confirm that hard copies can be provided to the assigned USACE site engineer or, in his absence, that electronic submittal and approvals can be used for this Project?

11. A: - All submittals are required in both “hard copy” paper set and an electronic submittal set, electronic submittal alone are not acceptable, paper submittals are also required.

Responses by: John R. Secler – Architect R.A. & NCARB, and Raymond R. Greenheck – Contracting Officer, U.S. Army Corps of Engineers TAS-KNQ

The following corrections are indicated by new wording underlined and replaced/deleted wording crossed out.

## **Section 01010:**

### **1.5 GENERAL REQUIREMENTS**

All standard construction amenities and details such as heating, lighting, site drainage, utility connections, etc. shall be implied as a design and construction requirement.

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, ventilation and air conditioning (HVAC) for all facilities unless otherwise stated in sections 01010 or 01015.

The utilities for the hospital complex shall be designed for an ultimate population of 150 ~~200~~ people.

The site population incorporates the populations of all occupied buildings including those in the bid option list. Site utility systems shall be sized to incorporate all Option Items.

## **Section 01015:**

### **2.2.3 SITE GRADING & DRAINAGE**

The Contractor shall 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 200mm above finished grade and slope away from the building on all sides at a minimum of 5% for 3 meters. All other grading on site shall be a minimum of 1% to ensure proper drainage. Protection of facilities from flood waters originating offsite of an installation shall be based on a rainfall for a 10 ~~25~~-year frequency event.

#### **2.3.6.1 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 ~~20~~-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 be based on 10 ~~20~~-year rainfall event. Protection of installations

against flood flows originating from areas exterior to the base installation shall be based on a minimum 10 25-year rainfall event.

### 6.9.1 ~~COMPRESSED AIR SYSTEMS~~

~~Compressed air system shall be in accordance with UFC 3 420 02FA. 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 10 kPa (200 psig) maximum for 6 kPa (125 psig) normal units. High pressure system (above 10 kPa (200 psig)) shall be provided to supply compressed air to equipment where required. Provide an engine driven air compressor where generator electrical power is unreliable. Noise level of air compressor should not exceed acceptable db limits.~~

~~The air distribution system shall be provided with necessary regulator valves to maintain desired pressure. Compressed air drops shall be provided in each maintenance bay, tire shop, tool room, paint shop and other areas requiring compressed air service. 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.~~

### SECTION 00010 - SOLICITATION CONTRACT FORM

The required performance has changed **TO:** This procurement is for the Design and Construction of a new Shindand District Hospital in Herat Province, Afghanistan. Project No: W&I-029 The Magnitude of Construction is between \$5,000,000.00 and \$10,000,000.00 Performance Period: 365 days Solicitation POC: Mr. Raymond R. Greenheck USACE-AES raymond.r.greenheck@usace.army.mil Courtesy Copy (CC) Tas.contracting@usace.army.mil.

### SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS

The following have been added by full text:

#### UPDATED C3 CLAUSES

#### **252.225-7039 CONTRACTORS PERFORMING PRIVATE SECURITY FUNCTIONS (AUG 2011)**

(a) *Definition.* *Private security functions* means activities engaged in by a contractor, including—

(i) Guarding of personnel, facilities, designated sites, or property of a Federal agency, the contractor or subcontractor, or a third party; or

(ii) Any other activity for which personnel are required to carry weapons in the performance of their duties.

(b) *Requirements.* The Contractor is required to—

(1) Ensure that all employees of the Contractor who are responsible for performing private security functions under this contract comply with any orders, directives, and instructions to Contractors performing private security functions that are identified in the contract for—

(i) Registering, processing, accounting for, managing, overseeing, and keeping appropriate records of personnel performing private security functions. This includes ensuring the issuance, maintenance, and return of Personal Identity Verification credentials in accordance with FAR 52.204–19, Personnel Identity Verification of Contractor Personnel, and DoD procedures, including revocation of any physical and/or logistical access (as defined by Homeland Security Presidential Directive (HSPD–12)) granted to such personnel;

(ii) Authorizing and accounting for weapons to be carried by or available to be used by personnel performing private security functions;

(A) All weapons must be registered in the Synchronized Predeployment Operational Tracker (SPOT) materiel tracking system.

(B) In addition, all weapons that are Government-furnished property must be assigned a unique identifier in accordance with the clauses at DFARS 252.211–7003, Item Identification and Valuation, and DFARS 252.245.7001, Tagging, Labeling, and Marking of Government-Furnished Property, and physically marked in accordance with MIL–STD 130 (current version) and DoD directives and instructions. The items must be registered in the DoD Item Unique Identification (IUID) Registry (<https://www.bpn.gov/iuid/>);

(iii) Registering and identifying armored vehicles, helicopters, and other military vehicles operated by Contractors performing private security functions;

(A) All armored vehicles, helicopters, and other military vehicles must be registered in SPOT.

(B) In addition, all armored vehicles, helicopters, and other military vehicles that are Government-furnished property must be assigned a unique identifier in accordance with the clauses at DFARS 252.211–7003 and DFARS 252.245.7001 and physically marked in accordance with MIL–STD 130 (current version) and DoD directives and instructions. The items must be registered in the DoD IUID Registry (<https://www.bpn.gov/iuid/>); and

(iv) Reporting incidents in which—

(A) A weapon is discharged by personnel performing private security functions;

(B) Personnel performing private security functions are attacked, killed, or injured;

(C) Persons are killed or injured or property is destroyed as a result of conduct by contractor personnel;

(D) A weapon is discharged against personnel performing private security functions or personnel performing such functions believe a weapon was so discharged; or

(E) Active, non-lethal countermeasures (other than the discharge of a weapon) are employed by personnel performing private security functions in response to a perceived immediate threat;

(2) Ensure that all employees of the Contractor who are responsible for personnel performing private security functions under this contract are briefed on and understand their obligation to comply with—

(i) Qualification, training, screening (including, if applicable, thorough background checks), and security requirements established by DoDI 3020.50, Private Security Contractors Operating in Areas of Contingency Operations, Combat Operations, or Other Significant Operations, at <http://www.dtic.mil/whs/directives/corres/pdf>;

(ii) Applicable laws and regulations of the United States and the host country and applicable treaties and international agreements regarding performance of private security functions;

(iii) Orders, directives, and instructions issued by the applicable commander of a combatant command relating to weapons, equipment, force protection, security, health, safety, or relations and interaction with locals; and

(iv) Rules on the use of force issued by the applicable commander of a combatant command for personnel performing private security functions; and

(3) Cooperate with any Government authorized investigation by providing access to employees performing private security functions and relevant information in the possession of the Contractor regarding the incident concerned.

(c) *Remedies.* In addition to other remedies available to the Government—

(1) The Contracting Officer may direct the Contractor, at its own expense, to remove and replace any Contractor personnel who fail to comply with or violate applicable requirements of this contract. Such action may be taken at the Government's discretion without prejudice to its rights under any other provision of this contract, including termination for default. Required Contractor actions include—

(i) Ensuring the return of personal identity verification credentials;

(ii) Ensuring the return of other equipment issued to the employee under the contract; and

(iii) Revocation of any physical and/or logistical access granted to such personnel;

(2) The Contractor's failure to comply with the requirements of this clause will be included in appropriate databases of past performance and may be considered in any responsibility determination or evaluation of past performance;

(3) If this is an award-fee contract, the Contractor's failure to comply with the requirements of this clause shall be considered in the evaluation of the Contractor's performance during the relevant evaluation period, and the Contracting Officer may treat such failure to comply as a basis for reducing or denying award fees for such period or for recovering all or part of award fees previously paid for such period; and

(4) This contract may be terminated for default if the Contractor fails to comply with the requirements of paragraph (b) of this clause or, if directed by the Contracting Officer, fails to remove or replace, at its own expense, any of its personnel who violate the requirements of paragraph (b) of this clause.

(d) *Rule of construction.* The duty of the Contractor to comply with the requirements of this clause shall not be reduced or diminished by the failure of a higher- or lower-tier Contractor to comply with the clause requirements or by a failure of the contracting activity to provide required oversight.

(e) *Subcontracts.* The Contractor shall include the substance of this clause, including this paragraph (e), in all subcontracts that will be performed in areas of contingency operations, complex contingency operations, or other military operations or exercises designated by the Combatant Commander.

(End of Clause)

**952.222-0001 PROHIBITION AGAINST HUMAN TRAFFICKING, INHUMANE LIVING CONDITIONS, AND WITHHOLDING OF EMPLOYEE PASSPORTS (AUG 2011)**

(a) All contractors ("contractors" refers to both prime contractors and all subcontractors at all tiers) are reminded of the prohibition contained in Title 18, United States Code, Section 1592, against knowingly destroying, concealing, removing, confiscating, or possessing any actual or purported passport or other immigration document, or any other

actual or purported government identification document, of another person, to prevent or restrict or to attempt to prevent or restrict, without lawful authority, the person's liberty to move or travel, in order to maintain the labor or services of that person.

(b) Contractors are also required to comply with the following provisions:

(1) Contractors shall only hold employee passports and other identification documents discussed above for the shortest period of time reasonable for administrative processing purposes.

(2) Contractors shall provide all employees with a signed copy of their employment contract, in English as well as the employee's native language, that defines the terms of their employment/compensation.

(3) Contractors shall not utilize unlicensed recruiting firms or firms that charge illegal recruiting fees.

(4) Contractors shall be required to provide adequate living conditions (sanitation, health, safety, living space) for their employees. Fifty square feet is the minimum acceptable square footage of personal living space per employee. Upon contractor's written request, Contracting Officers may grant a waiver in writing in cases where the existing square footage is within 20% of the minimum, and the overall conditions are determined by the Contracting Officer to be acceptable. A copy of the waiver approval shall be maintained at the respective life support area.

(5) Contractors shall incorporate checks of life support areas to ensure compliance with the requirements of this Trafficking in Persons Prohibition into their Quality Control program, which will be reviewed within the Government's Quality Assurance process.

(6) Contractors shall comply with International and Host Nation laws regarding transit/exit/entry procedures and the requirements for visas and work permits.

(c) Contractors have an affirmative duty to advise the Contracting Officer if they learn of their employees violating the human trafficking and inhumane living conditions provisions contained herein. Contractors are advised that Contracting Officers and/or their representatives will conduct random checks to ensure contractors and subcontractors at all tiers are adhering to the law on human trafficking, humane living conditions and withholding of passports.

(d) The contractor agrees to incorporate the substance of this clause, including this paragraph, in all subcontracts under his contract.

(End of Clause)

Contractors shall notify the Contracting Officer, as soon as practicable, whenever employee kidnappings, serious injuries or deaths occur.

Report the following information:

Contract Number  
Contract Description & Location  
Company Name  
Reporting party:  
Name  
Phone number  
e-mail address  
Victim:  
Name  
Gender (Male/Female)  
Age  
Nationality  
Country of permanent residence  
Incident:  
Description  
Location  
Date and time  
Other Pertinent Information

(End of Clause)

**952.225-0001 ARMING REQUIREMENTS AND PROCEDURES FOR PERSONAL SECURITY SERVICES CONTRACTORS AND FOR REQUESTS FOR PERSONAL PROTECTION (AUG 2011)**

(a) **General.** Contractor and its subcontractors at all tiers that require arming under this contract agree to obey all laws, regulations, orders, and directives applicable to the use of private security personnel in Iraq and Afghanistan, including U.S. CENTCOM, United States Forces - Iraq (USF-I) and United States Forces - Afghanistan (USFOR-A) Commander orders, instructions and directives. Contractors will ensure that all employees, including employees at any tier of subcontracting relationships, armed under the provisions of this contract, comply with the contents of this clause and with the requirements set forth in the following:

- (1) DODI 3020.50, *Private Security Contractors (PSCs) Operating in Contingency Operations*;
- (2) DODI 3020.41, *Program Management for Acquisition and Operational Contract Support in Contingency Operations*;
- (3) DFARS 252.225-7040, *Contractor Personnel Supporting a Force Deployed Outside the United States*;
- (4) Class Deviation 2011-O0004, *Contractor Personnel in the United States Central Command Area of Responsibility*
- (5) USFOR-A, FRAGO 11-128, *Outlines Management of Armed Contractors and Private Security Companies Operating in the Combined Joint Operations Area - Afghanistan (CJOA-A)*

(6) USF-I OPORD 11-01, Annex C, Appendix 20

(7) U.S. CENTCOM Policy and Delegation of Authority for Personal Protection and

Contract Security Service Arming of DoD Civilian Personnel Dated 18 Jan 2011.

(b) **Required Contractor Documentation.** Contractors and their subcontractors at all tiers that require arming approval shall provide to the arming approval authority via the COR consistent documentation (signed and dated by the employee and employer as applicable) for each of their employees who will seek authorization to be armed under the contract as follows:

(1) Weapons Qualification/Familiarization. All employees must meet the weapons qualification requirements on the requested weapon(s) established by any DoD or other U.S. government agency, Law of Armed Conflict (LOAC); Rules for the Use of Force (RUF), as defined in the U.S. CENTCOM Policy, dated 23 December 2005; and distinction between the above-prescribed RUF and the Rules of Engagement (ROE), which are applicable only to military forces.

(2) Completed DD Form 2760 (or equivalent documentation) for each armed employee, indicating that the employee is not otherwise prohibited under U.S. law from possessing the required weapon or ammunition.

(3) Written acknowledgement by the individual of the fulfillment of training responsibilities and the conditions for the authorization to carry firearms. This document includes the acknowledgement of the distinctions between the ROE applicable to military forces and RUF that control the use of weapons by DoD civilians, DoD contractors and PSCs.

(4) Written acknowledgement signed by both the armed employee and by a representative of the employing company that use of weapons could subject both the individual and company to U.S. and host nation prosecution and civil liability.

(5) A copy of the contract between the contractor's company and the U.S. Government that verifies the individual's employment and addresses the need to be armed.

(6) One (1) copy of a business license from the Iraqi or Afghani Ministry of Trade or Interior.

(7) One (1) copy of a license to operate as a PSC (or a temporary operating license) from the Ministry of Interior.

(c) **Communication Plan.** The contractor will submit to the COR a communications plan that, at a minimum, sets forth the following:

(1) The contractor's method of notifying military forces and requesting assistance where hostilities arise, combat action is needed or serious incidents have been observed.

(2) How relevant threat information will be shared between contractor security personnel and U.S. military forces.

(3) How the contractor will coordinate transportation with appropriate military authorities.

(d) **Plan for Accomplishing Employee Vetting.** The contractor will submit to the COR an acceptable plan for vetting all contractor and subcontractor employees. The contractor shall, at a minimum, perform the following (which will be specifically addressed in its plan):

(1) Local Nationals: Perform Local and National Agency background checks in accordance with Host Nation Government policies and protocols.

(2) Use one or more of the following sources when conducting the background checks on Third Country Nationals: Interpol, FBI, (2) Country of Origin Criminal Records, Country of Origin U.S. Embassy Information Request, CIA records.

(3) All local nationals and third country nationals will voluntarily submit to full biometric enrollment in accordance with theater biometric policies prior to submitting arming requests. All local nationals and third country nationals will voluntarily submit to routine biometric screening in accordance with local installation policies and procedures. The contractor will immediately notify the COR, local installation Force Protection agency and the theater arming approval authority of any individuals who are revealed as potential security risks during biometric processing.

(4) The Contractor shall provide to the COR official written certification of candidate(s) suitability for employment. This certification may address multiple employees on a single certification but must clearly state each employee was vetted in accordance with the Contractor's plan for accomplishing employee vetting.

(e) **Penalties for Non-Compliance.** Failure of contractor or subcontractor employee(s) to comply with the laws, regulations, orders, and rules (including those specified herein) governing the use of force, training, arming authorization, and incident reporting requirements may result in the revocation of weapons authorization for such employee(s). Where appropriate, such failure may also result in the total revocation of weapons authorization for the contractor (or subcontractor) and sanctions under the contract, including termination.

(f) **Criminal and Civil Liability.** Arming of contractor or subcontractor employees under this contract may subject the contractor, its subcontractors, and persons employed by the same, to the civil and criminal jurisdiction of the U.S. and Host Nation. "Host Nation" refers to the nation or nations where services under this contract are performed.

(g) **Lapses in Training or Authorization.** Failure to successfully retrain an employee who has been properly authorized to be armed under this contract within twelve (12) months of the last training date will constitute a lapse

in the employee's authorization to possess and carry the weapon. All unauthorized employees will immediately surrender their weapon and authorization letter to the contractor and will remain unarmed until such time as they are retrained and newly approved by the arming authority. Additionally, the arming authority's authorization letter is valid for a maximum of twelve (12) months from the date of the prior letter (unless authorization is earlier invalidated by a lapse in training).

**(h) Authorized Weapon & Ammunition Types.** Unless DCDRUSCENTCOM (or a designee) expressly provides otherwise, all arming requests and authorizations for contractor or subcontractor employees under this contract shall be limited to U.S. Government-approved weapons and ammunition. Notwithstanding Host Nation laws or regulations that would allow use of heavier weapons by contract security/PSC, all DoD security service / PSC contractors must have weapons approved by DCDRUSCENTCOM (or a designee) before use. This restriction applies to all weapons in the possession of contractor employees, even if such weapons are required for personal protection. The following weapons and ammunition are currently authorized by the U.S. Government for use in Iraq and Afghanistan:

- (1) The M9, M4, M16, or equivalent (e.g. .45 CAL, AK-47).
- (2) The M9 or equivalent sidearm will be the standard personal protection weapon unless other weapons are specifically requested and approved.
- (3) Standard authorized weapons are selectable fire semi-automatic weapons only. All Non-U.S. and Non-standard weapons must be submitted to the theater arming authority for review and approval. Non-standard weapons are classified as any machine gun, belt-fed or crew served weapon or any weapon utilizing ammunition greater than 7.62mm X 51mm NATO. Contractors must also provide scorecards and criteria for qualification appropriate to the Non-standard weapon's caliber.
- (4) U.S. government Ball ammunition is the standard approved ammunition.

**(i) Requirements for Individual Weapons Possession.** All employees of the contractor and its subcontractors at all tiers who are authorized to be armed under this contract must:

- (1) Possess only those U.S. Government-approved weapons and ammunition for which they are qualified under the training requirements of section (b) and subsequently authorized to carry.
- (2) Carry weapons only when on duty or at a specific post (according to their authorization).
- (3) Not conceal any weapons, unless specifically authorized.
- (4) Carry proof of authorization to be armed. Employees not possessing such proof will be deemed unauthorized and must surrender their weapon to their employer.
- (5) IAW USCENTCOM G.O. #1, consumption of alcohol or use of any intoxicating substances which may impair judgment, medication or otherwise in Iraq or Afghanistan is prohibited. In the event of a suspension or an exception to G.O. #1, employees shall not consume any alcoholic beverage while armed or within

eight (8) hours of the next work period when they will be armed. There are no circumstances under which a person will be authorized to consume any alcoholic beverage or use any judgment impairing substance when armed for personal protection.

(j) **Weapons/Equipment Restrictions and Responsibilities.** Unless otherwise provided, the U.S. Government will not provide any weapons or ammunition to contractors, their subcontractors, or any employees of the same. The Contractor will provide all weapons and ammunition to those employees that will be armed under the contract. The contractor and its subcontractors at all tiers will also provide interceptor body armor, ballistic helmets, and the Nuclear, Biological, and Chemical (NBC) protective masks to those employees that require such equipment in the performance of their duties.

(k) **Rules for the Use of Force (RUF).** In addition to the RUF and ROE training referenced in paragraph (b), the contractor and its subcontractors at all tiers will monitor and report all activities of its armed employees that may violate the RUF and/or otherwise trigger reporting requirements as serious incidents. Prompt reporting demonstrates a desire by the contractor and its subcontractors to minimize the impact of any violations and, therefore, will be given favorable consideration. Violations of the RUF include, though are not limited to:

- (1) Taking a direct part in hostilities or combat actions, other than to exercise self-defense.
- (2) Failing to cooperate with Coalition and Host Nation forces.
- (3) Using deadly force, other than in self-defense where there is a reasonable belief of imminent risk of death or serious bodily harm.
- (4) Failing to use a graduated force approach.
- (5) Failing to treat the local civilians with humanity or respect.
- (6) Detaining local civilians, other than in self-defense or as reflected in the contract terms.

(l) **Retention and Review of Records.** The Contractor and all subcontractors at all tiers shall maintain records on weapons training, LOAC, RUF and the screening of employees for at least six (6) months following the expiration (or termination) of the contract. The Contractor and its subcontractors at all tiers shall make these records available to the Contracting Officer or designated representative, at no additional cost to the government, within 72 hours of a request.

(m) **Contractor Vehicles.** Vehicles used by contractor and subcontractor personnel in the course of their security duties shall not be painted or marked to resemble U.S./Coalition or host nation military and police force vehicles.

(n) **Monthly Reporting.** The prime contractor will report monthly arming status to the Contracting Officer responsible for this contract, and any other organization designated by the Contracting Officer in accordance with theater policy and the timelines defined in the Performance Work Statement.

(End of Clause)

**952.225-0002 ARMED PERSONNEL INCIDENT REPORTS (AUG 2011)**

(a) All contractors and subcontractors in the United States Forces-Iraq (USF-I) or United States Forces-Afghanistan (USFOR-A) theater of operations shall comply with and shall ensure that their personnel supporting USF-I or USFOR-A forces are familiar with and comply with all applicable orders, directives, and instructions issued by the respective USF-I or USFOR-A Commanders relating to force protection and safety.

(b) **IRAQ:** Contractors shall provide an initial report of all weapons firing incidents or any other serious incidents they or their contractors are involved in to USF-I Contractor Operations Cell (CONOC) as soon as practical, but not later than 4 hours after the incident. The contractor and its subcontractors at all tiers shall submit a written report to CONOC, the Contracting Officer (KO) within 96 hours of the incident. Interim reports shall be submitted between the initial and final report, when necessary to the CONOC at [usfic3conoc@iraq.centcom.mil](mailto:usfic3conoc@iraq.centcom.mil) DSN 318-435-2369, UK# 0044 203 286 9851 or 0044 203 239 5894 or Skype: USFICONOC.

(c) **AFGHANISTAN:** Contractors shall immediately report all incidents and use of weapons through their Contracting Officers Representative (CORs) who will notify the Contracting Officer. Contracting Officers are responsible to notify the SCO-A Chief of Operations and the SAR @ USFOR-A (SAR SHIFT DIRECTOR, DSN: 318-237-1761) Information should include: the name of the company, where the incident occurred, time when the incident occurred, a brief description of the events leading up to the incident, and a point of contact for the company. The SCO-A Chief of Operations in coordination with the SAR will issue guidance for further reporting requirements.

(d) Contractors shall provide first aid and request MEDEVAC of injured persons, and remain available for U.S. or Coalition response forces, based upon the situation. In the event contractor personnel are detained by U.S. or Coalition Forces, prolonged detention due to lack of proper identification can be alleviated by contractor personnel possessing on their person information that includes the contractor's name, the contract number, a contractor management POC, and the phone number of the CONOC/SAR Watch. Contractor and subcontractor personnel shall carry their Letter of Authorization (LOA) on their person at all times.

(End of Clause)

**952.225-0003 FITNESS FOR DUTY AND MEDICAL/DENTAL CARE LIMITATIONS (AUG 2011)**

(a) The contractor shall perform the requirements of this contract notwithstanding the fitness for duty of deployed employees, the provisions for care offered under this section, and redeployment of individuals determined to be unfit. Contractor personnel who deploy for multiple tours, for more than 12 months total must be re-evaluated for fitness to deploy. An examination will remain valid for 15 months from the date of the physical. The contractor bears the responsibility for ensuring all employees are aware of the conditions and medical treatment available at the performance location. The contractor shall include this information and requirement in all subcontracts with performance in the theater of operations.

(b) The contractor shall not deploy an individual with any of the following conditions unless approved by the appropriate CENTCOM Service Component (i.e. ARCENT, AFCENT, etc.) Surgeon: Conditions which prevent the wear of personal protective equipment, including protective mask, ballistic helmet, body armor, and chemical/biological protective garments; conditions which prohibit required theater immunizations or medications; conditions or current medical treatment or medications that contraindicate or preclude the use of chemical and biological protective's and antidotes; diabetes mellitus, Type I or II, on pharmacological therapy; symptomatic coronary artery disease, or with myocardial infarction within one year prior to deployment, or within six months of coronary artery bypass graft, coronary artery angioplasty, or stenting; morbid obesity (BMI  $\geq$  40%); dysrhythmias or arrhythmias, either symptomatic or requiring medical or electrophysiological control; uncontrolled hypertension, current heart failure, or automatic implantable defibrillator; therapeutic anticoagulation; malignancy, newly diagnosed or under current treatment, or recently diagnosed/treated and requiring frequent subspecialist surveillance, examination, and/or laboratory testing; dental or oral conditions requiring or likely to require urgent dental care within six months' time, active orthodontic care, conditions requiring prosthodontic care, conditions with immediate restorative dentistry needs, conditions with a current requirement for oral-maxillofacial surgery; new onset ( $<$  1 year) seizure disorder, or seizure within one year prior to deployment; history of heat stroke; Meniere's Disease or other vertiginous/motion sickness disorder, unless well controlled on medications available in theater; recurrent syncope, ataxias, new diagnosis ( $<$  1 year) of mood disorder, thought disorder, anxiety, somatoform, or dissociative disorder, or personality disorder with mood or thought manifestations; unrepaired hernia; tracheostomy or aphonia; renalithiasis, current; active tuberculosis; pregnancy; unclosed surgical defect, such as external fixeter placement; requirement for medical devices using AC power; HIV antibody positivity; psychotic and bipolar disorders. (Reference: Mod 10 to USCENTCOM Individual Protection and Individual/Unit Deployment Policy, Tab A: Amplification of the Minimal Standards of Fitness for Deployment to the CENTCOM AOR).

(c) In accordance with military directives (DoDI 3020.41, DoDI 6000.11, CFC FRAGO 09-1038, DoD Federal Acquisition Regulation Supplement (DFARS) PGI 225.74), resuscitative care, stabilization, hospitalization at Level III (emergency) military treatment facilities and assistance with patient movement in emergencies where loss of life, limb or eyesight could occur will be provided. Hospitalization will be limited to emergency stabilization and short-term medical treatment with an emphasis on return to duty or placement in the patient movement system. Subject to availability at the time of need, a medical treatment facility may provide reimbursable treatment for emergency medical or dental care such as broken bones, lacerations, broken teeth or lost fillings.

(d) Routine and primary medical care is not authorized. Pharmaceutical services are not authorized for routine or known, routine prescription drug needs of the individual. Routine dental care, examinations and cleanings are not authorized.

(e) Notwithstanding any other provision of the contract, the contractor shall be liable for any and all medically-related services or transportation rendered. To view reimbursement rates that will be charged for services at all DoD deployed medical facilities please go to the following website: <http://comptroller.defense.gov/rates/fy2011.html> (change fiscal year as applicable).

(End of Clause)

#### **952.225-0004 – COMPLIANCE WITH LAWS AND REGULATIONS (JUL 2010)**

(a) The Contractor shall comply with, and shall ensure that its employees and its subcontractors and their employees, at all tiers, are aware of and obey all U.S. and Host Nation laws, Federal or DoD regulations, and Central Command orders and directives applicable to personnel in Iraq and Afghanistan, including but not limited to USCENTCOM, Multi-National Force and Multi-National Corps operations and fragmentary orders, instructions, policies and directives.

(b) Contractor employees shall particularly note all laws, regulations, policies, and orders restricting authority to carry firearms, rules for the use of force, and prohibiting sexual or aggravated assault. Contractor employees are subject to General Orders Number 1, as modified from time to time, including without limitation, their prohibition on privately owned firearms, alcohol, drugs, war souvenirs, pornography and photographing detainees, human casualties or military security measures.

(c) Contractor employees may be ordered removed from secure military installations or the theater of operations by order of the senior military commander of the battle space for acts that disrupt good order and discipline or violate applicable laws, regulations, orders, instructions, policies, or directives. Contractors shall immediately comply with any such order to remove its contractor employee.

(d) Contractor employees performing in the USCENTCOM Area of Responsibility (AOR) may be subject to the jurisdiction of overlapping criminal codes, including, but not limited to, the Military Extraterritorial Jurisdiction Act (18 U.S.C. Sec. 3261, et al) (MEJA), the Uniform Code of Military Justice (10 U.S.C. Sec. 801, et al)(UCMJ), and the laws of the Host Nation. Non-US citizens may also be subject to the laws of their home country while performing in the USCENTCOM AOR. Contractor employee status in these overlapping criminal jurisdictions may be modified from time to time by the United States, the Host Nation, or by applicable status of forces agreements.

(e) Under MEJA, a person who engages in felony misconduct outside the United States while employed by or accompanying the Armed Forces is subject to arrest, removal and prosecution in United States federal courts. Under the UCMJ, a person serving with or accompanying the Armed Forces in the field during a declared war or contingency operation may be disciplined for a criminal offense, including by referral of charges to a General Court Martial. Contractor employees may be ordered into confinement or placed under conditions that restrict movement within the AOR or administratively attached to a military command pending resolution of a criminal investigation.

(f) Contractors shall immediately notify military law enforcement and the Contracting Officer if they suspect an employee has committed an offense. Contractors shall take any and all reasonable and necessary measures to secure the presence of an employee suspected of a serious felony offense. Contractors shall not knowingly facilitate the

departure of an employee suspected of a serious felony offense or violating the Rules for the Use of Force to depart Iraq or Afghanistan without approval from the senior U.S. commander in the country.

(End of Clause)

**952.225-0005 MONTHLY CONTRACTOR CENSUS REPORTING (AUG 2011)**

Contractor shall provide monthly employee census information to the Contracting Officer, by province, for this contract. Information shall be submitted either electronically or by hard-copy. Information shall be current as of the 25<sup>th</sup> day of each month and received by the Contracting Officer no later than the first day of the following month. The following information shall be provided for each province in which work was performed:

- (1) The total number (prime and subcontractors at all tiers) employees.
- (2) The total number (prime and subcontractors at all tiers) of U.S. citizens.
- (3) The total number (prime and subcontractors at all tiers) of local nationals (LN).
- (4) The total number (prime and subcontractors at all tiers) of third-country nationals (TCN).
- (5) Name of province in which the work was performed.
- (6) The names of all company employees who enter and update employee data in the Synchronized Pre-deployment & Operational Tracker (SPOT) IAW DFARS 252.225-7040 or DFARS DOD class deviation 2011-00004.

(End of Clause)

**952.225-0009 MEDICAL SCREENING AND VACCINATION REQUIREMENTS FOR CONTRACTOR EMPLOYEES OPERATING IN THE CENTCOM AREA OF RESPONSIBILITY (AOR) (AUG 2011)**

(a) Contractors and subcontractors at any tier shall ensure and provide satisfactory evidence that all locally hired employees, including Local National (LN), Third Country National (TCN), and U.S. employees, working on bases have been screened for and do not currently have active tuberculosis (TB).

(1) Contractors may initially utilize a testing method of either a chest x-ray or TB skin test (TST), depending on the originating country of a contracted employee.

- (i) Chest x-rays (CXR's), symptom survey, and Body Mass Index (BMI) shall be taken, and TSTs administered within 12 months prior to the start of deployment/employment. Contractors are required to bring in a physical copy of the pre-employment CXR film as it is the only way to verify interval changes should an active case of TB occur.

(A) Third Country Nationals (TCNs) and Local Nationals (LNs) cannot be screened with the TST. They need the pre-employment screening with a quality CXR, BMI and symptom survey.

(B) Small-Risk Nationals (SRNs), those with less than 25 TB cases per 100,000 persons annually (mostly expats from Europe and US), can be screened via the TST.

(ii) Annual re-screening for TCNs, and LNs will be performed with a CXR conducted by the Contractor's medical provider or local economy provider who will look for interval changes from prior CXR's and review any changes in the symptom survey.

(iii) SRN's do not require annual TB re-screening. However, for a TB contact investigation, a TST or Interferon Gamma Release Assay (IGRA) is required.

(iv) For a contact investigation, all personnel with a positive TST or IGRA will be evaluated for potential active TB with a symptom screen, exposure history, BMI, and CXR. All cases of suspected or confirmed active TB must be reported to the theater Preventive Medicine (PM) physician and/or TB Consultant as soon as possible. TB reporting is required within 24 hours to the PM POC. Contact tracing, and medical coding have specific requirements. All Small-Risk National (SRN) contract personnel are required to be MEDEVAC'd out of theater, at the contractor's expense, for treatment of active TB, after consultation with the Theater PM or TB Consultant. For SRN personnel, the contractor is responsible for management and compliance with all prescribed public health actions.

(v) Screening may be performed either by a licensed medical provider from the local economy or by the contractors' licensed medical staffs. Contractors shall maintain medical screening documentation and make it available to the Contracting Officer upon request.

(2) TB screening and documentation is a requirement prior to receiving badges to work in the CENTCOM Area of Operations. A copy of the TB screening documentation shall be provided to the responsible Base Operations Center prior to issuance of base access badges.

(b) Contractor employees, including subcontractors at any tier, who work in food service positions and/or water and ice production facilities, shall have current Typhoid and Hepatitis "A" (full series) immunizations in accordance with the Centers for Disease Control and Prevention guidelines (e.g. typhoid vaccination booster is required every 2 years), in addition to the required TB tests. The contractor medical provider must complete a pre-placement examination to include a stool sample test for ova and parasites, and annual medical screening form or equivalent for food service, ice and water production workers.

(c) Proof of individual employee vaccinations shall be provided to the Contracting Officer and COR showing that their employees and their subcontractor employees at any tier have received the above vaccinations. The contractor shall maintain their employees' vaccination records for examination by the Contracting Officer. The contractor shall ensure that their subcontractors at any tier maintain their respective employees' vaccination records for examination by the Contracting Officer.

(d) The contractor is responsible for management and compliance with all prescribed public health actions regarding TB in the contracted personnel. The contractor also bears the responsibility of ensuring that adequate health management for TB (screening/diagnosis/treatment/isolation) is available at the contractor's chosen health care provider for their contracted and subcontracted personnel.

NOTE: Contractors are reminded of the requirement to comply with their contract and all regulatory guidance (DoD Instructions/Regulations, Federal Acquisition Regulation as Supplemented, and FRAGO's) as applicable regarding Medical Screening and Vaccination Requirements.

(End of Clause)

#### **952.225-0011 GOVERNMENT FURNISHED CONTRACTOR SUPPORT (AUG 2011)**

The following is a summary of the type of support the Government will provide the contractor, on an "as-available" basis. In the event of any discrepancy between this summary and the description of services in the Statement of Work, this clause will take precedence.

\* CAAF means Contractors Authorized to Accompany Forces.

#### U.S. Citizens Accompanying the Force

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> APO/FPO/MPO/Postal Services  | <input type="checkbox"/> DFACs                | <input type="checkbox"/> Mil Issue Equip               |
| <input type="checkbox"/> Authorized Weapon            | <input type="checkbox"/> Excess Baggage       | <input type="checkbox"/> MILAIR                        |
| <input type="checkbox"/> Billeting                    | <input type="checkbox"/> Fuel Authorized      | <input type="checkbox"/> MWR                           |
| <input type="checkbox"/> CAAF*                        | <input type="checkbox"/> Govt Furnished Meals | <input checked="" type="checkbox"/> Resuscitative Care |
| <input type="checkbox"/> Controlled Access Card (CAC) | <input type="checkbox"/> Military Banking     | <input type="checkbox"/> Transportation                |

- |  |  |                               |
|--|--|-------------------------------|
| <input checked="" type="checkbox"/> Badge      | <input type="checkbox"/> Military Clothing | <input type="checkbox"/> All  |
| <input type="checkbox"/> Commissary            | <input type="checkbox"/> Military Exchange | <input type="checkbox"/> None |
| <input type="checkbox"/> Dependents Authorized |  |                               |

Third-Country National (TCN) Employees

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> APO/FPO/MPO/Postal Services  | <input type="checkbox"/> DFACs                | <input type="checkbox"/> Mil Issue Equip               |
| <input type="checkbox"/> Authorized Weapon            | <input type="checkbox"/> Excess Baggage       | <input type="checkbox"/> MILAIR                        |
| <input type="checkbox"/> Billeting                    | <input type="checkbox"/> Fuel Authorized      | <input type="checkbox"/> MWR                           |
| <input type="checkbox"/> CAAF*                        | <input type="checkbox"/> Govt Furnished Meals | <input checked="" type="checkbox"/> Resuscitative Care |
| <input type="checkbox"/> Controlled Access Card (CAC) | <input type="checkbox"/> Military Banking     | <input type="checkbox"/> Transportation                |
| <input checked="" type="checkbox"/> Badge             | <input type="checkbox"/> Military Clothing    | <input type="checkbox"/> All                           |
| <input type="checkbox"/> Commissary                   | <input type="checkbox"/> Military Exchange    | <input type="checkbox"/> None                          |
| <input type="checkbox"/> Dependents Authorized        |   |  |

Local National (LN) Employees

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> APO/FPO/MPO/Postal Services  | <input type="checkbox"/> DFACs                | <input type="checkbox"/> Mil Issue Equip               |
| <input type="checkbox"/> Authorized Weapon            | <input type="checkbox"/> Excess Baggage       | <input type="checkbox"/> MILAIR                        |
| <input type="checkbox"/> Billeting                    | <input type="checkbox"/> Fuel Authorized      | <input type="checkbox"/> MWR                           |
| <input type="checkbox"/> CAAF*                        | <input type="checkbox"/> Govt Furnished Meals | <input checked="" type="checkbox"/> Resuscitative Care |
| <input type="checkbox"/> Controlled Access Card (CAC) | <input type="checkbox"/> Military Banking     | <input type="checkbox"/> Transportation                |
| <input checked="" type="checkbox"/> Badge             | <input type="checkbox"/> Military Clothing    | <input type="checkbox"/> All                           |
| <input type="checkbox"/> Commissary                   | <input type="checkbox"/> Military Exchange    | <input type="checkbox"/> None                          |
| <input type="checkbox"/> Dependents Authorized        |   |  |

(End of Clause)

**952.225-0013 CONTRACTOR HEALTH AND SAFETY (AUG 2011)**

(a) Contractors shall comply with all National Electrical Code (NEC 2008), Specifications as outlined, and MIL Standards and Regulations. All infrastructure to include, but not limited to, living quarters, showers, and restrooms shall be installed and maintained in compliance with these standards and must be properly supported and staffed to ensure perpetual Code compliance, prevent hazards and to quickly correct any hazards to maximize safety of those who use or work at the infrastructure. The government has the authority to enter and inspect contractor employee living quarters at any time to ensure the prime contractor is complying with safety compliance standards outlined in the 2008 National Electric Code (NEC).

(b) The contractor shall correct all deficiencies within a reasonable amount of time of contractor becoming aware of the deficiency either by notice from the government or a third party, or discovery by the contractor. Further guidance on mandatory compliance with NFPA 70: NEC 2008 can be found on the following link <http://www.nfpa.org>.

(End of Clause)

**952.225-0016 CONTRACTOR DEMOBILIZATION (AFGHANISTAN) (AUG 2011)**

(a) Full demobilization of contractors and subcontractor(s) in the Afghanistan Combined Joint Operations Area (CJOA) is critical to responsible drawdown. The prime contractor is required to submit a demobilization plan to the Contracting Officer a minimum of 120 days prior to the end of the contract performance period or when requested by the Contracting Officer. The demobilization plan shall address, as a minimum, the following procedures detailed below. The procedures outline specific guidance to ensure a timely and responsible exit from theater. Prime contractors are responsible and accountable to ensure their subcontractor(s) at all tiers comply with responsible and timely exit from theater immediately following contract performance completion or termination.

(1) Exit from Afghanistan: The prime contractor is responsible to remain cognizant of Afghan laws regarding exit from Afghanistan. Currently, all foreigners traveling out of Afghanistan airports via commercial air transportation must have exit visas. Department of Defense, U.S. Forces-Afghanistan, Letters of Authorization (LOAs), and/or Embassy Badges are not accepted means of exiting Afghanistan. All U.S. citizens and foreign national contractors exiting via commercial means must obtain an Afghanistan exit sticker before departing the country. The exit sticker may be obtained from Ministry of Interior (MOI) office. It is the prime contractor's responsibility to ensure that the most recent exit procedures are followed and to ensure that subcontractor(s) at all tiers are in compliance with exit procedures. It is to the responsibility of the contractor to work with the Embassy of Afghanistan or Afghanistan MOI as required.

(2) Letter of Authorization (LOA): The prime contractor is responsible for demobilizing its workforce, including subcontractor employees at all tiers, and all contractor owned and subcontractor owned equipment out of theater as

part of the prime contractor's exit strategy. This exit strategy must include reasonable timeframes starting with the end of the contract performance period and not exceeding 30 days. The Contracting Officer has the authority to extend selected LOAs up to, but not exceeding 30 calendar days after the contract completion date to allow the prime contractor to complete demobilization of its workforce and contractor owned equipment, as well as subcontractor(s) workforce and owned equipment, out of the Afghanistan CJOA. The prime contractor shall notify the Contracting Officer a minimum of 30 days prior to the end of the contract period to request up to a 30-day extension of selected LOAs beyond the contract completion date to complete demobilization. The request shall include at a minimum:

- (i) the name of each individual requiring a new LOA;
- (ii) the number of days for the LOA (no more than 30 calendar days); and
- (iii) justification for the request (e.g., what function the individual(s) will be performing during the demobilization period).

The Contracting Officer may request additional information for an LOA extension. Any LOA extension granted beyond the contract completion date shall not exceed 30 days and the contractor is not entitled to additional compensation for this period. If approved by the Contracting Officer, this is a no cost extension of an employee's LOA due to demobilization and in no way is an extension of the contract performance period.

(3) **Badging:** The prime contractor is responsible to ensure all employee badges, including subcontractor employees at all tiers, are returned to the local Access Control Badging Office for de-activation and destruction. The prime contractor shall submit a Badge Termination Report to ensure each record is flagged and the badge is revoked. If a prime and/or subcontractor employee's badge is not returned, the prime contractor shall submit a Lost, Stolen or Unrecovered Badge Report to the appropriate Access Control Badging Office. Contractor employees in possession of a Common Access Card (CAC) shall be responsible for turning in the CAC upon re-deployment through a CONUS Replacement Center in the U.S. Failure to return employee badges in a timely manner may result in delay of final payment.

(4) **Contractor Controlled Facility Space:** If the prime contractor has entered into a Memorandum of Understanding with the Installation Mayor or Garrison for site space, buildings, facilities, and/or Containerized Housing Units (CHU) to house prime and/or subcontractor employees (at all tiers), the prime contractor is responsible to notify the Installation Mayor or Garrison Commander of intent to vacate at least 90 calendar days prior to the end of the contract performance period. All United States Government (USG) provided property in the prime contractor's possession must be returned to the USG in satisfactory condition. The prime contractor is responsible and liable for any and all damages to USG property caused by prime and/or subcontractor employees, and shall be further liable for all cleanup, clearing, and/or environmental remediation expenses incurred by the USG in returning prime contractor and/or subcontractor facilities including surrounding site to a satisfactory condition, including expenses incurred in physically moving property, trash, and refuse from such premises, removing/remediating hazardous wastes on the premises, and repairing structures, buildings, and facilities used by the prime contractor and/or subcontractor. The prime contractor shall provide notification to the Installation Mayor or

Garrison Commander to perform an inspection of all facilities as soon as practicable, but no more than 30 days, after the end of the contract period. If damages are discovered, the prime contractor shall make the necessary repairs. The prime contractor shall notify the Installation Mayor or Garrison Commander for re-inspection of the facilities upon completion of the repairs. If the Installation Mayor or Garrison Commander inspects the property, site space, buildings, facilities, and/or CHUs and finds they have not been properly cleaned, cleared, and/or environmentally remediated, or if the prime contractor fails to repair any damages within 30 calendar days after the end of the contract performance period, the final contract payment shall be reduced by the amount of the specified damages/repairs or the expenses incurred by the USG to properly clean, clear, and/or environmentally remediate the premises.

(5) Government Furnished Equipment/Materials: The prime contractor is responsible to return all USG furnished equipment, as defined in Federal Acquisition Regulation (FAR) Part 45, clauses 52.245-1, if included in the contract. Prime contractors who are not in compliance with the FAR, Defense Federal Acquisition Regulation Supplement, Department of Defense Directives and Instructions, policies, or procedures will be responsible and liable for damages to the government property. The prime contractor may apply for a "relief of responsibility" from the Contracting Officer anytime during the contract performance period. A joint inventory shall be conducted of the equipment by the prime contractor, USG representative, and the Contracting Officer or their representative, within 10 calendar days after the end of the contract performance period. The prime contractor shall report lost, damaged or destroyed property immediately to the Contracting Officer, but no later than the joint inventory at the end of the contract period. If the prime contractor fails to report lost, damaged or destroyed equipment or materials during the contract performance period, the prime contractor shall be responsible for the replacement and/or repair of the equipment or materials. The replaced equipment shall be new, of the same quality, and shall perform at the same functional level as the missing piece of equipment. If the prime contractor fails to repair and/or replace damaged or missing equipment, the final payment shall be reduced by the appropriate amount of the specified damages or cost to replace missing equipment with new.

(6) Contractor Personal Property: The contractor is advised that all personal property left on the respective installation after the date of departure of said premises, shall be sold or otherwise disposed of in accordance with 10 U.S.C. § 2575.

- (i) A request for the return of the property will be honored, if feasible, and if received before the expiration of the period of time allowed to vacate the installation.
- (ii) If abandoned property is left on the respective installation, contractual remedies may be enforced against the contractor, (See paragraph (b) of this clause for potential contractual remedies). Additionally, even if the contractor waives its interest to all abandoned personal property, the contractor may still be liable for all costs incurred by the USG to remove or dispose of the abandoned property.
- (iii) The contractor hereby authorizes the USG authority to dispose of any and all abandoned personal property in any manner the USG may deem suitable and hereby releases and discharges the USG and its agents from any and all claims and demands whatsoever that could otherwise be asserted because of the disposition of said abandoned personal property.

(7) Synchronized Predeployment Operational Tracker (SPOT): The prime contractor is responsible to close out the deployment of personnel, including subcontractor employees at all tiers, at the end of the contract completion period and to release the personnel from the prime contractor's company in the SPOT database. The release of employee information must be accomplished no more than 30 calendar days after the end of the contract completion date.

(8) Accountability of Prime and Subcontractor Personnel: Whether specifically written into the contract or not, it is the expectation of the USG that for any persons brought into the Afghanistan CJOA for the sole purposes of performing work on USG contracts, contract employers will return employees to their point of origin/home country once the contract is completed or their employment is terminated for any reason. If the prime contractor fails to re-deploy an employee, or subcontractor employee at any tier, the USG shall notify the applicable U.S. Embassy to take appropriate action. Failure by the prime contractor to re-deploy its personnel, including subcontractor personnel at any tier, at the end of the contract completion date, could result in the contractor being placed on the Excluded Parties List System (EPLS) and not be allowed to propose on future U.S. contracts anywhere in the world.

(9) Personnel Recovery: Any DoD contractor with unaccounted for employees shall follow the instructions in the "Contractor Accountability and Personnel Recovery" Clause 952.225-20. The contractor may use the Contracting Fusion Cell as a resource to track or research employees last known location and/or to view LOA's.

(b) CENTCOM - Joint Theater Support Contracting Command (C-JTSCC) and external agencies will utilize all available contracting remedies to guarantee compliance with demobilization requirements. Such actions include, but are not limited to withholding payment, issuing a cure notice, issuing a negative Contractor Performance Assessment Reporting System (CPARS) evaluation, reduction of award fee, debarment, reimbursement of U.S. Government expenses, and/or any other legal remedy available to a contracting officer. The USG reserves the right to withhold payment from the prime contractor not in compliance with the above procedures included herein. Additionally, the Contracting Officer shall document all unresolved contractor compliance issues in CPARS, which shall have an adverse past performance affect on future contracts with the USG, anywhere in the world.

(End of Clause)

**952.225-0020 CONTRACTOR ACCOUNTABILITY AND PERSONNEL RECOVERY (AFGHANISTAN)  
(AUG 2011)**

(a) Contract performance may require work in dangerous or austere conditions. Except as otherwise provided in the contract, the contractor accepts the risks associated with required contract performance in such operations.

(1) Unaccounted Personnel: It is the expectation of the USG that any contractor brought into Afghanistan for the sole purposes of performance of work on a USG contract must be accounted for at all times by their respective employers. Additionally, contractors who maintain living quarters on a USG base shall verify the location of each of its employees' living quarters a minimum of once a month. If a DoD contracted employee becomes missing and evidence does not indicate foul play, a Personnel Recovery (PR) event is NOT automatically

triggered. Such an event will be treated as an accountability battle drill by the employer's chain of command or civilian equivalent.

(2) Contractor Responsibilities: The contractor is responsible to take all necessary steps to locate and investigate the unaccounted for employee(s) whereabouts to the maximum extent practicable. To assist in this process, contractors may use the Contracting Fusion Cell as a resource to track or research employee's last known location and/or to view LOA's. All missing personnel will be immediately reported to the installation division Personnel Recovery Officer (PRO), Mayor's cell, Military Police Station and/or the Criminal Investigative Division, and the Base Defense Operations Center (BDOC).

(3) Contractor Provided Information: If it is determined that a potential criminal act has occurred, the USD PRO (or USFOR-A Personnel Recovery Division (PRD) with prior coordination) will attempt to validate the missing person's identity through the employer. The contractor shall provide the information to PRD within 12 hours of request. The required information the contractor should keep on file includes but is not limited to: copy of the individual's Letter of Authorization generated by the Synchronized Pre-deployment and Operational Tracker System (SPOT), copy of passport and visas, housing information of where the individual resides such as room number and location, DD Form 93, Record of Emergency Data, copy of badging, and contact information for known friends or associates.

(b) If USFOR-A PRD determines through investigation that the unaccounted personnel have voluntarily left the installation either seeking employment with another contractor or other non-mission related reasons, PRD will notify the contractor. The contractor shall ensure that all government-related documents such as LOA's, visas, etc. are terminated/reconciled appropriately within 24 hours of notification by PRD in accordance with subparagraph (a)(8) of C-JTSCC Clause 952.225-0016 entitled "Contractor Demobilization (Afghanistan)". Contractors who fail to account for their personnel or whose employees create PR events will be held in breach of their contract and face all remedies available to the Contracting Officer.

(End of Clause)

**952.236-0001 ELECTRICAL AND STRUCTURAL BUILDING STANDARDS FOR CONSTRUCTION PROJECTS (AUG 2011)**

(a) The standards set forth herein are the minimum requirements for the contract. These standards must be followed unless a more stringent standard is specifically included. In such case the most stringent standard shall be required for contract acceptance.

(b) The contractor, in coordination with the Contracting Officer, Base Camp Mayor, Base/Unit Engineers, and requiring activity shall evaluate, upgrade, build, and/or refurbish buildings to a safe and livable condition. This work may include refurbishment, construction, alterations, and upgrades. All work shall be in accordance with accepted standards of quality.

(c) As dictated by the Unified Facilities Criteria (UFC) the contract shall meet:

- (1) “the minimum requirements of United States’ National Fire Protection Association (NFPA) 70,
- (2) 2011 National Electrical Code (NEC),
- (3) American National Standards Institute (ANSI) C2, and
- (4) United States’ National Electrical Safety Code (NESC).

(d) These standards must be met when it is reasonable to do so with available materials. When conditions dictate deviation, then provisions within the International Electrical Code (IEC) or British Standard (BS 7671) shall be followed. Any deviations from the above necessary to reflect market conditions, shall receive prior written approval from a qualified engineer and the Contracting Officer.

(e) The following internet links provide access to some of these standards:

UFC: [http://www.wbdg.org/ccb/browse\\_cat.php?o=29&c=4](http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4)

NFPA 70: <http://www.nfpa.org>

NESC: <http://www.standards.ieee.org/nesc>

(End of Clause)

The following have been deleted:

C3 CLAUSES

(End of Summary of Changes)

## SECTION 01010

### SCOPE OF WORK

#### 1. PROJECT DESCRIPTION

The project consists of the design and construction of a Hospital Complex in Shindand Afghanistan. The Hospital is split into zones to include Administrative and Clinic areas, Emergency and Operating areas, and Patient Areas. Included within the project are utility buildings and structures, and other ancillary buildings and structures.

The project is defined as the design, materials, labor, and equipment to construct buildings, utilities, site work and other infrastructure. The project includes buildings/facilities, site work, utilities and infrastructure that shall be designed and constructed as a Design-Build project in general accordance to the provided Concept Drawings, and in accordance with the requirements herein.

The work within this contract shall be designed and constructed in accordance with the latest editions of U.S. building and life safety codes, force protection requirements and security standards as listed in 01015 Technical Requirements. A partial listing of references is included herein:

- IBC, International Building Codes
- NFPA 101, Life Safety Codes
- NEC, National Electrical Code (NFPA 70)
- UFC 4-010-01, DoD Minimum Anti-Terrorism Standards for Buildings

#### 1.1 LOCATION

The site is located in Shindand, Afghanistan, as shown on the site plan, included in the Appendix. The coordinates of its boundaries are:

Corner	Latitude (N)	Longitude (E)	MGRS
P1	33.31326374	62.18399889	41S MS 2404286313
P2	33.31342305	62.18723216	41S MS 2434386329
P3	33.31161761	62.18735607	41S MS 2435386128
P4	33.31146420	62.18412280	41S MS 2405286114

#### 1.2 ENGLISH LANGUAGE REQUIREMENT

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

#### 1.3 SUBMITTALS

Submittals and a Submittal Register are required as specified in Section 01335.

#### 1.4 CQM TRAINING REQUIREMENT

The Contractor's Quality Control (QC) Manager is required to have completed the U.S. Army Corps of Engineers (USACE) Construction Quality Management (CQM) course or equivalent as soon as possible. The CQM course will be offered periodically by the USACE Afghanistan Engineer District (AES or AEN). Additional approved CQM courses include those offered by the Commercial Technical Training Center (in Jalalabad) and the Champion Technical Training Center (in Kabul). The Quality Assurance Branch of the

AES can provide information related to AES offerings of the CQM course, as well as contact information for training centers. Alternative CQM courses, other than those mentioned above, must be approved by the Quality Assurance Branch.

The Contractor's quality control plan, as defined in USACE Guide Specification 01451, entitled "Contractor Quality Control", shall include "The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function." For the QC Manager, qualifications must include a certificate demonstrating completion of an approved CQM course.

## **1.5 GENERAL REQUIREMENTS**

All standard construction amenities and details such as heating, lighting, site drainage, utility connections, etc. shall be implied as a design and construction requirement.

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, ventilation and air conditioning (HVAC) for all facilities unless otherwise stated in sections 01010 or 01015.

The utilities for the hospital complex shall be designed for an ultimate population of 150 ~~200~~ people.

The site population incorporates the populations of all occupied buildings including those in the bid option list. Site utility systems shall be sized to incorporate all Option Items.

### **1.5.1 LIFE SAFETY**

Design and construction of paths of egress shall be in accordance with building code references herein. Exit signs shall be placed above doors as required by code exit signs shall be labeled in Dari and Pashtun.

Provide occupancy separations and design for the hospital building as a non-sprinklered facility. The partial coverage of the automatic fire sprinkler system does not cover an area large enough to alter the overall design criteria beyond that of a non-sprinklered facility.

The Contractor shall equip all buildings with wall-mounted ABC dry-chemical fire extinguishers at a 1:100 SM density (minimum). Provide one CO<sub>2</sub> fire extinguisher at each electrical room/closet. Refer to section 01015 for additional information and specifications.

The Contractor shall provide and install hardwired smoke detectors to provide local alarm only.

The Contractor shall provide and install carbon monoxide (CO) monitors in high-occupancy areas and patient rooms. These CO monitors/alarms shall be hardwired for reliability and to prevent pilferage.

Fire-rated ceilings and walls shall be provided in accordance with building code requirements.

For other requirements, refer to 01015 Technical Requirements and references therein.

## **2. SUMMARY OF WORK**

Refer to 01015 Technical Requirements for all Work items. In case of any discrepancy between Section 01010 Scope of Work and 01015 Technical Requirements; the 01010 Scope of Work takes precedence. The USACE construction representative shall be notified immediately of any inconsistencies discovered in this RFP.

### **2.1 GENERAL**

#### **2.1.1 MINE CLEARANCE AND UNEXPLODED ORDNANCE (UXO) REMOVAL**

The Contractor shall search for, identify and clear all mines and unexploded ordnance (UXO) from the entire site. The contractor may only provide clearance/removal services via UN Mine Action Center for

Afghanistan (UNMACA) accredited entities, and clearance shall be accomplished to the anticipated foundation depth as indicated in the contract. If sub-surface construction activities are to be performed on this site the minimum clearance depth will be 1 meter. Sub-surface clearance for construction activities in excess of 1 meter as defined by the contract parameters will also be the responsibility of the contractor. Clearance by definition is an investigation and clearance of all sub-surface metallic anomalies on the site. Clearance/removal may only be undertaken in accordance with International Mine Action Standards (IMAS), Afghanistan Mine Action Standards (AMAS), and applicable U.S. Army Corps of Engineer (USACE) Ordnance & Explosives (OE) safety standards. When mines and/or UXO's are identified, the Contractor shall place them in a location in accordance with IMAS/AMAS/USACE until destruction of the items can take place. Construction work shall not occur inside the safety exclusion zone based on the most probable munition (MPM) expected on the site. Construction will not commence in any area that has not been cleared to the specified depth.

**The contractor will provide a standard UXO/Demining safety work plan to the US Army Corps of Engineers UXO / Demining COR for review prior to commencement of all UXO clearance / demining activities on the project sites. Once the UXO/ Demining clearance has concluded, the contractor shall provide the US Army Corps of Engineers UXO / Demining COR a clearance certificate for review and approval before any construction activities are to commence.**

*NOTE 1:* The USACE does not need written clearance certificate approval from the UNMACA to approve the construction start activities. However, the contractor is responsible for providing a copy of the clearance certificate to the UNMACA for entry into their country wide database. A final signed copy of the UNMACE certificate must then be provided to the USACE UXO/Demining COR.

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 under the IMAS/AMAS from the UNMACA.

If a UXO/mine is encountered after a UNMACA-approved clearance certificate is provided to the Government, UXO/mine disposal shall be handled in accordance with Section 01015, Technical Requirements.

*NOTE 2:* Point of Contact for UXO/Demining Safety Work Plan review and approval shall be directed to the US Army Corps of Engineers Demining Safety/COR:

UXO Safety/ Demining COR, USACE  
[tas.uxo.demining.safety@usace.army.mil](mailto:tas.uxo.demining.safety@usace.army.mil)  
Roshan:079-403-1452  
Comm:540-667-6359

## **2.1.2 MOBILIZATION / DEMOBILIZATION**

Mobilization and Demobilization shall consist of all labor, equipment, supplies, facilities, and utilities required to stage all equipment and facilities needed for construction of this project. Requirements for mobilization and temporary structures are set forth in 01015 Technical Requirements and 01060 Special Requirements.

The mobilization, demobilization and schedule for construction activities (including deliveries) shall be coordinated with the Contracting Officer's Representative ( COR ).

Mobilization and Demobilization shall be priced as "Mobilization / Demobilization" in Section 00010 Proposal Schedule.

### **2.1.3 SECURITY**

Security is critical to construction in Afghanistan, especially on roads and remote areas away from Coalition Force bases. The Contractor must have an appropriate amount of security/protection to match the threat in the project area and along the supply routes. A detailed security plan in accordance with Section 01040 SECURITY shall be approved by the Government before construction Notice to Proceed.

The Contractor shall be responsible for physical security of all materials, supplies, and equipment of every description, including property which may be Government-furnished or owned, for all areas occupied jointly by the Contractor and the Government, as well as for all work performed.

Security shall be priced as "Security" of the 00010 Proposal Schedule.

## **2.2 DESIGN PROGRAM**

### **2.2.1 SITE SURVEY / EXISTING CONDITIONS PLAN**

The Contractor shall provide a Site Survey and Existing Conditions Plan. This activity shall consist of all labor, equipment and supplies necessary to produce the topographical data in accordance with the requirements specified in Sections 01015 and 01335.

Site Survey and Existing Conditions Plan shall have a unit of measure lump sum and be paid for under bid item, "Site Survey/Existing Conditions Plan" of the Proposal Schedule (Section 00010).

### **2.2.2 GEOTECHNICAL INVESTIGATION**

Existing geotechnical information is not available at the project site. Any site-specific geotechnical data required to develop foundations, fill at elevated slabs, materials, earthwork, and other geotechnical related design and construction activities for this project shall be the Contractor's responsibility.

The Contractor shall develop all pertinent geotechnical design and construction parameters by appropriate field and laboratory investigations and analyses. The Contractor shall produce a detailed geotechnical report containing field exploration and testing results, laboratory testing results (particle sizes and distribution, liquid and plastic limit test, and moisture and density test, etc).

The geotechnical report shall contain the results of a geotechnical investigation conducted in accordance with the requirements specified in Section 01015. All labor, equipment and supplies necessary to conduct a geotechnical investigation and report shall be considered a part of the geotechnical investigation.

The Geotechnical Investigation shall be priced as "Geotechnical Investigation" in the 00010 Proposal Schedule.

### **2.2.3 A/E DESIGN**

The Contractor shall perform all Architecture and Engineering (A/E) design for all buildings, structures, site improvements, utilities, and all other components to complete the Work as required herein. All drawings shall be submitted in accordance with the requirements specified in Section 01335 and 01780A.

A/E Design shall be priced as "A/E Design" in the 00010 Proposal Schedule.

#### **2.2.3.1 SITE PLANNING**

The Contractor shall prepare a site boundary survey and site plan for each site based on information contained in the Request for Proposal. Contractor shall verify all space requirements and code compliance in accordance with sections 01010 and 01015 of this contract.

Site Planning shall be included as part of "A/E Design" in the 00010 Proposal Schedule.

## **2.2.4 AS-BUILT DRAWINGS**

The Contractor shall provide the government with complete As-Built drawings at the conclusion of the project. As-built drawings shall consist of all labor, equipment, and all supplies needed to produce design records, documents and drawings in accordance with the requirements specified in Section 01335 and 01780A.

The As-Built Drawings shall be priced as "As-Built Drawings" in the 00010 Proposal Schedule.

## **2.3 SITE DEVELOPMENT, IMPROVEMENTS, AND UTILITIES**

### **2.3.1 DEMOLITION**

The Contractor shall remove and dispose of all debris, trash, concrete, unused fences, buildings above or below ground that are not to be incorporated into the work of the project. Cap all existing utilities that are being abandoned. The Contractor shall be responsible for locating and paying all fees associated with removal and relocation of all debris and shall verify the location of debris disposal with the Contracting Officer's Representative (COR). Scrap metal on site shall be moved to an area away from the site perimeter as directed by the COR and left for the host government to salvage.

The contractor shall demolish all existing structures at each site prior to commencement of new work. The Contractor shall remove and dispose of all debris, concrete, and foundations and any other remains of the existing structure. The Contractor shall choose and propose a location for disposal resulting from demolition for approval by the Contracting Officer.

All demolition shall be priced as "Demolition" in the 00010 Proposal Schedule.

### **2.3.2 SITE PREPARATION, GRADING, AND STORMWATER MANAGEMENT (SWM)**

Site grading and SWM features shall conform to the requirements and references specified herein for development of the site. The Contractor shall design and submit a Site Grading and SWM Plan. The Grading and SWM Plan shall indicate the existing and proposed contour lines, the location of drainage structures, if required, and the direction of flow. Spot elevations shall be indicated at the beginning and the end of all drainage structures and inflexion points and they shall be spaced every 25 m along the alignment. Proposed contour lines shall meet with existing contour lines on the Grading and Drainage Plan. The Grading and SWM Plan shall be at a scale that all lines and structures can be easily seen and ascertained.

The Hospital site shall be designed to provide positive drainage away from all buildings, structures, and other functional areas of the site.

The Site Preparation, Grading and Stormwater Management shall be priced as "Site Preparation, Grading and SWM" in the 00010 Proposal Schedule.

### **2.3.3 ROADS/DRIVEWAYS, PARKING AND SIDEWALKS**

The Contractor shall design and construct the entire road/driveway and parking network. The roads/driveaways shall be designed to carry traffic of up to an 18 ton three-axle vehicle. A storm drainage system shall also be incorporated into the road/driveway design. The road layout shall provide access to parking areas, fuel points, trash collection point, and all other buildings and facilities as illustrated in the Concept Plan. All roads/driveaways shall be constructed of 20mm in diameter coarse aggregate a minimum of 150 mm in depth over compacted earth.

Native crushed stone 100mm thick shall be placed around all buildings, from the building wall out 2m and in all areas of anticipated foot or vehicle traffic to reduce erosion and to provide dust control.

Provide aggregate parking areas for vehicles for the following facilities inside the compound; parking quantities shall be as illustrated on the Appendix drawings. All parking areas shall receive a top layer of 100mm thick of 20mm in diameter crushed aggregate over compacted earth.

Design and provide 100mm thick concrete sidewalks adjacent to the main hospital building with down turned edges to a depth 200mm. Aggregate walkways shall be provided to connect the parking areas and all buildings of the hospital complex as shown in the Concept Site Plan of the Appendix drawings. Aggregate walkways are to be provided at all other locations as illustrated in the Appendix drawing. All sidewalks shall be of a minimum width of 1500mm; wider sidewalks are necessary at exterior door locations to facilitate ingress and egress. All aggregate walkways shall be a minimum of 100mm thick crushed native stone 20mm in diameter over compacted earth.

All walkways, roadways and driveways are required as shown on attached drawings and shall be designed and constructed based upon recommendations from geotechnical analysis as required herein.

Roads/driveways, Parking and Sidewalks shall be priced as "Roads/Driveways, Parking and Sidewalks" in the 00010 Proposal Schedule.

### **2.3.4 PERIMETER FENCE**

Design and construct a perimeter chain-link fence 2600mm in height and located as illustrated in the Concept Site Plan. Construct in accordance with the provided Appendix drawings. Concertina razor wires and outriggers shall be omitted from the design. For other requirements, refer to 01015 Technical Requirements and references therein.

The Perimeter Fence shall be priced as "Perimeter Fence" in the 00010 Proposal Schedule.

### **2.3.5 WATER DISTRIBUTION SYSTEM**

The Contractor shall design and construct a potable water system to include a well, water storage tank(s), booster pumps, and distribution system to all facilities requiring water service. Refer to the Concept Plan for locations of all buildings.

Refer to 01015 Technical Requirements for the design and construction requirements of the water storage tank and distribution system. Contractor shall install the equipment and provide all materials for connections, and shall provide all necessary components to form a complete, operational water distribution and storage system.

Provide bollards at corners of water storage tank and at water storage tank fill area. Fill area shall be located outside the Compound wall.

The Water Storage and Distribution System shall be priced as "Water Storage and Distribution System" in the 00010 Proposal Schedule, and shall exclude the Well House, Booster Pumps/Building, Potable Water Storage Tank/Canopy, and Well Drilling that are described in the following sub-paragraphs.

#### **2.3.5.1 WELL HOUSE**

Construct a well House in accordance with the provided architectural and structural Well House Building drawings. Any additional architectural and structural design shall be performed to produce a complete design. All Mechanical/Electrical/Plumbing and all other necessary systems shall be designed and constructed. For other requirements, refer to 01015 Technical Requirements and references therein.

The Well House shall be priced as "Well House" in the 00010 Proposal Schedule.

#### **2.3.5.2 BOOSTER PUMPS AND BOOSTER PUMP BUILDING**

Provide booster pumps to the Water Distribution System between the Well and the Potable Water Tank, and a second pump between the Potable Water Tank and the Hospital (and other buildings).

Booster pumps shall be located in the Booster Pump Building. Booster Pump Building shall be constructed in accordance with the provided architectural and structural Booster Station BUL drawings. Any additional architectural and structural design shall be performed to produce a complete design. All Mechanical/Electrical/Plumbing and all other necessary systems shall be designed and constructed.

The Booster Pumps and Booster Pump Building shall be priced as "Booster Pumps and Booster Pump Building" in the 00010 Proposal Schedule.

### **2.3.5.3 POTABLE WATER STORAGE TANK AND CANOPY**

Provide one potable water storage tank, sized per 01015 Technical Requirements. Tank shall be located atop a concrete slab and beneath a Canopy. Design and construct the Canopy, to be steel pole-mounted structure with corrugated galvanized sheet metal roof. Connections shall be bolted. Canopy shall provide 1.5 meter minimum clearance over tank, and shall be sized to provide a one meter perimeter around all tanks, controls and equipment.

The Potable Tank and Canopy shall be priced as "Potable Water Tank and Canopy" in the 00010 Proposal Schedule.

### **2.3.5.4 WELL DRILLING**

The Contractor shall drill a water well in accordance with 01015 Technical Requirements. Drilling shall utilize the "mud-rotary method" and shall stop at bedrock.

The Well Drilling shall be priced, by unit price per linear-meter depth of well, as "Well Drilling" in the 00010 Proposal Schedule.

For other requirements, refer to 01015 Technical Requirements and references therein.

### **2.3.6 SANITARY SEWER SYSTEM**

The sanitary sewer collection and treatment system shall be designed and constructed by the Contractor. The sanitary sewer collection system shall consist of gravity sewer pipe network and accessories such as manholes, cleanouts, grease interceptors, and building service connections, and lift stations (if necessary) to collect wastewater and sewer for all required facilities.

The sanitary sewer system shall be designed to accommodate the maximum facility population of 150 people, which includes all Option items. Provide verification is design development using the required Capacity Factor from UFC 3-240-09FA Domestic Water Treatment, Chapter 4.

System capacity shall be calculated based on a hydraulic waste load equivalent to 80 percent of the water usage rate of 190L per capita day, which is 152L per capita day.

The gravity sewer collection system shall connect to the installation wastewater treatment systems.

All components of the Sanitary Sewer System shall be priced as "Sanitary Sewer System" in the 00010 Proposal Schedule.

For other requirements, refer to 01015 Technical Requirements and references therein.

### **2.3.7 LEACH FIELDS & SEPTIC TANKS**

Septic Tank and Absorption Field designs shall include a complete design of a traditional septic tank and absorption field effluent disposal system which shall be based on the percolation test results and a population of 150 occupants. Absorption fields and septic tanks shall be underground and shall be located at the approved locations where the system is compatible with site and soil conditions. The design shall indicate which site will accommodate such a system for the given project requirements and propose alternatives if, and only if, the site characteristics will not support such a system. Septic tank

drawings and details showing tank depth and sizing based on expected sanitary load and all connecting piping with dimensions shall be provided.

### **2.3.8 GREASE INTERCEPTORS & OIL-WATER SEPARATORS**

Grease interceptor & oil-water separator designs shall include a complete design and based on the calculated flow from a dining facility with an area of 285 sq.m and seating capacity for 80 people. Drawings and details of all grease interceptors and oil-water separators provided. Grease interceptors should either be gravity or hydro-mechanical type. Drawings shall show sizing, depth, and all connection piping. DA shall include calculations for sizing both the interceptor-separator equipment and connection piping.

### **2.3.9 ELECTRICAL GENERATION AND DISTRIBUTION SYSTEM**

The Contractor shall design and construct the site power and electrical distribution system, providing electricity to all required facilities on the compound. All electrical design and installation shall comply with British Standard BS 7671. Electrical receptacles and devices shall be provided as indicated. Conductors and circuits shall be sized for the specific design loads. All wiring shall be run and pulled through conduits. Utilization voltage shall be 380/220 VAC, 50 hertz. Site Power shall be supplied by two identical generators in an "n+1" configuration; generator and fuel tank sizing shall be in accordance with the requirements of Section 01015. The Contractor shall provide and install all necessary equipment, materials, and appurtenances for a complete and operational system. As part of the base bid, the Contractor shall fully test and commission the site electrical generation and distribution system; the Contractor shall provide sufficient fuel for the generators for this purpose.

#### **2.3.9.1 GENERATORS**

Contractor shall provide and install two (2) generators per 01015 Technical Requirements.

Generators shall have a unit of measure of each, and shall be priced as "Generators" in the 00010 Proposal Schedule.

#### **2.3.9.2 DISTRIBUTION SYSTEM**

The remainder of the Site Electrical Generation and Distribution System, not including the two generators, shall have a unit of measure lump sum and shall be priced as "Site Electrical Power Generation and Distribution System" of the proposal schedule.

(Note: The electrical systems within individual buildings/ facilities/ structures shall be priced as part of the respective building/facility structure.)

### **2.4 FACILITIES**

#### **2.4.1 GENERAL REQUIREMENTS FOR FACILITIES**

Provide exterior wall-pack lighting to properly light all entrances and service entries of all buildings, to include all utility and ancillary buildings and structures. Provide wall-pack lighting at Hospital exterior.

Design and construct circulation pathways and egress routes in accordance with building code references herein.

A partial automatic fire sprinkler system is required at the Patient Rooms, Quarantine Rooms and Nursery. The facility shall comply with all other safety requirements as required within references. Smoke detectors and fire alarm systems shall be installed in accordance with requirements herein.

The example buildings included require design of the foundations to match the recommendations produced in the Geotechnical Investigating.

For all buildings and facilities, provide walkways to building/facility entrances to connect to the walkway network illustrated in the Concept Site Plan of the Appendix.

## **2.4.2 HOSPITAL**

Design and construct the Hospital building to incorporate all requirements, including those listed in the following sub-paragraphs. Hospital design shall be in general accordance with the provided example Herat Hospital design, in the Appendix drawings. All programmatic spaces appearing in the plan are required to be of similar area, with similar adjacencies to other programmatic spaces.

The provided Herat Hospital Drawings are included for reference to illustrate the quality of detail and construction desired. Contractor is responsible for the complete final design that is to include code compliance in the design and construction.

The Hospital shall be priced as "Hospital" in the 00010 Proposal Schedule.

### **2.4.2.1 PROGRAMMATIC REQUIREMENTS**

Specific requirements for programmatic spaces include the following:

- (a) Patient Rooms (Wards): Provide three (3) open area rooms for 8 beds each. Provide 8 dual electrical outlets per room. Electrical circuits shall not support more than 4 electrical outlets per circuit. Each patient room will have at least one shower and toilet room. Doors to Wards must be at least a minimum of 1200 mm clear width to accommodate surgical bed traffic. Provide a complete patient headwall at each patient bed location.
- (b) Quarantine Rooms: provide two separate rooms for infectious patients that include a separate HVAC and ventilation system for the purpose of infection control. A Quarantine Vestibule at each Quarantine room is provided to improve isolation and transfer of air borne particles. Quarantine rooms shall have negative air pressure that is maintained by the HVAC system/exhaust fans. Doors to Quarantine Room and Quarantine Vestibule must be at least a minimum of 1200 mm clear width to accommodate surgical bed traffic. Provide a complete patient headwall at each patient bed location.
- (c) Emergency Room/Trauma Room: Provide six (6) bed locations with headwalls in the Emergency Room and four (4) bed locations in the Trauma Room. Provide additional electrical receptacles for medical equipment, monitors and mobile procedural devices as required throughout both the Emergency Room and Trauma Room.
- (d) Operating Rooms: Provide electrical service connection/junction boxes and additional reinforcing in the ceiling to support overhead surgical light fixtures. Provide an oxygen system, electrical receptacles for monitors, medical equipment, standard services, a vacuum line and medical gasses and one emergency outlet for life-support equipment in each Operating Room.
- (e) Laboratory and adjacent Blood Bank room: Provide both rooms with a negative pressure environment using the HVAC system and exhaust fans. Coordinate the electrical receptacle requirements with the coolers and refrigeration equipment used for storing the blood and blood products in the Blood Bank room. The Laboratory shall be provided with above counter quad receptacles at 2 meters on center. Coordinate electrical receptacles required within cabinetry with client group during design. Verify all equipment to be installed by the client group in the future and complete utilities for all future equipment.
- (f) Patient Headwalls: All patient headwalls shall be provided with one emergency outlet for life-support equipment at location of each patient bed as part of the headwall design. Include an oxygen system to be tied in with the headwall system at each bed location. Provide headwall units with electrical receptacles for monitors, medical equipment, standard services, a vacuum line and medical gasses. Each headwall shall incorporate task lighting that is controllable from the headwall. Provide emergency call button with easy-grip cords at all headwall units.
- (g) Pharmacy: provide a Pharmacy room and Pharmacy Storage for the storage of drugs and medications. The rooms must be secure; with fully reinforced and grouted CMU walls and security rated doors with a cipher locks. Provide two (2) service windows with a counter at 1100 mm AFF is required; the opening shall not exceed 0.035 SM and be fitted with fire rated roll down

shutter assemblies. All walls shall extend to the underside of the structure above. Provide security bar grilles (Burglar Bars) in all HVAC penetrations of the Pharmacy and Pharmacy Storage room walls.

- (h) Laundry facilities: to include Dirty Utility room and Clean Linen Storage room and a full service Laundry Room facility. (The Dirty Utility room serves only the Operating Rooms and Delivery.) The soiled linen and laundry rooms require one hour fire rated walls with 45 minute rated doors.
- (i) Storage rooms: all storage rooms and closets require a one hour fire rated wall with 45 minute rated doors. Storage rooms within Patient Wards and Quarantine Areas are for clean linen storage.
- (j) All corridors, except the Administrative area, shall be provided with corridors of a minimum 2440mm clear width. All corridor walls shall be one hour fire rated assemblies with fire rated doors and openings throughout. Patient railings and bumper guards are required. All corridors are required to provide smoke tightness, which includes the ceiling.
- (k) Nurse station: full service nurse station with two-sided counter for nurse work station and reception side for patient care. Mirrors shall be provided on adjacent corridors for full viewing of the patient sleeping rooms.
- (l) Nurse Call Buttons: Provide emergency call button with easy-grip cords at all headwall units, in toilet rooms (within Patient rooms) and at the toilet rooms off the corridors and at each bed/headwall location within the Trauma, Post-Operation and Emergency Room bed locations.
- (m) Medical Storage: Medical Storage room to have direct exterior access, and thruway access into a main corridor.
- (n) Patient check-in: Provide a counter as illustrated on Appendix drawings. Requires work counter (seated height) on office side (with reception height counter towards lobby/waiting area, and a security grille.
- (o) Nurse offices: administration space for nurses.
- (p) Toilet/shower/locker spaces: sized for medical staff.
- (q) Provide one Janitor's Closet with a floor mounted mop sink.
- (r) Administrative area corridor requires a clear width of 1600 mm and one hour fire rating with 20 minute doors.
- (s) All patient room doors shall be a minimum of 1200mm clear for movement of hospital beds.
- (t) All floors shall receive an epoxy floor coating system and continues 100mm up the walls to form an integral base.
- (u) All interior partitions shall be concrete masonry units ( C.M.U. ) with plastered faces to 150mm above suspended ceiling levels and finished with paint.
- (v) Provide vestibules at the both sets of doors at the Waiting area exits.
- (w) Provide ceiling fans in the Waiting area away from the circulation path to the Emergency Room.

#### **2.4.2.2 HOSPITAL BUILDING REQUIREMENTS**

Hospital shall be a one-story concrete structure, with low sloping (minimum 2%) roof. Typical interior walls shall be concrete masonry. Hospital shall be atop a concrete foundation, and shall have a concrete floor slab atop a compacted gravel base. Exterior finish shall be of synthetic stucco atop rigid insulation.

Utilities shall be run beneath slab to the greatest extent possible. All utility locations shall be pre-located prior to slab pour. Utilities required to be run within the building shall be located above-ceiling to the greatest extent possible, and shall be located in a cable tray system that shall generally follow the main corridors.

Roof shall be a heavy traffic bearing waterproof system ( min. 65 wet mils total system ) using one component polyurethane system on the concrete roof structure over laid with 100mm of rigid foam insulation and 40mm thick precast concrete pavers as ballast over the entire roof surface. Roof shall have a continuous perimeter parapet and downspouts.

Windows shall be operable, and include insect screens. Windows shall be sized approximately 1110mm wide x 890 mm tall, and bottom of window shall be located 1400mm above finish floor.

Doors shall be insulated hollow metal (steel) and shall be similar to DP01-HH-A20 of the Appendix drawings. Door accessories, keying, etc. shall match the Door Schedule provided in DP01-HH-A21 of the Appendix drawings.

The typical construction shall match the Wall Section provided in Appendix drawing DP01-HH-A08. All assemblies, to include wall construction, roof construction, slab construction, windows and window detailing, exterior finishes, roofing, parapet/downspout detailing, insulation, and other features and systems shall be identical to the provide Wall Section.

For other requirements, refer to 01015 Technical Requirements and references therein.

#### **2.4.2.2.1 FINISHES**

Ceilings throughout shall be suspended systems.

All ceiling heights shall be at 3000mm above finished floor.

Provide factory painted metal suspended ceiling grids with lay-in panels appropriate to the rooms function. Painted semi-gloss gypsum wall boards may be used in the Laundry Room, storage rooms, Janitor's Closet and toilet rooms. Provide factory finished acoustical lay-in panels as standard in all patient rooms, exams rooms, corridors, offices, administrative areas, etc. Provide anti-bacterial factory finished ceiling panels in the Emergency Room, Trauma Room, Operating Rooms, Delivery Room, X-ray Room, Sterilization, Operating Corridor, Post Operation Room and Laboratory. Ceilings are not required in the Medical Storage room, Electrical-Communication-Mechanical Controls Room and Medical Gases.

Interior walls shall be concrete masonry construction with plaster to 150mm above suspended ceiling level and shall be finished with a washable 100% acrylic in semi-gloss paint. Restrooms and other wet rooms shall have epoxy coated walls.

Typical floor finish shall be an epoxy coating system over stable concrete floors. Sealed concrete flooring may be used in utility, mechanical and storage spaces. Provide 100mm height bases of epoxy coating system to match the floor finish as the standard base throughout the hospital, and other facility buildings.

All surfaces in the Operating ward (to include Operating Rooms, Operating Corridor, Sterilization, Post Operation, Delivery, Dirty Utility, Operating Vestibule, and Doctors' and Nurses' Locker Rooms shall be anti-bacterial.

Provide curtains in the Emergency Room around six (6) bed locations, around two (2) bed locations in the Trauma Room, at two patient locations within the Dental Clinic, around two (2) locations in each Quarantine Room and around eight (8) bed locations within each 8-bed Ward.

Lead-lining is required in the walls and doors of the X-ray Room. Provide the lead shielding to the underside of the roof structure above. Lead shielding is not required in the suspended ceiling system.

#### **2.4.2.2.2 CASEWORK**

Provide casework in the following areas:

Laboratory: 10 linear meters (typical: base and upper cabinets w/ adjustable shelves; shelving unit).

Casework shall include two (2) lavatories. Laboratory casework shall match to DP01-HH-A16 casework elevations provided in Appendix drawings.

Patient Check-in: 2 linear meters transaction counter (at Waiting Area); 3.5m work surface (within room)

Nurses' station (within Emergency Room): 5 linear meters L-shaped work surface configuration, to include 2 lm transaction counter.

Nurse's Station (near Ward Rooms): 8.5 linear meter L-shaped work surface with transaction counter towards corridor side.

Pharmacy window: two (2) transaction counters

Administration office: 2 linear meters transaction counter (at Lobby); 3.5 lm work surface (within room).

Casework shall be plastic laminate atop substrate and detailed similarly to DP01-FF-A15 of the Appendix drawings.

### **2.4.2.2.3 HVAC SYSTEM**

The Hospital shall be provided with heating and cooling. Heating and cooling to the respective spaces shall be provided using a ducted, forced air system. Packaged split pack heat pump units are acceptable only at the Staff Entrance Lobby, Administration Room, Records Room, Laboratory, Blood Bank Room and in the Quarantine Rooms. Each occupied space shall be provided the air quality as defined in ASHRAE 62.1.

HVAC systems shall be zoned separately for Clinic/Office spaces, Emergency/Operating areas, and Patient areas. See diagram in Appendix drawings that illustrates the intended zoning of spaces/rooms.

Provide negative pressure in Operating Rooms, Sterilization Room, Laboratory, Blood Bank Room and each of the Quarantine/Isolation Rooms. Exhaust fans out of the negative pressure rooms shall discharge directly to the exterior by way of a gravity damper louver/vent.

Provide a through roof exhaust system for the Laundry Room dryer unit with a roof top booster fan assembly and weather head louver discharge.

### **2.4.2.2.4 PLUMBING SYSTEM**

Provide lavatories in each Exam Rooms, Eye Clinic, Dental room (2 lavatories), Blood Bank Room, Laboratory, Emergency Room (2 lavatories), Trauma room, and Operating Corridor (2 lavatories), Nursery (2 lavatories) and at all other locations required by code, and per provided Concept Plan.

Hot water shall be circulated (minimum 3 liters per minute) in a loop by a small pump.

Provide plumbing for two (2) commercial grade washers in the Laundry Room.

Provide hose bibs at two exterior locations: along the main façade, and along the back (northeast elevation) façade.

The toilets shall be a mix of Western-style and Eastern-style toilets; confirm quantities and locations with COR. All toilets shall be orientated in a culturally appropriate direction.

### **2.4.2.2.5 OXYGEN**

Provide oxygen distribution system each 8-bed Ward (8 locations each), to each Operating Room, to the Post Operation room (2 locations), to the Trauma room (4 locations), to the Emergency Room (6 locations), and to each Quarantine Room (2 locations each). System shall include zone alarm panels at each nurses' station. Provide shut-off valves to segregate Emergency Room/ Trauma area, the Operating Room/ Post Operation area, and the Patient Wards/Isolation Rooms.

### **2.4.2.2.6 TELEPHONE / DATA SYSTEM**

Provide infrastructure for a telephone system, to include ports at each room, to exclude storage rooms/closets, mechanical rooms/closets, corridors, restrooms, and Operating Rooms. Provide two

telephone ports per Nurses' Station and in all offices. Provide eight ports in each 8-Bed Ward, two ports in the Post-Operation Room and Quarantine Rooms.

The Contractor shall design, provide, and install the interior and exterior communications infrastructure. The design and construction of the systems shall be in accordance with the references and the requirements contained herein, and in the 01015 Technical Requirements.

Provide a Communications / Data system serving the Hospital. Provide one data port in each of the Exam Rooms, Clinic Spaces, the Trauma Room, the Emergency Room, the Laboratory, the Blood Bank, and the Pharmacy. Provide two data ports per Nurses' Station and in all offices. Communications system shall be designed and constructed in accordance with 01015 Technical Requirements.

#### **2.4.2.2.7 NURSE CALL SYSTEM**

Provide a Nurse Call system that links each Nurses' Station to Patient Wards (8 locations/beds per ward room), to each Quarantine Room (2 locations), Post Operation Room (2 locations) and all toilet rooms serving the Patient Rooms (Quarantine and Ward Rooms), in the Emergency Room toilets rooms and Exam Room area toilet rooms off the corridor.

#### **2.4.2.2.8 FIRE ALARM SYSTEM**

Provide a 24V DC fire alarm system. Alarm system shall have 72 hours of operating time with 15 minutes of alarm signaling time. Pull stations shall be manual pull-down. Enunciators shall provide coverage to all corridors, lobby/waiting areas, to the nursery, the Operating corridor, the Emergency Room, and all other spaces as required per code.

#### **2.4.3 GENERATOR SHELTER**

The base bid shall include only a pole mounted metal roof system canopy with chain link fence enclosure and the appropriate personnel gates and equipment access gates. All gates shall be provided with pad lock latches.

The Generator Building is a Bid Option.

The Generator Building shall be priced as "Generator Building" in the 00010 Proposal Schedule.

#### **2.4.4 FUEL STORAGE TANKS AND CANOPY**

Contractor shall construct a Fuel Storage Canopy structure in accordance with the 01015 Technical Requirements and located as illustrated in the Concept Site Plan. The structure shall have a concrete slab with steel column structure to support a metal roof. Provide chain link fencing 2600mm in height with personnel gate with a pad lock latch.

The Fuel Storage Tanks and Canopy shall be priced as "Fuel Storage Tanks and Canopy" in the 00010 Proposal Schedule.

#### **2.4.5 MORGUE (CONEX UNIT)**

Provide one 2430mm ( 8 ft.) x 6000mm ( 20 ft. ) refrigerated CONEX unit affixed atop a concrete foundation slab. Morgue shall be connected as required to site utilities.

Morgue shall be priced as "Morgue" in the 00010 Proposal Schedule.

#### **2.4.6 INCINERATOR**

Design and construct one incinerator station to provide burning facilities for "Bio-Hazard" medical waste and common non-bio-hazard waste materials. The Incinerator Station shall have two burn units. One

burn unit shall be a self-contained diesel fuel medical waste incinerator. A second burn unit shall be for the burning of common non-bio-hazard waster materials. Provide a three-sided enclosure of chain-link fence with a metal roof, eight square meters in size for collecting materials at the incinerator station.

Provide around the incinerator and collection area a perimeter fencing, 2m in height with triple-strand razor wire atop, and locked personnel gate.

Incinerator shall be priced as "Incinerator" in the 00010 Proposal Schedule.

### **2.4.7 TRASH COLLECTION POINT**

The Contractor shall design a Trash Collection point, located per the Concept Plan, and constructed in accordance with the provided drawings. Any necessary design work shall be performed to complete the design.

Trash Collection building shall be priced as "Trash Collection Point" in the 00010 Proposal Schedule.

## **3. OPTION ITEMS**

### **3.1 DINING FACILITY**

Construct a Dining Facility in accordance with the provided architectural and structural Dining Facility Building drawings. Provide all necessary architectural and structural design work to complete the facility in accordance with the GeoTechnical Reports and findings. All Mechanical/Electrical/Plumbing and all other necessary systems shall be designed and constructed to provide a fully functional dining facility. Provide ceiling fans throughout the dining facility building.

Design and construct a service road to serve the Dining Facility, as illustrated on the Appendix drawings. Design and construct walkways to connect the entrances of the facility as shown in the Concept Site Plan of the Appendix.

The Dining Facility shall be priced as "Dining Facility" in the 00010 Proposal Schedule.

### **3.2 PERIMETER WALL**

Construct a 2.5m tall wall 600mm thick at the property line. The wall shall be either a steel reinforced concrete core wall or a completely stone wall with steel reinforcing. This Option shall include a full credit for "Perimeter Fence", described in Paragraph 2.3.4.

The Perimeter Wall shall be priced as "Perimeter Wall" in the 00010 Proposal Schedule.

### **3.3 SNIPER SCREEN**

Provide and install "sniper screen" fabric on the perimeter chain-link fence.

The Sniper Screen Option shall be priced as "Sniper Screen" in the 00010 Proposal Schedule.

### **3.4 OUTPATIENT CLINICS**

Construct two (2) Outpatient Clinics (one designated for male, and one designated for females) in accordance with the provided architectural and structural Clinic drawings. Any necessary architectural and structural design work shall be completed. All Mechanical/Electrical/Plumbing and all other necessary systems shall be designed and constructed. Design and construct walkways to connect the entrances as shown in the Concept Site Plan of the Appendix. Provide all necessary architectural and structural design work to complete the facility in accordance with the GeoTechnical Reports and findings.

The Outpatient Clinics shall be priced as "Outpatient Clinics" in the 00010 Proposal Schedule.

### **3.5 LATRINES**

Construct two (2) Latrine Buildings (one designated for male, and one designated for females) in accordance with the provided architectural and structural Latrine drawings. Any necessary architectural and structural design work shall be completed. All Mechanical/Electrical/Plumbing and all other necessary systems shall be designed and constructed. All toilets shall be orientated in a general north/south direction. Provide all necessary architectural and structural design work to complete the facility in accordance with the GeoTechnical Reports and findings. Design and construct sidewalks to connect the entrances to the site's sidewalk network.

The Latrines shall be priced as "Latrines" in the 00010 Proposal Schedule.

### **3.6 PUBLIC ADDRESS SYSTEM**

Provide a Public Address system. Public address enunciators shall be in all spaces, to exclude storage spaces, Operating Rooms, Patient (Ward) Rooms, and Quarantine Rooms. Paging and Emergency announcement units shall be located at each Nurses Station, Patient Check-in, and Administrative Area adjacent to the Staff Entry Lobby.

Public Address System shall include an AM/FM radio tuner, a CD player , and shall be configured into six zones.

The Public Address system shall be priced as "Public Address System" in the 00010 Proposal Schedule.

### **3.7 SECURITY CAMERA SYSTEM**

Design and construct a closed-circuit television security monitoring and recording system that includes cameras and a central monitoring station. Central monitoring station shall be located at the Administration room adjacent to the lobby. All exterior entrances shall be monitored, each by an individual camera. All corridors shall have full camera coverage. Provide cameras in Nursery, Medical Records, Pharmacy, Pharmacy Storage, Laboratory, Medical Gases, Waiting Room, Patient Check-In, Staff Entry Lobby and Administration counter.

The Security Camera System shall be priced as "Security Camera System" in the 00010 Proposal Schedule.

### **3.8 SOLAR HOT-WATER PRE-HEAT COLLECTORS**

Provide a Solar Hot Water Pre-heat system consisting of rooftop-mounted collector panels, piping and isolation ball valves located within the water heater enclosure room for disconnecting the solar hot water collector panels from the water heating system while maintaining the full function of the water heater system and loop within the hospital.

The Solar Hot-Water Pre-heat Collectors shall be priced as "Solar Hot-Water Pre-heat Collectors" in the 00010 Proposal Schedule.

### **3.9 FIRE PROTECTION SYSTEM**

Provide fire protection sprinkler coverage to all Patient Ward Rooms, Nursery and Quarantine Rooms. Water shall be sourced from the Potable Water Tank, and system shall include a dedicated electric pump and all other components to produce a working system, as described in Technical Requirements 01015.

The Fire Protection System shall be priced as "Fire Protection System" in the 00010 Proposal Schedule.

### **3.10 SOLAR-POWERED SITE LIGHTING**

Provide a pole-mounted solar-powered self-contained exterior light package with integral storage battery, and photocell switch. Light poles shall be spun-aluminum, Steel tube or precast concrete 6 meters in height above finished ground level. Lights shall be lamped with LED bulbs. Lighting levels shall meet minimum IES lighting standards. Site lighting shall light the vehicular/pedestrian entrances to the site, the front walkway of the Hospital building, roads and walkways as shown on the Concept Lighting Plan of the Appendix.

The Solar-powered site lighting shall be priced as "Solar-Powered Site Lighting" in the 00010 Proposal Schedule.

### **3.11 FLAG POLE**

Construct one (1) 10m tall flagpole, with concrete foundation, to be located adjacent the front entrance to the Hospital. (Coordinate exact location with COR.) Provide switched flood light to illuminate flagpole.

Flag Pole shall be priced as Flag Pole of the Section 00010 Proposal Schedule.

### **3.12 GENERATOR BUILDING**

Construct a Generator Building in accordance with the provided "Generator Room Building" drawings. Any necessary design work shall be performed to complete the design. Provide all necessary architectural and structural design work to complete the facility in accordance with the GeoTechnical Reports and findings.

### **3.13 FULL FUEL TANKS**

Contractor shall provide fuel tanks that are completely full of fuel for the generators at the time of turnover to the Government. Filling of the remainder of the fuel tanks with fuel shall have a unit of measure lump sum and shall be priced as "Full Fuel Fill for Generator Tanks" of the proposal schedule.

## **4. COMPLETION OF WORK**

All work required under this contract shall be completed within the period of time specified in Section 00150.

**-- END OF SECTION --**

**SECTION 01015  
TECHNICAL REQUIREMENTS**

**1.0 GENERAL**

**1.1 COMPLIANCE**

The Contractor's design and construction must comply with technical requirements contained herein. The Contractor shall provide design and construction using the best blend of cost, construction efficiency, system durability, ease of maintenance and environmental compatibility.

**1.2 MINIMUM & ALTERNATE REQUIREMENTS**

The design and product requirements stated in these documents are minimum requirements. Exceeding the minimum requirements as improvements to the design stated herein is highly encouraged at no additional cost and as approved by the government. Any deviation from the technical requirements shall be approved by the Contracting Officer. Request for deviations shall be submitted for approval. The Contractor is encouraged to propose alternate design or products (equipment and material) that are more commonly used in the region; but these variations shall be equal in performance from a technical standpoint as well as more cost effective or allow for more timely completion. Variations shall furnish the same system safety, durability, ease of maintenance and environmental compatibility. The Contractor will be required to submit information as specified in Section 01335, paragraph Variations, for all proposed variations with which to make a comprehensive comparison of the proposed alternate. All variations of approved designs must be approved by the Contracting Officer.

**1.3 ASBESTOS CONTAINING MATERIALS**

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

**1.4 SAFETY**

**1.4.1 UNEXPLODED ORDNANCE (UXO)**

**1.4.2 UXO/MINE DISCOVERY DURING PROJECT CONSTRUCTION**

It is highly recommended that all construction ground guide/ground observation personnel maintain a minimum 16 m buffer zone from all heavy equipment during excavation activities. A daily check of the area for signs of recently emplaced UXO/IED's is also highly recommended, to include unusual disturbed soil areas or mounds of soil from the previous day. If during construction, the contractor becomes aware of or encounters UXO/Mine or potential UXO/Mine, the contractor shall immediately stop work at the site of encounter, clearly mark the area of UXO/Mine, move to a safe location, notify the COR, and mitigate any delays to scheduled or unscheduled contract work. Once the contractor has informed the COR, the contractor will await further direction. UXO/Mine disposal will not be the responsibility of the Contractor.

**1.5 LIMITATION OF WORKING SPACE**

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

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

## **1.6 TEMPORARY STRUCTURES**

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

## **1.7 SUBCONTRACTORS**

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

## **1.8 LIST OF CODES AND TECHNICAL CRITERIA:**

The following codes and technical criteria and those referenced therein shall be required for this project. References within each reference below shall be required and adhered to. If there is conflict in the criteria the most stringent requirement shall be applied. This list is not exhaustive and is not necessarily complete.

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

ACI 301M Specifications for Structural Concrete (latest edition), American Concrete Institute

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

ACI 530/ASCE 5/TMS 402, Building Code Requirements for Masonry Structures (latest edition)

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

American Institute of Steel Construction (AISC), Specifications for Structural Steel Buildings (latest edition)

American Petroleum Institute (API) Codes

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

ARI - Air Conditioning and Refrigeration Institute

ASCE 7, Minimum Design Loads for Buildings and Other Structures (latest edition)

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

Engineers Handbooks latest editions: Fundamentals; HVAC Systems and Equipment; HVAC Applications; Refrigeration.

ASHRAE Standard 55-latest edition, Thermal Environmental Conditions for Human Occupancy

ASHRAE Standard 62.1-latest edition, Ventilation for Acceptable Indoor Air Quality

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

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

ASHRAE Standard 90.2-latest edition with Supplement, Energy-Efficient Design of Low-Rise Residential Buildings

ASME - American Society for Mechanical Engineering

ASTM - American Society for Testing and Materials

ASTM-D-1586 Standard Test Method for Standard Penetration Test

ASTM-D-5299 Standard Guide for Decommissioning Ground Water Wells

AWS D1.1, Structural Welding Code – Steel (latest edition), 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)

Design Standard per Memorandum for Record, Design Standards, DTD 16 August 2009 BT, Appendix B-1 and B-2

DoD Ammunition and Explosives Safety Standards

EIA ANSI/TIA/EIA-607: (1994) Commercial Building Grounding/Bonding Requirement Standard  
Factory Mutual (FM) Approval Guide-Fire Protection (2002)  
HESCO® Bastion Concertainer® Construct Guide for Engineers  
IBC - International Building Codes, 2006 edition (and its referenced codes including those inset below)  
BS 7671 British Standard for Electrical Installations requirements  
IEEE C2, National Electrical Safety Code (NESC), latest edition  
IFGC – International Fuel Gas Code, latest edition  
IMC – International Mechanical Code, latest edition  
IPC – International Plumbing Code, latest edition  
Lighting Handbook, IESNA, latest edition  
MIL-HDBK-1190, Facility Planning and Design Guide  
National Association of Corrosions Engineers (NACE) Codes  
Codes and Standards of the National Fire Protection Association (NFPA), as applicable and enacted in 2002 or later.  
NFPA 1, General Fire Protection, latest edition  
NFPA 10, Portable Fire Extinguishers, latest edition  
NFPA 13, Fire Sprinkler Code, latest edition  
NFPA 30, Flammable and Combustible Liquids Code, latest edition  
NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages, latest edition  
NFPA 54, National Fuel Gas Code, latest edition  
NFPA 58, Liquefied Petroleum Gas Code, latest edition  
NFPA 72, National Fire Alarm Code, 2002 edition  
NFPA 75, Standard for the Protection of Information Technology Equipment  
NFPA 80, Fire Rated Doors and Windows, latest edition  
NFPA 90A, Air Conditioning and Ventilating Systems, latest edition  
NFPA 96, Fire Protection for Commercial Kitchens, latest edition  
NFPA 101, Life Safety Code, latest edition  
NFPA 110, Standard for Emergency and Standby Power Systems, 2005 edition  
NFPA 221, Standard for Chimneys, Fireplaces, Vents, And Solid Fuel–Burning Appliances, latest edition  
NFPA 1141, Site Fire Protection, latest 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 5-805-4 Noise and Vibration  
TM 5-811-1 Electrical Power Supply and Distribution  
UFC 1-200-01, Design: General Building Requirements

UFC 1-300-07A Design Build Technical Requirements  
UFC 3-220-03fa Soils and Geology  
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 3-240-09fa Domestic Wastewater Treatment 16 Jan 2004  
UFC 3-240-07fa Gravity Sewers 16 Jan 2004  
UFC 3-240-09fa Domestic Wastewater Treatment  
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  
UFC 3-310-01, Structural Load Data  
UFC 3-310-02A, Structural Design Criteria for Buildings  
UFC 3-410-01FA Heating, Ventilating and Air Conditioning, latest edition  
UFC 3-410-02A, HVAC Control Systems, latest edition  
UFC 3-410-04N, Industrial Ventilation, latest edition  
UFC 3-420-01, Plumbing Systems Design, latest edition  
UFC 3-420-02FA, Compressed Air, latest edition  
UFC 3-430-01FA, Heating and Cooling Distribution Systems, latest edition  
UFC 3-460-01, Petroleum Fuel Facilities, latest edition  
UFC 3-501-01, Electrical Engineering latest edition  
UFC 3-520-01, Interior Electrical Systems, Latest edition  
UFC 3-520-05, Stationary Battery Areas, latest edition  
UFC 3-530-01, Design: Interior and Exterior Lighting and Controls, latest edition  
UFC 3-535-01, Visual Air Navigation Facilities, latest edition  
UFC 3-540-04N Diesel Electric Generating Plants, latest edition  
UFC 3-550-01 Exterior Electrical Power Distribution, latest edition  
UFC 3-600-01, Design: Fire Protection Engineering for Facilities, 14 Jul 2009

UFC 4-010-01, Design: Minimum DoD Antiterrorism Standards for Buildings, 22 Jan 2007  
UFC 4-020-03, Security Engineering: Fences, Gates, and Guard Facilities, 14 June 2007  
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  
UFC 4-022-01, Security Engineering: Entry Control Facilities/Access Control Points, 25 May 2005  
UFC 4-229-01N, Design: General Maintenance Facilities, latest edition  
UFC 4-722-01, Design: Dining Facilities, 27 January 2003

UL Standards (as applicable)

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

UL 710, Exhaust Hood for Commercial Cooking Equipment, latest edition

UL 752, Bullet Resisting Equipment, 2000 or later

USCINCCENT OPORD 97-1

Overseas Environmental Baseline Guidance Document, Department of Defense, May 2007

The publications to be taken into consideration shall be those of the most recent editions.

Unified Facility Criteria (UFC) is available online at [http://www.wbdg.org/ccb/browse\\_cat.php?o=29&c=4](http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4)

In addition, technical criteria provided in USACE-AED Design Requirements (most recent version) shall be required for use in design and construction specifications as indicated in the following documents. The following design criteria shall be used:

AED Design Requirements - Site Layout Guidance, latest version

AED Design Requirements - Well Pumps & Well Design, latest version

AED Design Requirements – Water Tank and Water Distribution Systems, latest version

AED Design Requirements - Booster Pumps, latest version

AED Design Requirements – Chlorinators, latest version

AED Design Requirements - Hydro-Pneumatic Tanks, latest version

AED Design Requirements - Jockey Pumps, latest version

AED Design Requirements - Water Tanks, latest version

AED Design Requirements – Hydrology, latest version

AED Design Requirements - Culvert and Causeway Design, latest version

AED Design Requirements - Sanitary Sewer and Septic Systems, latest version

AED Design Requirements - Grease Trap, latest version

AED Design Requirements - Oil-Water Separator, latest version

AED Design Requirements - Package Wastewater Treatment Plants and Lagoons, latest version

AED Design Requirements - Vertical Curves, latest version

AED Design Requirements – Horizontal Curves & Super elevation , latest version

AED Design Requirements – Geotechnical Investigations for USACE Projects, latest version

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.

## **1.9 AED DESIGN REQUIREMENTS DOCUMENTS**

AED Design Requirements documents (latest version) listed above shall be adhered to in this contract. These documents are available from the COR. These documents shall be used as the basis for design and construction, and for selecting options within the United Facilities Guide Specifications (UFGS). It is the contractor's option to use specifications contained in the AED Design Requirements Documents, when provided, or to adapt the UFGS specifications to match the requirements provided in the AED Design Documents and specifications. Site or project specific data and requirements in the AED Design Requirements documents shall supersede UFGS language where there are differing criteria which must be evaluated and selected.

## **2.0 SITE DEVELOPMENT**

### **2.1 ENVIRONMENTAL PROTECTION**

#### **2.1.1 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.

#### **2.1.2 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.

#### **2.1.3 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.

#### **2.1.4 DISPOSAL**

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

### **2.2 CIVIL SITE DEVELOPMENT**

#### **2.2.1 EXISTING CONDITIONS MAP AND SITE PLAN**

The Contractor shall prepare an Existing Conditions Map of the property including a Boundary and Site Survey. The survey shall show the closure of the property boundary consisting of identifying all property corners, establishing horizontal and vertical control, listing all bearing and distances of property lines from all property corners, and tie-ins (showing bearing and distance) from at least two (2) major offsite man-made or natural features. This survey shall meet the requirements of World Geodetic System 1984 (WGS 84 UTM Zone 41S in decimal degrees). The Existing Conditions Map shall include topographic information with existing contour lines and spot elevations of relevant topographic features, and show the locations of all on-site and nearby offsite existing features including but not limited to buildings, structures, major trees, road pavements and right of ways, names of roads, widths of roads, easements, right of way, setbacks, parking, paved areas, storage containers, stoops, sidewalks,

walkways, walls, fences and gates, HESCO barriers, and existing underground and aboveground utilities, dry creek beds, drainage channels, etc. and hydrological, geological, and vegetative or other physical conditions that could impact design. If there are areas where offsite surface water runoff has the potential to affect this project, topographic information of these areas will be required to be provided.

Based on the Boundary Survey a separate Site Plan shall be prepared showing the property boundary, and all proposed surface features including but not limited to buildings, roads, setbacks, parking and paving areas, storage containers, stoops, sidewalks and walkways, above ground utilities, bunker locations. The contractor shall identify and show perimeter walls, fences and gates, guard towers and entry control point structures. Also shown on the Site Plan shall be pertinent existing features (on-site and off-site) that will have an influence or impact on the development of the site. The Contractor shall locate the facilities in agreement with the associated drawings included and any requirements in Section 01010. All 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. All site plans and master plans shall be drawn in the following projection and datum for incorporation into the USACE GIS system:

WGS 1984 UTM Zone 41 South

### **2.2.2 DEMOLITION**

Demolition shall include removal of all structures, foundations, pavements, and utilities, and clearing and grubbing. Lengths of fence shall be removed for new gates and for the convoy assembly area.

Holes and depressions shall be backfilled.

### **2.2.3 SITE GRADING & DRAINAGE**

The Contractor shall 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 200mm above finished grade and slope away from the building on all sides at a minimum of 5% for 3 meters. All other grading on site shall be a minimum of 1% to ensure proper drainage. Protection of facilities from flood waters originating offsite of an installation shall be based on a rainfall for a 10 ~~25~~-year frequency event.

Proper drainage calculations shall be conducted in order to size drainage structures and channels properly.

Rainfall data shall be based on data obtained from meteorological records collected in Afghanistan. National agencies may be consulted for data. In the absence of site specific data, intensity-duration-frequency curves contained in the AED Design Requirements – Hydrology-most recent version shall be used by extrapolating the rainfall intensity information from the stations in closest proximity to the project.

Under no circumstances will relationships developed by extrapolation of hydrological data from foreign countries be used for hydrologic studies.

## **2.3 ROADS, PARKING, MANEUVER AREAS AND WALKWAYS**

Location, type, and width of roads, parking, maneuver, and storage areas required are stated in Section 01010. Roads, parking, maneuver, and storage areas shall be geometrically designed, graded for proper drainage, and provided with necessary drainage structures. 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, parking, maneuver, and storage area preexisting conditions are determined to be substantially or materially different than the above-described conditions/estimates.

All intersecting roads, parking, maneuver areas, storage areas, and walkways, driveways, and culvert crossings are required to end with a smooth transition with new road profiles.

All roads and areas indicated in Section 01010 to have aggregate surface shall consist of minimum 100 mm thick compacted aggregate base course compacted to 95% maximum density placed above minimum 150 mm thick of scarified sub-grade compacted to 95% maximum density, unless otherwise noted.

For all aggregate roads, the Contractor shall provide 1.0 m wide, aggregate base shoulder compacted to 95% maximum density that is 150 mm thick at 2.0% slope on both sides of the roadway. Provide 1.0 m wide shoulder around all parking areas and service areas consisting of 150 mm thick aggregate base course material at 2.0% slope. The centerline of all roads shall be sloped a minimum of 1% and a maximum of 8%.

All roads/driveways shall be designed geometrically with applicable sections of UFC 3-250-18FA and UFC 3-250-01FA to accommodate WB-50 five axle vehicles with a maximum speed of 20 kilometers per hour. Pavement surfaces shall be designed for a design life of 25 years, Road Class F, Category IV.

The above roadway/driveway structures dictated above are minimum requirements. Design of roads, parking, maneuver, and storage areas shall be conducted based on geotechnical data. The geotechnical data shall be used to calculate the pavement structure using the minimum pavement structure as dictated above as a reference. Reference Section "Geotechnical" below.

Aggregate Base Course (ABC) material must be well graded, durable, 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 in ASTM D 1557.

### **2.3.1 PROPERTY LINE ENCLOSURE**

The Contractor shall design and construct a perimeter enclosure consistent with the "Concept Site Plan" of the Appendix. The base bid shall include a perimeter chain link fence installation and an optional perimeter native stone wall shall be provided as an alternate.

For all fire lane design see National Fire Protection Association (NFPA) Life Safety Code 1, latest edition.

#### **2.3.1.1 PERIMETER WALL**

The perimeter walls shall be steel reinforced concrete core wall with native stone veneer or a steel reinforced stone wall. The height of the walls shall measure at least 2.5 m from the inside grade and be a minimum of 600mm thick/depth. Inside grade shall in all cases be higher than outside grade. The wall shall be capped with a cast-in-place concrete capping.

#### **2.3.1.2 CHAIN-LINK FENCE**

Provide chain-link fences 2600mm in height and gates where required with pad locks. Chain link fence and gate fabric shall be No. 9 gage wires woven into a 50 mm diamond mesh. Fabric shall be coated with 366 grams per square meter zinc galvanizing. Posts shall be ASTM F 1083 Pipe, Steel, Hot Dipped Zinc Coated (Galvanized) Welded or equal. Top of fence posts shall receive metal caps. Post sizes shall be provided as shown on drawings.

## **CIVIL UTILITIES**

### **2.3.2 WATER**

#### **2.3.2.1 GENERAL**

The Contractor shall provide water distribution mains, branches, service connections to include all pipe, valves, bends, thrust blocking, fittings and appurtenances. Exterior water line construction shall include service to all buildings as described in the Scope of Work Section 01010. The water system shall be designed to operate between 345-414 kPa. Minimum pressures of 207 kPa will be allowed at peak domestic flow conditions. The required average daily flow (ADF) shall be the average daily demand (ADD) per person - derived from 190 liters per capita per day (lpcd) – times a capacity factor (CF) of 1.5, times the effective population.

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 all buildings with water service. Every hose spigot shall have a lockable valve on its water line located inside an adjacent building or in a valve box. All buildings with water supply shall have a water meter installed in a locked cabinet area inside the building.

## **2.3.3 WATER DISTRIBUTION SYSTEM**

### **2.3.3.1 GENERAL**

The Contractor shall provide a water distribution system. Use similar piping materials for all buildings and pipe runs in the distribution system for efficiency of future maintenance activities. Water supply distribution shall connect to a building service at a point approximately 1.5 m outside the building or structure to which the service is required. All piping and joints shall be capable of at least 1.03 MPa leakage testing and 1.38 MPa hydrostatic pressure test, unless otherwise specified. Pipe diameters shall be adequate to carry the maximum flow of water at velocities less than 1.5m/sec. Piping segments where velocities less than 0.15 m/sec are anticipated shall be noted and brought to the attention of AES. The operating pressure range shall be between 345 kPa to 414 kPa at all points of the distribution system. If pressures greater than 690 kPa cannot be avoided, pressure-reducing valves shall be used. A system pressure of 207 kPa (30 psi) is acceptable at extreme peak flow conditions. A system pressure below 207 kPa shall be considered a deviation in the technical requirements requiring Contracting Officer approval.

Contractor shall not use HDPE pipe and fittings, regardless if existing project water distribution system had this pipe material.

Adequate cover must be provided for frost protection. A minimum cover of 800 mm is required to protect the water distribution system against freezing. Water lines less than 1.25 m deep under road crossings shall have a reinforced concrete cover of at least 150 mm thickness around the pipe extending out to 1 m from each road edge.

### **2.3.3.2 PIPE**

The Contractor shall provide Ductile Iron or PVC pipe of adequate strength, durability and be corrosion resistant with no adverse effect on water quality.

#### **2.3.3.2.1 WATER MAINS AND BRANCHES**

Water main diameter shall be based on the installation fixture unit flow or two times the ADF ( $ADD \times c \times CF$ ) and velocity requirements per this guide unless a minimum diameter is specified which is adequate to provide flow and meet the specified maximum velocity. Pipe material for water mains and branches shall be PVC or Ductile Iron (DI). The exterior surface of the pipe must be corrosion resistant. Distribution lines shall not be less than 100mm in diameter. Pipe diameters shall be 100mm and larger. Pipe diameters shall be selected to meet the previously specified flow, velocity, and pressure conditions. If Ductile Iron (DI) pipe is installed underground the pipe shall be encased with polyethylene in accordance with AWWA C105. Ductile iron pipe shall conform to AWWA C104. DI fittings shall be suitable for 1.03 MPa 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. DI fittings shall be cement mortar lined (standard thickness) in accordance with C104. All pipes and joints shall be capable of at least 1.03 MPa leakage test and 1.38 MPa hydrostatic pressure test unless otherwise specified herein. 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, Schedules 40, 80 and 120. PVCu pipe couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. Pipe less than 80mm (3 inch), screw joint, shall conform to dimensional requirements of ASTM D schedule 80. Elastomeric gasket-joint, shall conform to dimensional requirements of ASTM D 1785 Schedule 40, PVCu (or uPVC) pipe and fittings shall have SDR that provide equal or superior strength properties to ASTM 1785 SCH 40 or SCH 80 pipe and fittings.

### **2.3.3.2.2 WATER SERVICE**

Water service line diameter based on fixture units of the building serviced or per contract. Building service lines will be sized according to the following guidance. Water service connections from the mains to the buildings shall vary from 19mm, 25mm, 38mm, 75mm, to 100mm as calculated, depending on the maximum flow velocity and minimum pressure requirements as determined by hydraulic analysis of fixture flows. 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. PVC pipe couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. Contractor shall not use HDPE for any of the water pipes.

### **2.3.3.3 VALVES**

Valves (Gate valves w/box) shall be placed at all pipe network tees and cross intersections, and the number of valves shall be one less than the number of lines leading into and away from the intersection. For isolation purposes valves shall be spaced not to exceed 3600 mm (12 feet). Gate valves shall be in accordance with AWWA C 500 and/or C509. Butterfly valves (rubber seated) shall be in accordance with C504 etal. The valves and valve boxes shall be constructed to allow a normal valve key to be readily used to open or close the valve. Provide traffic-rated valve boxes. Provide concrete pad, 1 m square, for all valve boxes.

### **2.3.3.4 VACUUM AND AIR RELEASE VALVES**

Air release valves are required to evacuate air from the main high points in the line when it is filled with water, and to allow the discharge of air accumulated under pressure. Vacuum relief valves are needed to permit air to enter a line when it is being emptied of water or subjected to vacuum. Contractor shall submit manufacturer's data for properly sized combination air and vacuum release valves and determine their locations on the distribution system subject to review and approval of the Contracting Officer.

### **2.3.3.5 BLOW-OFF VALVES**

The Contractor shall provide 40-50 mm blow-off valves at ends of dead end mains. Valves should be installed at low points in the mains where the flushing water can be readily discharged to natural or manmade drainage ditches, swales or other.

### **2.3.3.6 THRUST BLOCKING**

Contractor shall provide concrete thrust blocking at any point where the layout of the system changes the direction of the flow, increases the velocity, or decreases or stops the flow. At these points, the pipes and fittings must be anchored and kept from moving or pulling apart by the use of thrust blocks installed against undisturbed earth.

### **2.3.3.7 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 concrete thrust blocking, unless otherwise approved. Pressure and leakage testing shall be as specified in AED Design Requirements – Water Tank and Water Distribution Systems, latest version.

#### **2.3.3.7.1 TIME FOR MAKING (HYDROSTATIC/PRESSURE) TESTS**

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipeline jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill.

#### **2.3.3.7.2 CONCURRENT (HYDROSTATIC AND LEAKAGE) 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. Pressure and leakage testing may be conducted concurrently. Hydrostatic tests and disinfection may be conducted concurrently using water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be re-accomplished.

### **2.3.3.7.3 HYDROSTATIC (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 1.38 MPa. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants and valves shall be carefully examined during the partially opened trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered following this pressure test shall be removed and replaced and retested until the test results are satisfactory.

### **2.3.3.7.4 LEAKAGE TEST**

Leakage tests shall be conducted after all pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and, during the test, water lines shall be subjected to not less than 1.01 MPa. 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 34.5 kPa of the specified leakage test pressure after the pipe has been filled with water and all air expelled. Pipe installation will not be accepted if leakage exceeds the allowable leakage, as determined by the following formula:

US UNITS:

$L = 0.0001351 * N * D * (P \text{ raised to } 0.5 \text{ power})$ , where:  
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 UNITS:

$L = 0.00042454 * N * D * (P \text{ raised to } 0.5 \text{ power})$ , where:  
L = Allowable leakage in liters per hour  
N = Number of joints in the length of pipeline tested  
D = Nominal diameter of the pipe in mm  
P = Average test pressure during the leakage test, in MPa gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the government.

### **2.3.3.7.5 PIPELINE DISINFECTION TESTS**

#### **2.3.3.7.5.1 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 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.

### **2.3.3.7.5.2 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. Contractor shall submit a water sampling protocol for approval. This shall include at a minimum the name of the laboratory, parameters to be tested, the Company conducting the sampling, and the sample locations.

### **2.3.3.7.5.3 ACCEPTANCE REQUIREMENTS**

The disinfection shall be repeated until tests indicate the absence of bacteria for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained. All retests shall be conducted at the Contractor's expense.

## **2.3.4 WATER SUPPLY SYSTEM**

### **2.3.4.1 GENERAL**

Design of the water supply system shall be in accordance with the AED Design Guides indicated in paragraph 2.0 above. The Contractor shall provide water distribution mains, branches, service connections to include all pipe, valves, bends, thrust blocking, 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 flow (ADF) shall be the average daily demand (ADD) per person - derived from 190 liters (or 50 gallons) per capita per day (lpcd) – times a capacity factor, times the effective population. A capacity factor of 1.5 shall be used if the effective population is less than or equal to 5,000. The capacity factor for larger populations is found in UFC 3-230-07a, Water Supply: Sources and General Considerations guidance. The capacity factor shall be utilized as described in the following paragraph. 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 outside water hydrant (hose spigot) for all buildings with water service. All buildings with water supply shall have a water meter installed in a locked cabinet area inside the building.

Features of the water system shall be sized to provide flow or storage capacity as follows:

- Water Well Pump Capacity - Capacity and total dynamic head (TDH) shall be based on an adjusted ADF (ADD, times the population, times the capacity factor) over a 16 hour period).
- Water Tank - Capacity shall be 72,000 liters ( approx. 19,000 gal.).
- Booster Pumps – For installations with fewer than 400 persons, the capacity shall be based on the installation wide, total fixture unit flow. For installations with greater than 400 persons, the capacity shall be based on the installation wide, total fixture unit flow or 2 times the average daily flow (16 hour basis), whichever is greater. Three identical pumps shall be provided which are all sized to deliver 50 percent of the calculated capacity. Pumps shall automatically alternate to distribute wear and shall automatically turn on and off based on demand and system pressures. The total dynamic head (TDH) of the booster pumps shall be calculated to maintain a minimum, residual system pressure of 40 psi at the calculated capacity unless stated otherwise in the contract documents. Either a bladder style expansion tank or a hydro-pneumatic tank shall be supplied when booster pumps are used in the water system.
- Hydro pneumatic tanks – Volume and pressure regulation to maintain a pressure range provided in the technical requirements based on a rate equal to the ADF (ADD x c x CF).

- Water Mains – Diameter based on the installation fixture unit flow or two times the ADF (ADD x c x CF) and velocity requirements per this guide unless a minimum diameter is specified which is adequate to provide flow and meet the specified maximum velocity. The flow through the system shall be distributed on the basis of fixture unit flow in each the buildings serviced or per contract
- Water Service Lines - Diameter based on fixture units of the building serviced or per contract

### **2.3.4.2 WATER WELLS**

The contractor shall construct water well(s) inside the compound, to provide sufficient supply for the facility. The new well capacity shall be based on the allowable safe yield of the new well determined by a well pump test as described in the USACE- AED Design Requirements - Well Pumps & Well Design/Specifications, latest version. The new well site shall be at a location approved by the Government. The new well site shall be no closer than 75 m from any existing wells. Well construction shall be in accordance with the USACE-AED Well Design Guide and Water Well Guide Specification.

After mine clearance, but prior to the construction of any structures, the Contractor shall submit a well test plan to drill and test the water well, conduct well design activities, and submit all required information to AED for review prior to installing any permanent well features. Drilling shall not proceed without an AED Engineering approved well drilling plan. A plan for decommissioning dry wells shall be included with the well drilling plan. It is acknowledged that water may not be available at the site despite Contractor good faith efforts to find it.

Well Capacity shall be equal to one day’s demand delivered over 16 hours of pumping time.

Well construction shall be in accordance with AED Design Requirements - Well Pumps & Well Design/Specifications, latest version - which includes, but is not limited to, requirements for well screen, casing, gravel pack, well pump, disinfection, and testing requirements. All design requirements, material specifications, and testing contained in this document shall be used and submittals shall be made promptly in accordance with Section 01335. Failure to follow the construction and submittal procedures outlined may, at AED’s discretion, result in rejection of the well and, the contractor having to remove the well casing and screen, re-drill the well and reinstall the proper features per the approved design.

Well Depth. The well shall be drilled to bedrock. The depth of the permanent well shall take into consideration the drawdown depth, screen depth and pump submergence as described in the AED Design Requirements document.

Casing. Selection of the casing diameter, material and depth shall be per the AED Design Requirements document. All wells will be cased 150 mm above grade (i.e., base of pit, ground surface, etc.) and be fitted with a lockable cap with air gap (vacuum relief during pumping). Each section of casing will be joined with standard couplings and full-threaded joints, or by proper welding, so that all joints are sound and watertight. Well casing alignment shall not interfere with the proper installation and operation of the pump.

Screen. The casing will be fitted with a well screen that will permit maximum transmission of water without clogging. The material of construction, opening requirements, minimum lengths and placement shall be per the AED Design Requirements document.

Sealing - The drilling process will create a hole (borehole) larger than the casing. To protect the well and properly finish construction, the entire space between the casing and the edge of the borehole will be filled with gravel, overburden, or concrete as follows:

- a. The upper 3 m of the well bore will be sealed with cement grout. Grout shall be placed in one continuous mass and be impermeable.
- b. The space around the well screen will be filled with material that will form a filter and not clog the slots in the screen (e.g. washed coarse sand for a fine bore wall material).
- c. The space between the top of the filter pack and the base of the grout seal may be backfilled with overburden or other clean earth material.

Crushed Stone. Per the AED Design Requirements, crushed stone for well sealing shall consist of crushed stone containing angular shapes and surfaces with no rounded surfaces shall be used for sealing the solid wall casing and

edge of the borehole area. All aggregate shall contain less than 5 percent of shale, clay lumps, coal, lignite, soft or unfragmented stone, or other deleterious materials.

Source protection - Surface drainage within 30 m of wellhead shall ensure no ponding, flooding or collection of runoff adjacent to the well. This can be accomplished through surface grading or use of gravel drains to modify site drainage in the vicinity of the well. Contractor shall identify all sources of contamination and ensure the proposed well site meets minimum standoff distances as indicated below:

Sewage storage areas (outhouses, tanks, individual sewage pits, lagoons, and WWTP) – 30 m

Septic fields (infiltration galleries) – 30 m

Fuel storage, engine maintenance/repair – 30 m

Well Pump – A submersible, centrifugal pump shall be installed inside the casing set no less than 2.0 m from the base of the excavation. Control of the pump shall be by means of a Hand-Off-Auto (HOA) switch. In the “Auto” position, the pump shall be started and stopped automatically by water levels in the water storage tank. Pump shall start at low level and shall stop at high level. Level controls shall be adjustable. Manual start shall be the Hand position.

Expansion Tank – Provide bladder style expansion tank for well pump to minimize pressure surges and water hammer effects.

### **2.3.4.3 WELL PUMP TESTING**

Well pump testing and water clarity testing after well development shall be per the requirements in AED Design Requirements - Well Pumps & Well Design/Specifications, latest version or most recent version.

### **2.3.4.4 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.

See USACE-AED Well Pumps & Well Design Guide with Attachment A – Guide Specifications for Drinking Water Wells, latest version and Appendix A of TM 5-813-3 (UFC 3 230 08a Water Supply Water Treatment, January 2004) for requirements for laboratory testing.

### **2.3.4.5 WELL HOUSE**

Construct a permanent well house with reinforced concrete slab floor, reinforced CMU walls, and a reinforced concrete roof in accordance with the provided drawings of the Appendix. The floor of the well house shall slope away from the casing approximately 3 mm per 300 mm (1/8 in per foot) and drain to the outside. Floor of well house shall be minimum 300 mm above adjacent grade. The well house design should be such that the well pump, motor, and drop pipe could be removed readily by providing an insulated roof hatch in the building roof and secured with a hasp and lock. The well house shall protect valves and pumping equipment plus provide freeze protection for the pump discharge piping beyond the check valve. The well house shall be insulated at the roof/ceiling and walls. Provide a heating unit within the well house with thermostat and a disconnect switch. The entry door shall be an insulated heavy duty hollow metal unit with a metal frame. Louvers are not permitted in the exterior well hose door. The well shall be protected from unauthorized use by a security fence with lockable gate. Provide outriggers, barbed wire and concertina wire on fence and gate.

### **2.3.4.6 RAW WATER DISINFECTION**

Contractor shall perform disinfection of the well water in accordance with AED Design Requirements - Well Pumps & Well Design/Specifications, latest version. Bacteriological samples shall be collected and examined in accordance with Standard Methods for the Examination of Water and Wastewater by a qualified lab as approved by the Contracting Officer.

#### **2.3.4.7 SERVICE BOOSTER PUMPS**

Contractor shall provide a booster pump station with capacities defined above 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). Provide suitable expansion tank for booster pump system sized for anticipated pressure surges, if hydro pneumatic tanks are not to be used. 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 gage and air relief valve.

#### **2.3.4.8 WATER STORAGE TANK**

Contractor shall provide a commercially fabricated water storage tank. Volume of the water storage tank shall be 72,000 liters ( approx.19,000 gal.) in capacity . The storage facility shall be located above drainage areas and locations subject to flooding as approved by the Contracting Officer. Overflow and air vents shall be screened so that birds, rodents and debris cannot enter the reservoir. The tank shall meet all applicable codes for potable water storage. The interior coatings for the tank shall meet NSF/ANSI 61 requirements. Contractor shall ensure that all elements of the Water

#### **2.3.4.9 DISINFECTION & CHLORINATION SYSTEM**

Use hypochlorite compounds for disinfection. A manufacturer assembled, self-contained, skid-mounted, hypo-chlorinator consisting of mixer, mixing tank, pump pipe injector, and control panel shall be used to feed a sodium hypochlorite solution of 1- 5 percent available chlorine into the system. Hypochlorite compound may be a liquid or solid form. The pump shall feed a hypochlorite solution in proportion to the water demand. The hypo-chlorinator shall have a pumping rate, liters per day (lpd) (gallons per day (gpd)) adequate to deliver 5 percent available hypochlorite solution adjustable to the quantity of water being produced from the source. The chlorine-feeding system shall consist of controls and devices necessary for a complete operating system. Dosage rate will vary somewhat depending on actual pump production rate and available residual chlorine in the system. Contractor shall determine the required dosage rate milligrams per liter (mg/l) to maintain the required chlorine residual (usually 0.2-0.4 mg/l) in the distribution system. Chlorine solution tank shall be large enough to hold a three days supply of hypochlorite solution. A fresh solution shall be prepared every two or three days because the solution may lose its strength over time and this will affect the actual chlorine feed rate. The hypochlorite shall be stored in a cool dry place. Sodium hypochlorite can lose from two to four percent of its available chlorine content per month at room temperature. Contractor shall verify required minimum residual chlorine in accordance with local requirements verified and approved by the Contracting Officer. The chlorination system shall have the capability for manually adjusting the dosage rate and be installed in such a manner that the system can be easily disconnected and bypassed in the event of health safety or routine maintenance and repair. Disinfection of water mains shall be in accordance with AWWA standard C651-86 and disinfection of storage facilities in accordance with AWWA standard C652-86. The package disinfection system shall be located in the well pump house.

### **2.3.5 SANITARY SEWER**

#### **2.3.5.1 GENERAL**

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. Sanitary sewers less than 1.25 meters under road crossings shall have reinforced concrete cover at least 150 mm thick around the pipe. Concrete cover will extend out to at least 1 m from each road edge.

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 the initial occupancy and a reasonable expansion capability. Sewer collection capacity shall be based on the two times the average daily wastewater flow unless minimum diameter specified is adequate to provide flow and required maximum velocity; wastewater flow through the system shall be distributed on the basis of fixture unit flow in each the buildings serviced by multiplying the proportion of the total fixture flow from each building or facility times the total wastewater flow for the project or installation as determined above.

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.

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 for gravity sewers.
- 2) Check subsurface investigations for groundwater levels and types of subsoil encountered. If possible, avoid areas of high groundwater and the placement of sewers below the groundwater table.
- 3) Avoid routing sewers through areas which require extensive restoration or underground demolition.
- 4) Depending upon the topography and building locates, 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. The intent is to provide future access to the lines for maintenance without impacting vehicular traffic.
- 5) Avoid placing manholes in low-lying areas where they could be submerged by surface water or subject to surface water inflow. In addition, all manholes shall be constructed 50 mm higher than the finished grade, with the ground sloped away from each manhole for drainage.
- 6) Sewer lines shall have a minimum of 800 mm of cover for frost protection.
- 7) Locate manholes at change in direction, pipe size, or slope of gravity sewers.
- 8) Sewer sections between manholes shall be straight. The use of a curved alignment shall not be permitted.
- 9) If required by the design, locate manholes at intersections of streets where possible. This minimizes vehicular traffic disruptions if maintenance is required.
- 10) Sewer lines less than 1.25 m deep under road crossings shall have a reinforced concrete cover of at least 150 mm thickness around the pipe or shall utilize a steel or ductile iron carrier pipe. It is recommended to continue the reinforced concrete cover or carrier pipe a minimum of one (1) m beyond the designated roadway.
- 11) Verify that final routing selected is the most cost effective alternative that meets service requirements.

### **2.3.5.2 PROTECTION OF WATER SUPPLIES**

The Contractor shall ensure that the sewer design meets the following criteria:

- 1) Sanitary sewers shall be located no closer than 30 m horizontally to water wells or reservoirs to be used for potable water supply.
- 2) Sanitary sewers shall be no closer than 3 m horizontally to potable water lines; where the bottom of the water pipe will be at least 300 mm above the top of the sanitary sewer, horizontal spacing shall be a minimum of 1.8 m.
- 3) Sanitary sewers crossing above potable water lines shall be constructed of suitable pressure pipe or fully encased in concrete for a distance of 3 m on each side of the crossing. Pressure pipe will be as required for force mains in

accordance with local standards and shall have no joint closer than 1 m horizontally to the crossing, unless the joint is fully encased in concrete.

4) When sanitary sewers cross water lines the designer shall cross the water line above the sewer line whenever possible. In such cases the water line shall be located a minimum distance of 450 mm above the sewer line or shall be fully encased in concrete for a distance of 3 m on each side of the crossing.

### **2.3.5.3 GRAVITY SEWER**

Sanitary sewers shall be designed in accordance with the AED Design Requirements for Sanitary Sewer and Septic Systems, latest version to flow at a maximum in the following way:

- 1) Sanitary sewer laterals, mains and trunk lines flow velocities shall be designed to provide a minimum velocity of 0.6 meters per second (mps).
- 2) A minimum velocity of 0.8 mps at the peak diurnal flow rate.
- 3) Flows shall be based on allocating the proportion of the average daily or peak daily flow to each building or facility on the basis of fixture unit flow developed for the plumbing design.
- 4) Minimum pipe slopes shall be provided regardless of the calculated flow velocities to prevent settlement of solids suspended in the wastewater. Minimum pipe slopes are provided in the AED Design Requirements for Sanitary Sewer and Septic Systems.

Unless otherwise indicated (see Building Connections and Service Lines), gravity sewer pipe shall be installed in straight and true runs in between manholes with constant slope and direction. Adequate cover must be provided for frost protection. A minimum cover of 800 mm will be required to protect the sewer against freezing.

#### **2.3.5.3.1 MANHOLES**

The Contractor shall provide standard depth manholes (MH), (depth may vary) an inside dimension of 1.2 m. Manholes shall be made of cast-in-place reinforced concrete with reinforced concrete cover. Alternate pre-cast manhole option shall taper to a 750 mm cast iron frame that provides a minimum clear opening of 600 mm. 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. Sanitary sewer lines shall enter at the manhole flow line. Where the invert of the inlet pipe would be more than 0.5 meter above the manhole floor, a drop inlet shall be provided. No internal drop structures shall be permitted at lift stations. Inlet to lift station wet wells shall enter below the lowest water level of the pump operating range, and if necessary a drop inlet approach pipe external to the lift station may be used to avoid cascading influent flow. The angle between inflow and outflow pipes converging at a manhole shall not be less than 90°.

#### **2.3.5.3.2 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. Manholes shall be installed at start of all main runs.

#### **2.3.5.3.3 SPACING**

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

#### **2.3.5.3.4 PIPE CONNECTIONS**

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

#### **2.3.5.3.5 FRAMES AND COVERS**

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

#### **2.3.5.3.6 STEPS FOR MANHOLES**

Steps shall be cast iron, polyethylene coated, at least 15 mm thick, not less than 400 mm in width, spaced 300 mm on center.

#### **2.3.5.4 PIPE**

Pipe shall conform to the respective specifications and other requirements as follows: Provide Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 3034, Type PSM with a maximum SDR of 35, size 380 mm or less in diameter. PVC shall be certified as meeting the requirements of ASTM D 1784, cell Class 12454 B. Minimum pipe sizes for the main lines and laterals shall be 200 mm diameter and service lines shall be a minimum of 150 mm diameter. Contractor may use uPVC pipe provided the SDR and strength properties of the pipe equal or exceed the properties of ASTM D 1784 for PVC.

##### **2.3.5.4.1 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.

##### **2.3.5.4.2 JOINTS**

Joints installation requirements shall comply with the manufacturers installation instructions. Flexible plastic pipe (PVC or high density polyethylene pipe) gasket joints shall conform to ASTM D3212.

##### **2.3.5.4.3 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. The minimum depth of the cover over the pipe crown shall be 0.8 m.

##### **2.3.5.4.4 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 30 m from the building cleanout. Tee connections to the main or branch are not allowed. Service connection lines will be a minimum of 150 mm diameter and laid at a minimum 1% grade. Laterals shall be 200 mm and sloped to maintain the minimum velocity as described in paragraph "Gravity Sewer."

##### **2.3.5.4.5 CLEANOUTS**

Cleanouts must be installed on all bends of 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 will be of the same diameter as the building sewer, and never be smaller than 150 mm. If there are no bends in the sewer building connection, a cleanouts shall be installed within 1 m from the building.

## **2.3.5.5 FIELD QUALITY CONTROL**

### **2.3.5.5.1 FIELD TESTS AND INSPECTIONS**

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment and incidentals required for testing.

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically a full circle of light through the pipeline when viewed from the adjoining end of the line. When pressure piping is used in a non-pressure line for non-pressure use, test this piping as specified for non-pressure pipe.

Test lines for leakage by either infiltration tests or exfiltration tests. Prior to testing for leakage, backfill trench up to at least lower half of the pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe to prevent movement during testing, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

Infiltration tests and ex-filtration tests: Perform these tests for sewer lines made of specified material, not only concrete, in accordance with ASTM C 969M, ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969M and ASTM 969.

Perform Low Pressure Air tests as follows:

- 1) Concrete pipe: Test in accordance with ASTM C 924M, ASTM C 924. Allowable pressure drop shall be given in ASTM C 924M ASTM C 924. Make calculations in accordance with the Appendix to ASTM C 924M, ASTM C 924.
- 2) Ductile-iron pipe: Test in accordance with the applicable requirements of ASTM C 924M, ASTM C 924. Allowable pressure drop shall be as given in ASTM C 924M, ASTM C 924. Make calculations in accordance with the Appendix to ASTM C 924M, ASTM C 924.
- 3) PVC Plastic pipe: Test in accordance with applicable requirements of UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.

### **2.3.5.5.2 DEFLECTION TESTING**

Deflection testing will not be required however; field quality control shall ensure that all piping is installed in accordance with deflection requirements established by the manufacturer.

## **2.3.6 STORM SEWER SYSTEMS**

### **2.3.6.1 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 ~~20~~-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 be based on 10 ~~20~~-year rainfall event. Protection of installations against flood flows originating from areas exterior to the base installation shall be based on a minimum 10 ~~25~~-year rainfall event.

## **2.3.7 WASTEWATER TREATMENT SYSTEMS**

### **2.3.8 SEPTIC SYSTEM**

Generally when determining an appropriate septic tank location, the Contractor shall provide protection for the septic system by ensuring that vehicles, material storage, and future expansion shall be kept away from the area.

Signage or other prevention methods (i.e. pipe bollards) shall be used to provide this protection. The finished grade for the site shall ensure that storm water runoff shall drain away from the site to prevent ponding, inflow, and infiltration. Once an appropriate site is located, the Contractor shall conduct soil investigations for the site to determine ground water levels, soil conditions, and the percolation rate. Septic systems shall be designed and installed in accordance with UFC 3-240-09A, Domestic Wastewater Treatment, latest edition, and the following guidance:

### **2.3.8.1 SITE SURVEY**

The Contractor shall conduct a topographic survey to determine existing site characteristics. The Contractor shall conduct a utility survey to determine the locations of any nearby water lines, wells, sanitary sewers, storm sewers and electrical lines.

### **2.3.8.2 PERCOLATION TESTING**

At proposed sites for holding ponds and the absorption field, the Contractor shall perform percolation tests. Percolation testing may be carried out with a shovel, posthole digger, solid auger or other appropriate digging instruments. Percolation tests shall be accomplished uniformly throughout the area where the absorption field is to be located. Percolation tests determine the acceptability of the site and serve as the basis of design for the liquid absorption. - Percolation tests will be made as follows (see Figure 1). All percolation testing shall be submitted promptly according the submittal schedule in Section 01335.

Six or more tests will be made in separate test holes uniformly spaced over the proposed absorption field site. The average of the six tests shall be determined and will be used as the final result. The location of each test shall be clearly and accurately shown on the site plan submitted to AED.

Dig or bore a hole to the required depth of the proposed trenches or bed, with dimensions necessary to enable visual inspection during percolation testing.

Carefully scratch the bottom and sides of the excavation with a knife blade or sharp-pointed instrument to remove any smeared soil surfaces and to provide natural soil interface into which water may percolate. Add 50 mm of gravel (of the same size that is to be used in the absorption field) to the bottom of the hole. In some types of soils the sidewalls of the test holes tend to cave in or slough off and settle to the bottom of the hole. It is most likely to occur when the soil is dry or when overnight soaking is required. The caving can be prevented and more accurate results obtained by placing in the test hole a wire cylinder surrounded by a minimum 25 mm layer of gravel (of the same size that is to be used in the absorption field.).

Carefully fill the hole with clear water to a minimum depth of 300mm above the gravel or sand. Keep water in the hole at least 4 hours and preferably overnight. In most soils it will be necessary to augment the water as time progresses. Determine the percolation rate 24 hours after water was first added to the hole. In sandy soils containing little clay, this pre-filling procedure is not essential and the test may be made after water from one filling of the hole has completely seeped away.

The percolation rate measurement is determine by one of the following methods:

If water remains in the test hole overnight, adjust the water depth to approximately 150 mm above the gravel. From a reference batter board, as shown in Figure 1, measure the drop in water level over a 30-minute period. This drop is used to calculate the percolation rate.

If no water remains in the hole the next day, add clean water to bring the depth to approximately 150mm over the gravel. From the batter board, measure the drop in water level at 30-minute intervals for 4 hours, refilling to 150mm over the gravel as necessary. The drop in water level that occurs during the final 30-minute period is used to calculate the percolation rate.

In sandy soils (or other soils in which the first 150mm of water seeps away in less than 30 minutes after the overnight period), the time interval between measurements will be taken as 10 minutes and the test run for 1 hour. The drop in water level that occurs during the final 10 minutes is used to calculate the percolation rate.

The percolation rate is the number of minutes it takes to drop 25 mm. Table 2 lists percolation rates and the corresponding absorption field sizing factor (liters/m<sup>2</sup>/day). The sizing factors are used, in conjunction with average daily demand (ADD), to determine the size of the absorption field.

Example: Calculating the percolation rate:

In 30 minutes, the measured drop in the water level is 15 mm.

Minutes/25mm = Time/ (drop/25mm) = 30 minutes/ (15mm/25mm) = 50 Minutes/25 mm, where  
Minutes/25mm = Minutes for water to drop 25 mm.

### 2.3.8.3 SEPTIC TANK

Septic tanks are buried, watertight receptacles design and constructed to receive and partially treat wastewater. The tank separate solids from the liquid, provides limited digestion of organic matter, stores solids, and allows the clarified liquid to discharge for further treatment and disposal. Settle able solids and partially decomposed sludge accumulate at the bottom of the tank, while scum rises to the top of the tank's liquid level. The partially clarified liquid is allowed to flow through an outlet opening position below the floating scum layer. The clarified liquid will be disposed of to the absorption field for further treatment and disposal.

Factors to be considered in the design of a septic tank include tank geometry, hydraulic loading, inlet and outlet configurations, number of compartments and temperature. If a septic tank hydraulically overloaded, retention time may become too short and solids may not settle properly.

For Afghanistan, a baffled multi-compartment or dual chamber design shall be utilized. Refer to Attachment A for further details. The septic tank shall be designed with a length-to-width ratio of 2:1 to 3:1 and the liquid depth should be between 1.2 m and 1.8m. This depth is determined by the outlet pipe invert elevation. If not specified in the contract, the septic tank shall be sized based on the average daily demand of 190 liters/capita/day, plus an additional 100% for sludge storage capacity and peak flows. The tank shall be constructed of reinforced, cast-in-place concrete, with a minimum compressive strength of 21MPa at 28 days. Wastewater influent and effluent shall enter and exit on the short sides of the tank, which will allow the wastewater longer detention and settling time. The baffle tank shall have two compartments, with the first compartment (influent entry point) having 2/3 thirds the volume capacity of the tank. The tank shall have a minimum earth backfill cover of 300mm. Access shall be provided at the entry (influent) and exit (effluent) points of the tank by installing reinforced concrete risers, with steel access hatches, that will rise 50mm above the finished grade. The following is an example of how to determine the volume and dimensions of the septic tank.

Example:

Size a Septic Tank for an effective population of 100 capita at 152 liters/capita/day (80% of 190 liters/capita/day). Assume that tank volume and dimensions are not specified in the contract.

$$V = \text{ADDP} * c * \text{CF} * 2 = 152 \text{ liters/capita/day} * 100(\text{capita}) * 1.5 * 2 = 45,600 \text{ Liters (45.6m}^3\text{)}$$

Where:

ADDP – Average Daily Demand per Person (liters/capita/day)

CF = Table 4-1 Capacity Factors, from UFC 3-240-09A

C = design population (capita)

2 = represents an additional 100% storage for sludge and peak surges

Assume 1.8 meter liquid depth and a tank length-to-width ratio of 2:1

$$A = V / 1.8 \text{ meters (liquid depth)} = 45.6 \text{ m}^3 / 1.8 \text{ m} = 25.33 \text{ m}^2$$

$$L * W = A$$

$$2W * W = 25.33 \text{ m}^2$$

$$W^2 = 12.66 \text{ m}^2$$

$$W = 3.56 \text{ m, so } L = 7.12 \text{ m}$$

Inside dimensions of tank – 3600mm x 7200mm x 1800mm (liquid depth)

Always round up to the nearest 100mm for final septic tank dimensions.

#### **2.3.8.4 ABSORPTION FIELD**

Absorption fields (also termed “leach fields”) are used, in conjunction with septic tank treatment, as the final treatment and disposal process for the septic system. Absorption fields normally consist of perforated distribution pipe laid in trenches or beds that are filled with rock. Refer to attachments B or C for minimum performance requires. The septic tank effluent is distributed by the perforate pipe and allowed to percolate through the ground, where it is filtered and treated by naturally occurring bacteria and oxygen.

Once effluent is released from the septic tank, it travels by gravity through a solid 100mm diameter PVC pipe, at a minimum 1.0% slope, to the distribution box or dosing tank. The distribution box is a reinforced concrete structure that distributes the septic tank effluent evenly throughout the absorption field through several 100mm diameter perforated pipes. The distribution pipe is distributed evenly over the absorption trenches or beds; the perforated pipe shall have a maximum slope of 0.5% and shall be capped at the end of each pipe. Generally, distribution piping is spaced from the one meter to 1.8 meters apart and is not longer than 30 meters.

The first zone is the absorption zone, which is the layer of in-situ material that filters and treats the effluent.

This zone is determined to be suitable material for wastewater treatment based on the percolation test results, with a minimum thickness of 600mm. Below the absorption zone, the material is considered unsuitable soil or bed rock or the seasonal water table is too high. If percolation tests determine that there isn't a minimum 600 mm of suitable soil, the Contractor can remove the unsuitable soil to the desired depth and replace it with material determined to be suitable; however, the Contractor must get approval from the COR before attempting this.

The second zone is the drainage zone, which is a 300 mm thick layer of rock fill, where the distribution pipe network lies. The bottom of this zone is filled with a minimum 150 mm of 19 mm to 38 mm diameter rock. The perforated distribution pipe is laid on top of the rock. A minimum of 50 mm of rocks placed carefully over the pipe network, and then a semi-permeable membrane (geotextile fabric) is placed over the rock to prevent fine-grained backfill from clogging it.

The final zone is the backfill zone. This is the upper most part of the absorption field, where backfill material is placed and is a minimum 500mm thick. The backfill material protects the lower lying zones from storm water infiltration and freezing. The Contractor shall leave a mound of backfill material above the desired finished grade to allow for settlement.

##### **2.3.8.4.1 SIZING THE ABSORPTION FIELD**

Table 2 lists percolation rates and the corresponding sizing factor (liters/m<sup>2</sup>/day). The sizing factors are used in conjunction with average daily demand (ADDD), to determine the size of the absorption field. The following is an example of how to calculate the absorption field size for trenches and beds:

###### Example:

Size an absorption field for a facility with an average daily demand of 19,000 liters/day and a percolation rate of 50 minutes.

$$A = \text{ADD} * \text{Water Absorption of Soil} = 19,000 \text{ liters/day} * 0.054 \text{ m}^2/\text{liters/day} = 1,026 \text{ m}^2$$

Where:

A = Area footprint needed for the absorption field in m<sup>2</sup>

ADD = Average Daily Demand (liters/day)

Water Absorption of Soil = by looking below, at Table 2, a percolation rate of 50 minutes falls in the 46 to 60 row and the correlating sizing factor is determined to be 0.054m<sup>2</sup>/liters/day

Dimensions for trenches:

-Assume a 1 meter wide trench bottom.

-Assume maximum trench length to be 30 meters

$$N_t = A / (T_w * T_l) = 1026 \text{ m}^2 / (1 \text{ m} * 30 \text{ m}) = 34.20, \text{ say } 35 \text{ trenches at } 1 \text{ m} \times 30 \text{ m}$$

Where:

N<sub>t</sub> = Number of trenches

T<sub>w</sub> = Trench width

T<sub>l</sub> = Trench length

Trench bottom area can be reduced by 20 percent if 305 mm of rock is placed below the distribution pipe. Keep in mind that the additional rock added below the distribution pipe adds additional thickness required for the drainage zone. For example, there is normally 150 mm of rock placed below the pipe for a total 300mm thickness for the drainage zone. If 305mm of rock is placed below the pipe, the total thickness for the drainage zone increases to 455 mm of rock, including 305mm below the pipe, 100 mm around the pipe, and 50 mm above the pipe. The distribution pipe should not be placed more than 1.2 meters below natural grade. The leach field distribution pattern shall be as shown in the Attachment C plan drawing.

TABLE 2. Soil Treatment Areas In Square Meters	
Percolation Rate (Minutes for Water to Drop 25mm)	Water Absorption of Soil (m <sup>2</sup> /liters/day)
Faster than 0.1	Soil is too coarse for sewage treatment
0.1 to 5	0.02
6 to 15	0.031
16 to 30	0.041
31 to 45	0.049
45 to 60	0.054
Slower than 60	Soil too fine for sewage treatment



### **2.3.8.5 AS-BUILTS**

Upon completion of installing the sanitary sewer and septic systems, the Contractor shall submit editable CAD format As-Built drawings. The drawings shall show the final product as it was constructed in the field, with the exact dimensions, locations, materials used, and any changes made to the original design.

### **2.3.8.6 STORM DRAINAGE SYSTEM DESIGN**

The Contractor shall be responsible for the complete design of the storm drainage system. Drainage of runoff from unpaved 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. All open storm drainage channels shall be concrete lined. 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 Specification Section 33 40 00 Storm Drainage Utilities. For cases when there is a need to penetrate the perimeter wall for drainage purposes (outfall), multiple wall penetrations shall be used to provide redundancy. Each drainage penetration through the perimeter wall shall be protected from unauthorized ingress/egress through the use of grates or rebar.

### **2.3.8.7 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 maximum velocity of 2m/s.

### **2.3.8.8 AREA INLETS**

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

#### **2.3.8.8.1 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 m of cover during construction to prevent damage by heavy construction equipment.

#### **2.3.8.8.2 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 m 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).

### **2.3.9 OIL WATER SEPERATORS**

Oil/water separators shall be utilized for all drains from the vehicle wash racks. Separators shall be located for easy maintenance and cleaning. Drain water from the separator shall drain to the surface drainage system.

## **2.4 EARTHWORK AND FOUNDATION PREPARATION**

### **2.4.1 CAPILLARY WATER BARRIER**

ASTM C 33 fine aggregate grading with a maximum of 3 percent by weight passing ASTM D 1140, 75 micrometers, No. 200 sieve, or 37.5 mm and no more than 2 percent by weight passing the 4.75 mm No. 4 size sieve and conforming to the soil quality requirements specified in the paragraph entitled "Satisfactory Materials."

Capillary water barriers shall be placed under floor slabs (not under footings) and be a minimum of 150 mm thick.

Provide a minimum 6 mil polyethylene sheet vapor barrier over all capillary water barrier installations.

### **2.4.2 SATISFACTORY MATERIALS**

Any materials classified by ASTM D 2487 as GW, GM, GC, GP, SP, SW, SM, and SC and free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

### **2.4.3 UNSATISFACTORY MATERIALS**

Any materials which do not comply with the requirements set forth in the Satisfactory Materials paragraph. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 75 mm. The Contracting Officer shall be notified of any unsatisfactory materials.

### **2.4.4 CLEARING AND GRUBBING**

Unless indicated otherwise, remove trees, stumps, logs, shrubs, brush and vegetation, and other items that would interfere with construction operations within lines 1.5 m outside of the building and structure line. Remove stumps entirely. Grub out matted roots and roots over 50mm in diameter to at least 460 mm below existing surface.

### **2.4.5 EXCAVATION AND COMPACTION OF FILL**

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed. Refill with satisfactory material and compact to at least 95% of the maximum dry density, as determined by the Modified Proctor laboratory procedure. ASTM D 1557 shall be used for producing the Modified Proctor moisture-density curve, unless the soil to be compacted includes more than 30% retained on the 19 mm sieve. In this case, the Contractor must replace the ASTM D 1557 laboratory compaction procedure with AASHTO T 180, Method D, corrected with AASHTO T 224.

During compaction, the moisture content of the soil shall be within 1.5% of the optimum moisture content, as determined by the Modified Proctor laboratory procedure. The thickness of compacted lifts shall not exceed 15 cm and the dry density of each compacted lift shall be tested by either sand cone (ASTM D 1556) or nuclear gage (ASTM D 2292). If the nuclear gage is used, it must first be compared to sand cone tests for each soil type to verify the accuracy of the nuclear gage measurements for moisture content, wet density, and dry density. Furthermore, every tenth nuclear gage test must be accompanied by a sand cone test and these verification data must be summarized and submitted to the Contracting Officer. Density tests shall be performed at a frequency of not less than one test for each 200 square meters and not less than two tests per compacted lift.

## 2.5 GEOTECHNICAL

### 2.5.1 SOIL INVESTIGATION

Existing geotechnical information is not available at the project site. Any site-specific geotechnical data required to develop foundations, fill at elevated slabs, materials, earthwork, and other geotechnical related design and construction activities for this project shall be the Contractor's responsibility. The Contractor shall develop all pertinent geotechnical design and construction parameters by appropriate field and laboratory investigations and analyses. The Contractor shall produce a detailed geotechnical report that includes:

- a. Clear description of the anticipated construction including planned grading and structural details to provide an estimation of foundation loads (compression, uplift, lateral, and moment) and settlement tolerance.
- b. Detailed site and area reconnaissance that includes a description of local geology and origin of sediments, surface features (e.g., ditches or other excavations, existing structures, vegetation, rock outcrops, seeps or springs), surface soil type(s), and subsurface lithology).
- c. Justification of number and depth of borings.
- d. Site plan illustrating exploratory boring locations.
- e. Boring logs that include groundwater levels (if encountered).
- f. Field tests and analyses (e.g., Unified Soil Classification System, field density, SPT).
- g. Analytical laboratory test results in accordance with ASTM or other recognized standards (e.g., sieve analysis, Atterberg Limits (plastic and liquid), moisture content, hydrometer, consolidation/collapse potential, specific gravity of solids, direct shear, density, chemical [sulfate, chloride, pH, lime], K values) and any other tests as needed to properly conduct necessary calculations to determine the engineering properties of the soil.
- h. A summary of the results of the subsurface geotechnical conditions including allowable soil bearing capacity, foundation recommendations, pavement design criteria, and construction materials (e.g. concrete cement, asphalt, and aggregates).

Two copies of the geotechnical report shall be submitted to the COR. Foundations, including sub-grade, shall be designed and constructed based on calculations and recommendations from a licensed structural engineer provided by the Contractor.

For standard penetration test (SPT), the Contractor shall use ASTM D1586. All geotechnical laboratory and field work shall be based on standards set forth in the ASTM. Contractor shall not use any DIN standards for penetration tests in lieu of ASTM D 1586. Soil investigations shall be in accordance with AED Design Requirements: Geotechnical Investigations for USACE Projects, latest version, or most recent version.

For foundation design, allowable soil bearing pressures shall be determined by calculations made based on the physical and mechanical properties obtained from laboratory testing. The soil bearing pressures calculated shall be compared with the International Building Code (IBC) 2006 Table 1804.2. The lower of the two bearing pressures, calculated or Table 1804.2, shall be chosen for the allowable soil bearing pressure.

California Bearing Ratio (CBR) tests shall be conducted on the existing soils throughout the proposed road alignment and vehicle parking and maneuver areas. Results from the tests shall be used to calculate the pavement structure using the minimum pavement structure as dictated in paragraph 2.3 as a reference. In the event that the calculations based on the CBR tests reveal that the pavement structure dictated in paragraph 2.3 is insufficient to carry the design load, the Contractor shall design and construct a sub-base layer for the pavement structure.

The Contractor shall conduct soils classification per ASTM D 2487-06.

No design review submittal shall be considered complete without an approved geotechnical report. Geotechnical investigation plans and report of investigations shall be submitted promptly in accordance with Section 01335.

## **2.5.2 GEOTECHNICAL QUALIFICATIONS**

A geotechnical engineer that is a member of a geotechnical firm responsible to the Contractor shall oversee all geotechnical engineering design parameters. The geotechnical engineer shall be qualified by:

- a. Education in geotechnical engineering;
- b. Professional registration;
- c. Minimum of ten (10) years of experience in geotechnical engineering design.

The geotechnical firm conducting the field investigation and laboratory work shall be certified by the Chief, Quality Assurance Branch USACE-AES or Chief, Quality Assurance Branch USACE-AEN. Certification document shall be submitted as part of the Geotechnical Report.

## **3.0 STRUCTURAL**

### **3.1 GENERAL**

The structures shall consist of reinforced concrete footings supporting a variety of structure types.

### **3.2 DESIGN**

Design shall be performed by or under the direct supervision of the Contractor's structural engineer. The structural engineer shall be a registered Professional Engineer. All structural design documents shall be stamped and signed by the structural engineer. Calculations shall be in SI (metric) units of measurements.

### **3.3 STANDARDS**

The Contractor should use the following American standards to provide structural design if local standards are not available, relevant, or applicable. All codes are latest edition.

Concrete	ACI 318 and ASTM C 39
Steel Reinforcement	ASTM A 615
Anchor Bolts	ASTM F 1554; Grade 36 steel.
Bolts and Studs	ASTM A 307.
Concrete Masonry Units	ASTM C 90; Type I (normal weight, moisture control).
Mortar	ASTM C 270; Type S (ultimate compressive strength of 13 MPa).
Grout	ASTM C 476; 14 MPa (2,000psi) minimum compressive strength @ 28 days (Slump between 200 mm to 250mm).
Structural Steel	ASTM A 36; 250 MPa ( $F_y = 36,000\text{psi}$ ).
Welding	AWS D1.1 (American Welding Society).
Cold-Formed Steel	AISI Specification for the Design of Cold-formed Steel Structural Members

### **3.4 DESIGN LOADS (DEAD & LIVE)**

Dead loads shall be in accordance with ASCE 7-05 Minimum Design Loads for Buildings and Other Structures. Dead loads consist of the weight of all materials of construction incorporated in the buildings. Live loads shall be per Chapter 4. All facilities shall be classified as a minimum of Category II in accordance with Table 1-1.

### **3.5 WIND LOADS**

Wind loads shall be calculated in accordance with ASCE 7-2005 using a "3-second gust" wind speed of 135 km/hr. Exposure = C. Importance Factor = 1.0.

### **3.6 SEISMIC**

Seismic design of all structures in southern Afghanistan shall be in accordance with ASCE 7-05. Seismic Acceleration Parameters shall be  $S_s = 1.28g$  and  $S_1 = 0.51g$ .

### **3.7 REINFORCED CONCRETE**

All concrete members shall be designed and constructed in accordance with the provisions of the American Concrete Institute, Building Code Requirements for Structural Concrete, ACI 318. A minimum 28 day compressive strength of 28 MPa shall be used for design and construction of all concrete. Concrete shall have maximum water-cement ratio of 0.45. Reinforcing steel shall be deformed bars conforming to American Society for Testing and Materials publication ASTM A 615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement. The minimum yield strength  $F_y$  shall be 420 MPa.

No concrete shall be placed when the ambient air temperature exceeds 32 degrees C unless an appropriate chemical retardant is used. In all cases when concrete is placed at 32 degrees C or hotter it shall be covered and kept continuously wet for a minimum of 48 hours.

### **3.8 STRUCTURAL CONCRETE**

Concrete structural elements shall be designed and constructed in accordance with the provisions of the American Concrete Institute, Building Code Requirements for Structural Concrete, ACI 318. A minimum cylinder 28 day compressive strength of 28 MPa shall be used for design and construction of all concrete, except that 24 MPa shall be used for Shotcrete applications. Reinforcing steel shall be deformed bars conforming to American Society for Testing and Materials publication ASTM A 615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement. Concrete members at or below grade shall have a minimum concrete cover over reinforcement of 75 mm. Concrete shall have maximum water-cement ratio of 0.45. No concrete shall be placed when the ambient air temperature exceeds 32 degrees C unless an appropriate chemical retardant is used. In all cases when concrete is placed at 32 degrees C or hotter it shall be covered and kept continuously wet for a minimum of 48 hours. Except with authorization, do not place concrete when ambient temperature is below 5 degrees C or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 18 and 27 degrees C. Methods of heating materials are subject to approval of the Contracting Officer. Do not heat mixing water above 74 degrees C. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306.1.

### **3.9 MASONRY**

Masonry shall be designed and constructed in accordance with the provisions of Building Code Requirements for Masonry Structures, ACI 530/ASCE 5/TMS 402, latest editions. Mortar shall be Type S and conform to ASTM C 270. All masonry used below grade shall be fully grouted. All cells of exterior reinforced CMU walls shall be fully grouted. For interior CMU walls, only the reinforced cells need to be grouted. All CMU walls shall have reinforced horizontal bond beams at a maximum spacing of 1,200 mm on center.

### **3.10 STRUCTURAL STEEL**

Structural steel shall be designed and constructed in accordance with the provisions of American Institute of Steel Construction (AISC), Specifications for Structural Steel Buildings.

### **3.11 COLD-FORMED LIGHT GAUGE STEEL**

Design of cold-formed steel structural members shall be in accordance with the provisions of American Iron and Steel Institute (AISI), Specifications for Design of Cold-Formed Steel Structural Members.

### **3.12 STANDING SEAM & CORRUGATED METAL ROOFING**

Design of cold-formed steel structural members shall be in accordance with the provisions of American Iron and Steel Institute (AISI), Specifications for Design of Cold-Formed Steel Structural Members.

### **3.13 FOUNDATIONS**

All structures shall be provided with a reinforced concrete foundation properly placed on suitable native or compacted earth and shall be prepared in accordance with the recommendations from the geotechnical investigation. Where frost protection is required, the perimeter foundation shall be founded a minimum of 800 mm below final grade.

All foundations have been or shall be designed for a maximum soil bearing capacity of  $0.75 \text{ kg/cm}^2$ . A geotechnical investigation shall confirm bearing capacity to be no less than  $0.75 \text{ kg/cm}^2$ . If geotechnical investigation shows less than  $0.75 \text{ kg/cm}^2$ , the Contractor shall redesign the foundation based on the values provided in the geotechnical investigations.

## **4.0 ARCHITECTURAL REQUIREMENTS**

### **4.1 GENERAL**

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

### **4.2 DESIGN CRITERIA**

Schematic designs for the facility types requested in this proposal are provided in the Appendix. These designs shall be used to create a complete and usable facility meeting the minimum requirements stated in these documents. The Codes, Standards, and Regulations listed in these documents shall be used in the construction of this project. The publications shall be the most recent editions. Standards other than those mentioned may be accepted provided they meet the minimum requirements and the Contractor shall submit proof of equivalency to the Contracting Officer for approval.

IBC - International Building Code, latest edition

NFPA 101 - Life Safety Code, latest edition

#### **4.2.1 LIFE SAFETY/ FIRE PROTECTION/ HANDICAPPED ACCESSIBILITY**

A life safety and fire protection analysis shall be completed prior to construction commencement for all buildings designed by the Contractor. This analysis shall be documented in plans and in the design analysis. All spaces shall be classified following NFPA 101 or IBC. Whichever code is used shall be stated and referenced in the life safety plan. The facility shall comply with all other safety requirements of the NFPA 101. To the extent possible, all

facilities shall be designed in accordance with recognized industry standards for life safety and building egress. An adequate fire alarm system, fire extinguishers, and smoke alarms shall all be included as required.

### 4.3 CONCRETE

#### 4.3.1 FINISH

If finish is exposed concrete, then the floor shall be a broom finish for texture and shall not interfere with sloping for drainage of the surface. Vertical work shall have a form finish. Exposed concrete shall be sealed with an approved sealer.

#### 4.3.2 PRECAST

Storage of precast units shall be in a dry place or materials shall be covered with a plastic or protective layer. Units shall be detailed to provide size, shape and location of installation. Precast units shall meet the minimum concrete strength requirements.

### 4.4 MASONRY

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. Masonry construction systems shall be reinforced.

#### 4.4.1 CONCRETE MASONRY UNITS

Concrete masonry units (CMU) for exterior walls shall be either 290 mm wide x 390 mm x 190 mm high or otherwise as shown on the standard drawings. They shall be installed in running bond level and plumb. Mortar joints shall be 10 mm on all sides between CMU. Joints shall be struck with a concave tool to provide a smooth recessed curved surface. Install only quality units. The surface shall be free of chips, cracks, or other imperfections that would detract from the overall appearance of the finished wall. Defective CMU or mortar shall be rejected. All CMU for internal or exterior walls shall be reinforced.

### 4.5 STONE

Stone type shall be identified for approval in design. Mortar shall be of lower strength than stone and weep holes shall be provided in cavity wall systems.

### 4.6 THERMAL PERFORMANCE OF EXTERNAL BUILDING ASSEMBLIES

External building 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 2.280 (R 13)
Ceilings/roof	RSI 5.284 (R 30)
Floor (over unheated space)	RSI 3.346 (R 19)
Exterior doors	RSI 0.252 (R 1.43)
Exterior windows/(glazing within doors)	RSI 0.308(R 1.75)
Skylights	RSI 0.180 (R 1.02)

This table is a summary of ANSI/ ASHRAE 90.1 Table 5.5-5, Climate Zone 5 (A,B,C)

RSI measured in K-m<sup>2</sup>/W, R measured in SF-F-hr/BTU. 1 K-m<sup>2</sup>/W = 5.678 SF-F-hr/BTU.

The building design shall utilize solar heating by orientating the buildings and wind breaks, insulation and exterior window shading techniques to reduce building heat loss and heat gain. Contractors shall include energy efficient heating and cooling solutions to minimize energy consumption.

## **4.7 ROOFING AND WEATHERPROOFING**

The hospital building shall be provided with a “Traffic Bearing Waterproofing” coating directly applied to the concrete roof structure and up the inside face of the parapet wall to the top inside edge using a one component polyurethane system in multiple coats per manufacturer’s instructions. Rigid foam insulation shall be over laid on the “Traffic Bearing Waterproofing” system after the curing period of two complete days. Concrete precast pavers 40mm thick by 300mm by 300mm shall be placed neatly and tightly to each other as ballast and a top surface over the entire roof top.

Buildings with pitched roofs shall be provided with metal fascia, eaves, and soffits. All exterior entry ways to be covered and protected by rain gutters and diverters as to not have water falling on the entry ways to all buildings.

### **4.7.1 TRAFFIC BEARING WATERPROOFING SYSTEM**

Provide a “Traffic Bearing Waterproofing” system using SONOSHIELD – SONOGUARD by Sonneborn Waterproofing Systems from the BASF Chemical Company or an approved by the Government EQUAL PRODUCT. A “Heavy Duty Traffic System” with the aggregate to refusal method and using three coats with a minimum total wet mil thickness of 65 mils over a primer coat of the manufacturer’s #770 two-component waterborne epoxy primer and sealer. Provide the “traffic bearing waterproofing” system over the clean dry concrete roof surface and the inside face of the parapet wall up to inside edge of the parapet.

HEAVY – DUTY TRAFFIC SYSTEM:

A.- Apply 25 wet mils ( 0.6mm ) of base coat. Immediately backroll to level base coat. Allow to cure overnight.

B.- Apply 20 wet mils ( 0.5mm 0 of intermediate coat.

C.- Immediately backroll to level the intermediate coat. While still wet, evenly apply by hand casting or machine spreader manufacturer approved aggregate at an approximate rate of 1.5 kilograms to 2.4 kilograms per square meter. Allow to cure over night.

D.- Remove all loose aggregate. Sweeping and careful scooping is appropriate. After all loose aggregate has been removed, prepare to apply the top color coat.

E.- Apply 20 wet mils top color coat. Allow to cure for two complete days. Do not walk on until the third day.

Application of liquid one component polyurethane waterproofing system coatings shall be done using a roller with fibers 10mm long and a brush for locations and conditions not accessible with the roller assembly.

The “Top Color Coat” shall be provided in the manufacturer’s standard TAN color.

F.- After the “Traffic Bearing Waterproofing” system is fully cured, place 100mm thick of rigid expanded polystyrene foam insulation over the entire roof.

G.- Provide a top ballast layer of precast concrete pavers 40mm thick by 300mm by 300mm on top of the foam insulation over the entire roof. Place all pavers tight to one another.

### **4.7.2 SLOPED ROOFS**

A sloping roof shall be as defined in the IBC. On sloping roofs provide and install 0.60 mm galvanized steel in either corrugated or standing seam design. Metal roofing shall be anchored to the steel “Z” purlins using exposed fasteners at 300 mm on center at all seams and at 600 mm on center in the panel field. Fasteners shall be placed at the top of the corrugation taking care not to dent panel. Roof sealant or adhesive shall be placed over each anchor head. Roofing system shall include all edge, ridge and penetration flashings necessary for a watertight installation and as described in this section. Roofing shall be provided in the manufacturer’s standard white finish. Panels shall be overlapped two corrugations side to side and be continuous sheets from ridge to eave. Provide continuous ridge vents on all gable roofs. All roof accessories, such as drip edge, ridge vents, soffit, fascia, gutters, down spouts, gable vents, etc., shall be provided in white to match the roof panel color.

## **4.8 CONNECTIONS AND JOINTING**

### **4.8.1 SOLDERING**

Soldering shall apply to copper and stainless steel items. Edges of sheet metal shall be pre-tinned before soldering is begun. Soldering shall be done slowly with well heated soldering irons so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Edges of stainless steel to be pre-tinned shall be treated with soldering acid flux. Soldering shall follow immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a water solution of washing soda and rinsed with clean water.

#### **4.8.1.1 SEAMING**

Flat-lock and soldered-lap seams shall finish not less than 25 mm wide. Unsoldered plain-lap seams shall lap not less than 75 mm unless otherwise specified. Flat seams shall be made in the direction of the flow.

#### **4.8.1.2 CLEATS**

A continuous cleat shall be provided where indicated or specified to secure loose edges of the sheet metalwork. Butt joints of cleats shall be spaced approximately 3 mm apart. The cleat shall be fastened to supporting wood construction with nails evenly spaced not over 300 mm on centers. Where the fastening is to be made to concrete or masonry, screws shall be used and shall be driven in expansion shields set in concrete or masonry.

## **4.9 METAL**

### **4.9.1 MATERIALS**

Any metal listed by ASTM, DIN, BS or EN standards. Manual for a particular item may be used, unless otherwise specified or indicated. Materials shall conform to the requirements specified below and to the thicknesses and configurations established in ASTM, DIN, BS or EN standards. Different items need not be of the same metal, except that if copper is selected for any exposed item, all exposed items shall be copper.

#### **4.9.1.1 STEEL SHEET, ZINC-COATED (GALVANIZED)**

Zinc coated steel conforming to ASTM A 525, DIN BS or EN Standards.

#### **4.9.1.2 ALUMINUM WALL CAPPING**

Aluminum wall capping shall conform to ASTM B 209 M, DIN 18339, BS or EN Standards.

### **4.9.2 FLASHING**

Flashing shall be installed at locations indicated and as specified below. Sealing shall be according to the flashing manufacturer's recommendations. Flashings shall be installed at intersections of roof with vertical surfaces and at projections through roof, except that flashing for heating and plumbing, including piping, roof and floor drains, and for electrical conduit projections through roof or walls are specified in other sections. Except as otherwise indicated, counter flashings shall be provided over base flashings. Perforations in flashings made by masonry anchors shall be installed on top of joint reinforcement. Lashing shall be formed to direct water to the outside of the system.

#### **4.9.2.1 THROUGH-WALL FLASHING**

Through-wall flashing includes sill, lintel, and spandrel flashing. The flashing shall be laid with a layer of mortar above and below the flashing so that the total thickness of the two layers of the mortar and flashing are the same thickness as the regular mortar joints. Flashing shall not extend further in to the masonry backup wall than the first mortar joint. Joints in flashing shall be lapped and sealed. Flashing shall be one piece for lintels and sills.

#### **4.9.2.2 LINTEL FLASHING**

Lintel flashing shall extend the full length of lintel. Flashing shall extend through the wall one masonry course above the lintels and shall be bent down over the vertical leg of the outer steel lintel angle not less than 50 mm, or shall be applied over top of masonry and pre-cast concrete lintels. Bed joints of lintels at joints shall be under laid with sheet metal bond breaker.

#### **4.9.2.3 VALLEY FLASHING**

Valley flashing shall be provided at intersections of roofs where a valley is formed. Flashing shall be a minimum of 500 mm centered on the valley (extending each direction a minimum of 250 mm). Valley flashing shall have a small ridge in the center to allow for expansion and contraction. Material shall be stainless steel, galvanized or match finished roofing metal. Provide in white to match the roof panel color.

#### **4.9.2.4 SILL FLASHING**

Sill flashing shall extend the full width of the sill and not less than 100 mm beyond ends of sill except at joint where the flashing shall be terminated at the end of the sill.

#### **4.9.3 METAL FASCIA & SOFFIT**

No wood fascias and/or soffits are allowed. Extend roof decking out over fascias a minimum of 20 mm. Provide a 40 mm drip flashing over edge of roof decking so that it extends past bottom of decking on all sides of the building. Soffits shall be a minimum width of 600mm extending from the building wall. Provide in white to match the roof panel color.

#### **4.9.4 CONTINUOUS SOFFIT VENT**

Enclose soffits and return to vertical wall. Provide continuous soffit venting of all overhangs on the underside of the soffit. The opening shall be no larger than 100 mm and set in a minimum of 50 mm from the exterior fascia edge. Provide in white to match the roof panel color.

#### **4.9.5 RIDGE VENT**

For sloping roofs, provide continuous metal ridge vent at the top of roof along the ridge. Ridge vent shall be sized to provide adequate ventilation of the roofing system. Provide in white to match the roof panel color.

#### **4.9.6 SCREEN**

Provide insect screen for all soffit, ridge, vents, louvers and all openings except for doors unless otherwise specified.

#### **4.9.7 EXPANSION JOINT PROFILES**

Metal expansion joints shall have a profile to allow deflection and expansion in two directions. Metal shall be treated for exterior conditions. Expansion joints shall be water proof.

#### **4.9.8 ROOF GUTTERS**

Roof gutters shall be installed as indicated. Roof gutters shall be rigidly attached to the building. Supports for roof gutters shall be spaced according to manufacturer's recommendations. A 600 mm overlap, jointing with approved crimping or welding shall provide a continuous gutter along the building eaves. Provide in white to match the roof panel color.

#### **4.9.9 DOWNSPOUTS**

Downspouts shall be designed and fabricated for each specific application. Unless otherwise specified or indicated, exposed edges shall be folded back to form a 13 mm hem on the concealed side, and bottom edges of exposed vertical surfaces shall be angled to form drips. Bituminous cement shall not be placed in contact with roofing

membranes other than built-up roofing and shall not block the flow of water to the downspout for low sloped roofs. Downspouts shall be rigidly attached to the building with supports a minimum of 1.5 m apart. At the base of each downspout, concrete splash block shall be placed to eliminate damage to the building due to rain water runoff toward the building. In rural locations, a layer of rock 10 - 80 mm in size, 100 mm thick, may be substituted upon governmental approval. Provide in white to match the roof panel color.

#### **4.9.10 WALL CAPPING**

Wall Capping shall be installed according to the manufacturer's recommendations. Provide in white to match the roof panel color.

#### **4.9.11 LEAD SHIELDING AT X-RAY EQUIPMENT ROOM**

All walls and doors of the X-Ray equipment room shall be fully shield in accordance with industry standards. All walls of the X-Ray equipment room shall extend to the underside of the roof structure above. Provide minimum 2mm continuous lead sheet shielding throughout the X-ray room walls and doors.

### **4.10 SEALANTS**

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and cannot be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. The Contractor shall tool smooth fresh sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints; apply sealant, and tool smooth as specified. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

#### **4.10.1 INTERIOR SEALANT**

ASTM C 834 or ASTM C 920, Type S or M, Grade NS, Class 12.5. Use NT, DIN, BS, or EN equal standards.

#### **4.10.2 EXTERIOR SEALANT**

For joints in vertical and horizontal surfaces, provide ASTM C 920, Type S or M, Grade NS, DIN, BS, or EN equal standards.

#### **4.10.3 FLOOR JOINT SEALANT**

(ASTM C 920) Type S or M, Grade P, class 25, use T

#### **4.10.4 PRIMERS**

Provide a non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application. Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

#### **4.10.5 BOND BREAKERS**

Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint. Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

#### **4.10.6 BACKING**

Backing shall be 25 to 33% oversize for closed cell and 40 to 50% oversize for open cell material, unless otherwise indicated.

#### **4.10.7 SURFACE PREPARATION**

Surfaces shall be clean, dry to the touch, and free from dirt, frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

#### **4.10.8 MASKING TAPE**

Masking tape shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

#### **4.10.9 BACKSTOPS**

Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified.

#### **4.10.10 PROTECTION**

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

##### **4.10.10.1 FINAL CLEANING**

Provide cleaning solvent type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant. Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

##### **4.10.10.1.1 MASONRY AND OTHER POROUS SURFACES**

Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.

##### **4.10.10.1.2 METAL AND OTHER NON-POROUS SURFACES**

Remove excess sealant with a solvent-moistened cloth.

#### **4.11 LOUVERS**

##### **4.11.1 INTERIOR LOUVERS**

SDI 111-C, Louvers shall be stationary sight-proof or lightproof type as required. Louvers for lightproof doors shall not transmit light. Detachable moldings on room or non security side of door; on security side of door, moldings to be integral part of louver. Form louver frames of 0.90 mm thick steel and louver blades of a minimum 0.60 mm. Louvers for lightproof doors shall have minimum of 20 percent net-free opening. Sight-proof louvers shall be inverted "V" blade design with minimum 55 or inverted "Y" blade design with minimum 40 percent net-free opening.

#### **4.11.2 EXTERIOR LOUVERS**

Louvers shall be inverted "Y", "V" or "Z" type. Weld or tenon louver blades to continuous channel frame and weld assembly to door to form watertight assembly. Form louvers of hot-dip galvanized steel of same gage as door facings. Louvers shall have steel-framed insect screens secured to room side and readily removable. Provide aluminum wire cloth, 7 by 7 per 10 mm or 7 by 6 per 10 mm mesh, for insect screens.

### **4.12 WINDOWS, DOORS & GLAZING**

#### **4.12.1 WINDOWS**

Windows shall be operable. Operable windows shall be slider or awning type.

##### **4.12.1.1 MATERIALS**

###### **4.12.1.1.1 ALUMINUM EXTRUSIONS**

Provide alloy and temper recommended by the window manufacturer for the strength, corrosion resistance, and application of required finish, meeting the DIN 1725 raw material requirements, but not less than 215 N/mm<sup>2</sup> ultimate tensile strength and not less than 1.5 mm thick at any location for main frame and sash members.

###### **4.12.1.1.2 FASTENERS**

Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.

###### **4.12.1.1.3 REINFORCEMENT**

Where fasteners screw-anchor into aluminum less than 3 mm thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard non-corrosive pressed-in splined grommet nuts.

###### **4.12.1.1.4 EXPOSED FASTENERS**

Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match the finish of the member or hardware being fastened, as appropriate.

###### **4.12.1.1.5 ANCHORS, CLIPS, AND WINDOW ACCESSORIES**

Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with the requirements of DIN 1748; provide sufficient strength to withstand design pressure indicated. As a minimum provide 3 anchors on each side of the frame.

###### **4.12.1.1.6 COMPRESSION-TYPE GLAZING STRIPS AND WEATHERSTRIPPING**

Unless otherwise indicated, and at the manufacturer's option, provide compressible stripping for glazing and weather stripping such as molded EPDM or neoprene gaskets.

###### **4.12.1.1.7 SEALANT**

For sealants required within fabricated window units, provide type recommended by the manufacturer for joint size and movement. Sealant shall remain permanently elastic non-shrinking, and non-migrating. Comply with Sealants of these specifications for selection and installation of sealants.

###### **4.12.1.1.8 WIRE FABRIC INSECT SCREEN**

Wire Fabric Insect Screen shall be permanently fixed to the exterior of operable windows.

#### **4.12.1.2      **HARDWARE****

Provide the manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended. Provide at a minimum one locking device on the interior of each window. Any operable window over 2 square meters shall have two locking devices as a minimum.

#### **4.12.1.3      **FABRICATION****

Provide aluminum windows with factory finish in all buildings as indicated in the design drawings. Window openings shall be provided with insect screening permanently fixed to the exterior. Provide a minimum of 3 anchors on each side of the frame into the adjoining structure. Provide weather stripping system for all exterior windows and doors.

#### **4.12.1.4      **METAL WINDOW SILLS****

Galvanized metal window sills, 0.90 mm, shall be installed on the exterior of all windows. The metal window sills shall have a turn down of 50 mm over the exterior masonry and stucco. Metal sills shall extend from side to side of the masonry opening in a single piece. Extend the metal window sill a minimum of 20 mm under the bottom of the aluminum windows. Install masonry mortar as required for a smooth surface under the window sills. Sills shall slope a minimum of 6 mm to the exterior and not allow water to puddle.

#### **4.12.1.5      **FINISHES****

Apply baked enamel in compliance with paint manufacturer's specifications for cleaning, conversion coating, and painting. Color shall be white meeting the requirements of DIN 50018

#### **4.12.1.6      **INSPECTION****

Inspect openings before beginning installation. Verify that rough or masonry opening is correct and the sill plate is level. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.

#### **4.12.1.7      **INSTALLATION****

Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, and other components of the work. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weather tight construction. Refer to the Sealant sections for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.

#### **4.12.1.8      **ADJUSTING****

Adjust operating sash and hardware to provide a tight fit at contact points and at weather stripping for smooth operation and a weather tight closure.

#### **4.12.1.9      **CLEANING****

Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

### **4.12.2      **DOORS****

Fire rated door assemblies including hollow metal frame and hardware shall be provided as required. Rated doors and frames shall be tested and approved as an assembly and shall be provided by a single manufacturer/distributor. Hardware for fire rated door assemblies shall be labeled as appropriate for fire rated applications and shall be coordinated with door manufacturer. All exterior doors shall be heavy duty metal doors with metal frames. Interior

door shall be hollow metal doors with hollow metal frames. Commercial duty lock sets and hardware shall be used on all doors. Hinges shall be the 5 knuckle type or equivalent. Provide door handles and locksets that can be locked with a key on all doors. All door locks shall have a thumb latch on inside of door such that no key is necessary to exit the room or building. Coordinate the final keying schedule with Contracting Officer prior to ordering lock sets. Generally each building should have 8 master keys fitting all locks, 8 sub-master keys fitting all exterior doors and 3 keys each for each interior door. Include 25% spare key blanks for the amount of keys provided per building. Provide numbering system identifying key to associated room door. Provide weather stripping system for all exterior doors.

#### **4.12.2.1 STEEL DOORS**

SDI A250.8, except as specified otherwise. Prepare doors to receive specified hardware. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 44.5 mm thick, unless otherwise indicated. Doors shall be constructed using heavy gauge steel with minimum thickness of 1.2 mm.

#### **4.12.2.2 FIRE AND SMOKE DOORS AND FRAMES**

The requirements of NFPA 80 and NFPA 105 respectfully shall take precedence over details indicated or specified.

#### **4.12.2.3 THRESHOLDS**

All exterior doors (except Mechanical/Electrical rooms) shall be provided with manufactured metal thresholds conforming to ANSI/BHMA A156.21. Thresholds shall span continuously from jamb to jamb.

#### **4.12.2.4 STANDARD STEEL FRAMES**

SDI A250.8, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners or knock-down field-assembled corners. Provide steel frames for doors, transoms, sidelights, mullions, cased openings, and interior glazed panels, unless otherwise indicated.

#### **4.12.2.5 WELDED FRAMES**

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

#### **4.12.2.6 STOPS AND BEADS**

Form stops and beads from 0.9 mm thick steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space the fasteners approximately 300 to 400 mm on centers. Miter molded shapes at corners. Use butt or miter square or rectangular beads at corners.

#### **4.12.2.7 WEATHER-STRIPPING, INTEGRAL GASKET**

Provide weather-stripping that is a standard cataloged product of a manufacturer regularly engaged in the manufacture of this specialized item. Black synthetic rubber gasket with tabs for factory fitting into factory slotted frames, or extruded neoprene foam gasket made to fit into a continuous groove formed in the frame, may be provided in lieu of head and jamb seals. Weather stripping shall be looped neoprene, synthetic rubber gasket, or vinyl held in an extruded non-ferrous metal housing. Air leakage of weather stripped doors shall not exceed 0.003125 cubic meters per second of air per square meter of door area when tested in accordance with ASTM E 283.

#### **4.12.2.8 ANCHORS**

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, anchors not lighter than 1.2 mm thick.

#### **4.12.2.8.1 WALL ANCHORS**

Provide at least three anchors for each jamb. For frames which are more than 2285 mm in height, provide one additional anchor for each jamb for each additional 760 mm or fraction thereof.

#### **4.12.2.8.2 FLOOR ANCHORS**

Provide floor anchors drilled for 10 mm anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

#### **4.12.2.9 HARDWARE PREPARATION**

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

#### **4.12.2.10 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 1,200mm wide. Hinges for labeled fire doors must be either steel or stainless steel. Hinges shall conform to ANSI/BHMA A156.1 and A156.7.

#### **4.12.2.11 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 latch sets shall be the product of the same manufacturer. Locksets, padlocks and latch sets shall be provided, as required, with lever handles on each side. Provide heavy duty hasp and locks at all fuel storage tanks.

#### **4.12.2.12 CLOSERS**

Closers shall be provided on all exterior doors and fire-rated doors. All exterior doors and interior doors that require security or privacy such as toilet room shall be provided with heavy-duty hydraulic closers. Closers shall conform to ANSI/BHMA A156.4, Grade 1. Closers shall be surface-mounted, modern type, with cover. Closer shall be adjustable type and have slow-down control to prevent door leaf from slamming to frame. Provide door silencers on all door frames provided with closers.

#### **4.12.2.13 DOOR STOPS**

Door Stops: Door stops shall be provided on all exterior and interior doors. Door stops shall comply with ANSI/BHMA A156.16 and shall be satin chrome on bronze, Grade 1.

#### **4.12.2.14 KEYING SYSTEM & LOCK CYLINDERS**

Provide locks for all doors. A Master key system shall be provided. Master key system shall include a separate & different key for each door with a master key provided to open any & all doors.

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.

#### **4.12.2.15 FINISHES**

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in SDI A250.8, or paintable A25 galv-annealed steel without primer. Where coating is removed by welding, apply touchup of factory primer. Provide door finish colors as selected by the Contracting Officer from the color selection samples.

#### **4.12.2.16 WATER-RESISTANT SEALER**

Provide a water-resistant sealer compatible with the specified finish as approved and as recommended by the door manufacturer.

#### **4.12.2.17 FABRICATION AND WORKMANSHIP**

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 3 mm larger than the actual masonry thickness. Design other frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive caulking compound.

#### **4.12.2.18 INSTALLATION**

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 2 mm minimum, 3 mm maximum clearance at sides and top, and a 5 mm minimum, 6 mm maximum clearance over thresholds. Provide 10 mm minimum, 11 mm maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 3 mm in 50 mm. Door warp shall not exceed 6 mm when measured in accordance with WDMA I.S. 1-A. Hang doors in accordance with clearances specified in SDI A250.8. After erection and glazing, clean and adjust hardware.

##### **4.12.2.18.1 FRAMES**

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. When an additive is provided in the mortar, coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

##### **4.12.2.18.2 GROUTED FRAMES**

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

##### **4.12.2.19 PROTECTION AND CLEANING**

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is completely removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat. Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

##### **4.12.2.20 WEATHER STRIPPING**

Install doors in strict accordance with the manufacturer's printed instructions and details. Weather strip the exterior

swing-type doors at sills, heads and jambs to provide weather tight installation. Apply weather stripping at sills to bottom rails of doors and hold in place with a brass or bronze plate. Apply weather stripping to door frames at jambs and head. Shape weather stripping at sills to suit the threshold. Insert gasket in groove after frame is finish painted.

#### **4.12.2.21 PRE-FITTING**

At the Contractor's option, doors may be provided factory pre-fit. Doors shall be sized and machined at the factory by the door manufacturer in accordance with the standards under which they are produced. The work shall include sizing, beveled edges, mortising, and drilling for hardware and providing necessary beaded openings for glass and louvers. Provide the door manufacturer with the necessary hardware samples, and frame and hardware schedules as required to coordinate the work.

### **4.12.3 GLAZING**

All glazing shall be double laminated and insulating. Laminated glazing shall be constructed of two panes of minimum 3 mm tempered glass laminated to a minimum 0.75 mm polyvinyl-butylal (PVB) interlayer, in accordance with UFC 4-010-01. Two panes of laminated glazing shall be installed in each window with hermetically sealed 13 mm airspace between them. After installation of windows, the contractor shall install a minimum 3 mil tinted film (Scotch Shield Ultra Safety and Security Window Film or approved equal) to the inside face of the glazing in accordance with manufacturer's instructions.

#### **4.12.3.1 TEMPERED GLAZING**

Tempered glass shall be kind FT fully tempered flat type. Class 1 clear, condition A uncoated surface, Quality q3-glazing select, conforming to ASTM, DIN, BS or EN standards. Color shall be clear.

#### **4.12.3.2 SEALANT**

Sealant shall be elastomeric conforming to ASTM, DIN, BS, or EN standards. Type S or M, Grade NS, Class 12.5, Use G, of type chemically compatible with setting blocks, preformed sealing tape and sealants used in manufacturing insulation glass. Color of sealant shall be as selected from manufacturer's full range of standard colors by Contracting Officer.

#### **4.12.3.3 GLAZING GASKETS**

Glazing gaskets shall be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening shall be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets shall be in lengths or units recommended by manufacturer to ensure against pull-back at corners.

#### **4.12.3.4 FIXED GLAZING GASKETS**

Fixed glazing gaskets shall be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM, DIN, BS or EN standards.

#### **4.12.3.5 WEDGE GLAZING GASKETS**

Wedge glazing gaskets shall be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM, DIN, BS, or EN standards.

#### **4.12.3.6 PUTTY AND GLAZING COMPOUND**

Glazing compound shall conform to ASTM, DIN, BS, or EN standards for face-glazing metal sash. Putty shall be linseed oil type conforming to DIN, BS, or EN standards for face-glazing primed wood sash. Putty and glazing compounds shall not be used with insulating glass or laminated glass.

#### **4.12.3.7 SETTING AND EDGE BLOCKING**

Neoprene setting blocks shall be dense extruded type conforming to ASTM, DIN, BS, or EN standards. Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer.

#### **4.12.3.8 PREPARATION**

Openings and framing systems scheduled to receive glass shall be examined for compliance with glass manufacturer's recommendations including size, squareness, offsets at corners, presence and function of weep system, face and edge clearance requirements and effective sealing between joints of glass-framing members. Detrimental materials shall be removed from glazing rabbet and glass surfaced and wiped dry with solvent. Glazing surfaces shall be dry and free of frost.

#### **4.12.3.9 INSTALLATION**

Glass and glazing work shall be performed in accordance with, glass manufacturer's instructions and warranty requirements. Glass shall be installed with factory labels intact and removed only when instructed. Edges and corners shall not be ground, nipped or cut after leaving factory. Springing, forcing or twisting of units during installation will not be permitted.

#### **4.12.3.10 CLEANING**

Upon completion of project, outside surfaces of glass shall be washed clean and the inside surfaces of glass shall be washed and polished in accordance with glass manufacturer's recommendations.

#### **4.12.3.11 PROTECTION**

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth, or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Glass units which are broken chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

### **4.13 FINISHES**

All exterior finishes shall be submitted and approved by the COR. Provide color boards with all materials, paints and finishes for COR approval prior to ordering materials. Color boards shall remain on site in view or with the Contractor until completion of the facility.

#### **4.13.1 PAINTS & COATINGS**

Paints and coatings shall be provided as a Specification 09 90 00 Paints and Coatings.

#### **4.13.2 CONCRETE HARDENER**

Concrete sealers shall be a liquid chemical sealer-hardener compound. Apply a minimum of two coats. Sealer shall be compatible with climate temperatures and not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing or other materials applied to the concrete.

#### **4.13.3 PAINT**

Paint shall be latex. A primer shall be placed prior to any coats of paint. A minimum of two (2) coats of paint shall be used for each surface. Existing painted material shall be cleaned, cracks patched, and prepared for new paint. Existing sealant shall be inspected, cleaned or removed and new sealant placed.

#### **4.13.3.1 EXPOSED EXTERIOR STEEL**

Exposed exterior steel shall include items such as trim, frames, door, pipe rails and other exposed steel surfaces. Provide manufacturers standard baked on finish where possible. For unfinished steel items, paint with one coat oil-based primer, with 2 coats of oil-based alkyd gloss enamel, color to be selected by the Contracting Officer from the color board provided by the Contractor.

#### **4.13.3.2 EXPOSED WOOD**

Exposed wood shall include items such as trim, frames, doors and other exposed wood surfaces. Paint with one coat oil-based primer, 2 coats of gloss enamel, color to be selected by the Contracting Officer from the color board provided by the Contractor

#### **4.13.4 EXPANSION JOINTS IN PLASTER & STUCCO**

Expansion joints shall be provided as specified in ASTM, DIN 18339, BS or EN Standards for all walls, floors and ceilings.

#### **4.13.5 EXTERIOR WALLS**

The exterior of all buildings not scheduled to be arch span shall be stucco and/or plaster conforming to ASTM C926 where indicated in standard building design. A temperature of between 4 and 27 degrees C shall exist for a period of not less than 48 hours prior to application of plaster and for a period of at least 48 hours after plaster has set. Control joints shall be designed for expansion and contraction of plaster work due to thermal exposure. Control joints shall comprise of back to back casing beads. Install new stucco in 2 coats. The first coat shall be a scratch coat approximately 10 mm thick. Allow 7 days to cure. The second coat shall be finish stucco, smooth finish, approximately 10 mm thick. Allow 7 days to cure before painting. Stucco showing over sanding, cracks, blisters, pits, checks, discoloration or other defects is not acceptable. Defective plaster work shall be removed and replaced with new plaster at the expense of the Contractor. Patching of defective work will be permitted only when approved by the Contracting Officer. Patching shall match existing adjacent work in texture and color. All exterior color finish shall be integral with the stucco finish. No painted stucco shall be permitted due to minimize future maintenance.

#### **4.13.6 INTERIOR WALLS**

##### **4.13.6.1 PLASTER WALLS**

Interior walls shall be plaster applied in a similar manner as exterior stucco. Paint with 2 coats of semi-gloss off-white with less than 0.06% lead by weight color to be selected by the Contracting Officer from the color board provided by the Contractor.

##### **4.13.6.2 SOUND CONTROL**

Walls between patient rooms, exam rooms, clinic rooms, and offices shall have a Sound Transmission Class (STC) minimum 45-55 or better. An STC value is a single number rating used to characterize the sound insulating value of a partition (wall, floor, or ceiling). All walls shall be caulked at floor and ceiling prior to installing wall base. All openings between rooms shall be caulked or sealed. Doors shall have rubber seal around frames and threshold.

##### **4.13.6.3 HARDENED (CMU) INTERIOR WALLS**

Interior walls intended to be CMU shall be a minimum thickness of 100 mm. Interior CMU walls shall be plaster applied in a similar manner as exterior stucco. Paint with 2 coats of semi-gloss off-white paint 100% acrylic over one coat of primer paint. The final color shall be selected by the Contracting Officer from the color board provided by the Contractor.

## **4.13.7 INTERIOR CEILINGS**

### **4.13.7.1 CONCRETE CEILINGS**

Concrete ceilings shall be exposed concrete painted with 2 coats of flat white 100% acrylic paint over a coat of primer paint.

## **4.14 SPECIALTIES**

### **4.14.1 MIRRORS**

600 mm x 900 mm, 6 mm plate glass shall be mounted above all lavatories. Mount bottom of mirrors 1100 mm above finished floor.

### **4.14.2 TOILET PAPER HOLDERS**

Toilet paper holders with removable pin shall be stainless steel, installed approximately 200 mm above floor by eastern toilets and 600 mm above floor by western toilets.

### **4.14.3 SHOWER CURTAIN RODS & SHOWER CURTAIN**

Shower curtain rods, stainless steel, heavy duty, 1.20 mm shall be mounted between the walls of each shower stall. Mount rod 2000 mm above finished floor. Provide a shower curtain with support rings for each shower stall.

### **4.14.4 GRAB-BARS**

Stainless steel grab-bars, heavy duty, 1.20 mm, two each 900 mm and 1050 mm long, 40 mm diameter shall be mounted behind and beside all eastern toilets, and two mounted vertically within all shower units. Mount grab-bars between 610mm - 900 mm height on the walls. Each bar shall support no less than 91 Kg in any direction.

### **4.14.5 PAPER TOWEL DISPENSERS**

Paper towel dispensers, 0.683 mm Type 304 stainless steel, surface mounted. Furnish tumbler key lock locking mechanism.

### **4.14.6 LIGHT DUTY METAL SHELF**

Provide a 600 mm long x 150 mm wide, light duty stainless steel shelf with integral brackets over each lavatory and laundry sink.

## **5.0 MECHANICAL**

### **5.1 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. The contractor will be responsible for producing a complete design meeting the requirements listed below and meeting the listed codes.

### **5.2 SPECIALIST SUB-CONTRACTORS QUALIFICATIONS**

The HVAC works shall be executed by a heating and cooling specialist sub-contractor experienced in the design and construction HVAC equipment to include conventional refrigerant systems, heat pump units, space heaters and knowledge in fabricating specialized units consisting of supplemental electric resistance heaters in satisfying the specified indoor design conditions.

### 5.3 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.

### 5.4 CODES, STANDARDS, & REGULATIONS

The design and installation of equipment, materials, and work covered under the mechanical services shall conform to the standards, codes, and regulations provide in the paragraph, List Of Codes And Technical Criteria, 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 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.

### 5.5 EQUIPMENT PROTECTION

Provide exterior pad-mounted mechanical equipment with either protective fences and concrete-filled steel bollards or protective screen walls to prevent accumulation of debris and vandalism.

### 5.6 DESIGN CONDITIONS

All mechanical and plumbing equipment and systems to be designed to comply with seismic criteria and parameters identified in Section 01015, Paragraph 3.6.

Outside Design Conditions (Contractor shall verify the ambient conditions with available and reliable local weather data).

Herat area:

Latitude – (approx.) 34.22 deg. North

Longitude – (approx.) 62.22 deg. East

Elevation – (approx.) 964 M (3163 ft.)

Summer – 38 deg C (100 deg F) Dry Bulb (DB) [& 20 deg C (68 deg F) Wet Bulb (WB)

Winter – (-6 deg C/21 deg F)

Daily Range – (17 F)

#### 5.6.1 INDOOR DESIGN CONDITIONS

Facility Type	Summer Temperature	Winter Temperature
Hospital Facility (Occupied Spaces)	Cooling 25 C (78 F) Unitary Ducted Heat Pump	Heating 20 C (68 F) Unitary Ducted Heat Pump
Mechanical/Electrical Room	No Cooling	Heating 20 C (68 F)
Dining Facility	No Cooling	Heating 20 C (68 F)
Male Out-Patient Clinic	Cooling 25 C (78 F), exam rooms, pharmacy storage, pharmacy, waiting rooms	Heating 20 C (68 F)

Female Out-Patient Clinic	Cooling 25 C (78 F), exam rooms, pharmacy storage, pharmacy, waiting rooms	Heating 20 C (68 F)
Morgue	Cooling 21C (70 F)	No Heating
Latrine	No Cooling	Heating 20 C (68 F)
Booster Pump Bldg	No Cooling	Heating 13 C (55 F)
Well House	No Cooling	Heating 13 C (55 F)

### 5.6.2 NOISE LEVEL

Noise levels inside occupied spaces generated by HVAC systems indoors shall not exceed NC 35. Noise levels for outdoor generators are provided in paragraph: Mechanical Requirements For Generators.

### 5.6.3 INTERNAL LOADS

Occupancy: Use ASHRAE standards to calculate sensible and latent heat from people. In general, light/moderate office work is 73 Watts sensible and 45 Watts latent.

Lighting: 21.5 W/sq.m (2 W/sq.ft) maximum (however lighting levels shall meet minimum requirements and shall be accounted for in the heating and cooling loads based on the actual lighting design).

Outdoor Air: Outdoor ventilation air shall be provided per ASHRAE Standard 62.1 for office and general areas. In general this requires 9 cmh/person (5 cfm/person) plus 1 cmh/ sq.m of floor space (0.06 cfm/sq.ft); outdoor air requirements can be satisfied by windows that open to the outside. Enclosed occupied areas without windows shall have exhaust based on occupancy using the formula above along with a means for allowing makeup air from adjoining parts of the building. In functional spaces the outdoor air shall be based on the required air changes per hour for each functional space as defined in UFC 4-510-01.

Toilet/Shower Exhaust: 85 cmh (50 cfm) per toilet, urinal, and shower head.

Building Pressurization: 12.5 Pa (0.05" w.c.); Maintain negative pressure in latrine areas. This is only applicable for buildings provided with central ducted forced air systems

## 5.7 AIR COOLING & HEATING 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 that is the most Life Cycle Cost Effective to the government. Contractor shall size and select equipment based on equipment manufacturer's performance data at the project site elevation and temperature conditions to ensure the equipment's performance meets the design heating and cooling sizing requirements.

Hospital systems shall use unitary ducted heat pumps. The units shall be constant volume and zoned as shown in concept plan. Calculate airflow from all rooms within the zone and provide ducted supply and ducted return to each room.

Toilet rooms, storage room, blood bank, laboratory, and quarantine room need to be under negative pressure and will need dedicated general exhaust systems. Design shall comply with UFC-4-510- Medical Military Facility section 7-16 ventilation design.

### **5.7.1 UNITARY DUCTLESS (SPLIT-PACK) HEAT PUMP UNITS**

Unitary ductless split-pack heat pump units may be provided as allowed per 01010. 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. **Heat pump units shall be suitable for low ambient operation.** Provide supplemental electric resistance heat as required for outdoor temperatures of -6 deg C (22F). Interior evaporator fan coil units shall consist of a DX coil, blower, 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 exterior condensing units shall contain compressor, condenser coil, and all controls/fittings enclosed in a weatherized housing. Outdoor condensing unit shall be wall-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.

Unitary ductless heat pumps shall be used in the Quarantine Rooms, the Laboratory and the Blood Bank Room, as shown in the Appendix. Locate the thermostat on an interior wall and not in the air stream from the unit.

### **5.7.1 UNITARY DUCTED HEAT PUMP UNITS**

Ducted packaged heat pump units shall be provided for the hospital. Ducted forced air systems are required to satisfy the indoor air quality as specified in ASHRAE 62.1 and to maintain positive pressure of 1.3 mm w.g. in the buildings. Ducted packaged heat pump units shall be unitary in design and factory manufactured ready for installation. Heat pump units shall provide cooling during summer and heating during winter. The unit shall consist of a return air damper, adjustable outside air damper, pre-filter, main filter, DX coil, fan, supplemental electric heater elements, washable filter, and condensing unit containing the compressor, condenser coil, fans and all internal controls/fittings complete all mounted in a weatherized housing finished for exposed installation.

The unit shall be suitable for exterior installation and be mounted on steel supports that rest on a concrete pad of a minimum of 150 mm thickness. Unit shall be mounted so that the bottom of the air intake is at least 1.5 meters (6 feet) above the ground in order to reduce the intake of dust. Unit temperature control shall include wall-mounted adjustable thermostat, blower on-off-auto switch and automatic heating-cooling change over control. Heat pump units shall be sized to serve the zones. Contractor shall provide a full set of replacement (for both stages of filtering) filters for each unit upon completion of the job. Fans shall be centrifugal type, either forward curved, backward inclined, airfoil type of Class II construction. Unit shall come with automatic controls that allow scheduled operation and perform all functions of unit control. Electric reheat shall not occur when the unit is in cooling mode.

Air handling unit submittals shall be complete with fan curves, dimensioned drawings of internal arrangement, damper locations, capacities, electrical requirements, as part of a complete shop drawing package. Diagrammatic and incomplete submittals will be rejected.

Ducted unitary heat pumps shall be used in Operating Room quadrant, the Emergency Room-Trauma area, the Patient Wards-Nursery zone, the Waiting area and the Exam Room core, as shown in the Appendix. Provide a thermostat location that best averages all the spaces in the zone. Do not locate a thermostat near a supply diffuser or grille.

#### **5.7.1.1 AIR FILTRATION**

The first set will be MERV 8 filters used on the return side of the supply fan after mixing of the return and outside air streams.

The unit shall be provided with pressure gages in the 0 Pa to 250 Pa range at each set of filters to be used by the maintenance personnel to determine when each set of filters needs cleaning/ replacement. The MERV 8 filters shall be changed when the pressure rises above 100% of the manufacturers dirty filter pressure rating.

## **5.7.2 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 next to the main entrance door. For units serving more than one (1) area, the thermostat shall be located near the return of the space with the highest heat generation.

## **5.8 DUCTWORK**

Air shall be distributed from packaged heat pump to achieve proper airflow throughout the facility and shall be removed by exhaust fans by means of ductwork. Air distribution system shall be comprised of supply and return ductwork, fittings, manual volume control dampers, grilles, registers, and/or diffusers. Ductwork shall be constructed of galvanized steel or aluminum sheets and installed as per SMACNA "HVAC Duct Construction Standards (Metal and Flexible)." Flexible non-metallic duct may be used for final unit/diffuser connection in ceiling plenums. These flexible duct run-outs shall be limited to 1.5 m (5') in length.

### **5.8.1 DUCT INSULATION**

Duct insulation shall be provided for all supply ductwork that is not located in the conditioned space and for return ductwork not located within the conditioned space. All ductwork exterior to the building shall be insulated with a minimum RSI=0.88 (R5).

In general interior ducts shall be exposed to the rooms and will not be insulated. The heat lost or gained from the un-insulated ducts shall be considered as part of the heating or cooling of the conditioned space. Makeup duct systems shall be provided with insulation and vapor barrier to prevent condensation. Insulation exposed to weather or physical damage shall be protected with aluminum jacketing.

### **5.8.2 DIFFUSERS, REGISTERS, & GRILLES**

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

### **5.8.3 BRANCH TAKE-OFFS**

Air extractors or 45-degree entry corners ("boots") shall be provided at all branch duct take-offs. Manual volume control dampers shall be included at the branch duct take-offs and where required to facilitate air balancing and shall be shown on the design drawings.

### **5.8.4 WALL PENETRATIONS**

Building wall penetrations for fans, exhaust duct, vents, and louvers 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 walls. The Contractor is encouraged to locate exterior wall louvers above doors, whenever possible, to take advantage of the structural framing void located above doors. If the building manufacturer is not available, the Contracting Officer shall be consulted. In either case, the recommendations of the manufacturer and/or Contracting Officer shall be strictly adhered to.

### **5.8.5 WALL TRANSFER GRILLES**

Wall penetrations for air transfer between two spaces shall be provided with a factory fabricated grille on both the inlet and outlet sides of the opening. For fire-rated walls in accordance with NFPA-90A with air transfer penetrations, fire dampers shall be installed between the inlet and outlet grilles.

### **5.8.6 OUTSIDE AIR INTAKE, MAKEUP, AND EXHAUST LOUVERS**

Outside air louvers shall be factory fabricated of steel or aluminum and allow the specified air quantity into the space intended. Louvers shall be square or rectangular with rain-proof exterior face blades and internal grille. To reduce sand and dirt migration, outside air intakes shall be installed as high as possible within architectural constraints or a minimum of 1.5 m (5') above the ground. Consideration shall be given to locating the louvers near the heating and cooling unit and encourage air flow across the room in conjunction with the exhaust fan. Outside air intake louvers shall be provided with air filter (See Air Filtration), insect screen, and motorized dampers interlocked to open when the exhaust fans operate. Minimum louver dimensions shall be submitted in the design analysis (DA) calculations.

All supply air shall be filtered using manufacturer's standard washable filters mounted inside the unit. In addition, all outdoor makeup air intakes shall be equipped with 50 mm (2") thick washable filters. 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 (1) area, the thermostat shall be located near the return of the space with the highest heat generation.

## **5.9 VENTILATION, EXHAUST AND AIR-MOVEMENT SYSTEMS**

All fans used for building ventilation, exhaust, and pressurization shall be selected for minimum noise level generation. All fans used for supply or roof/wall exhaust, including toilets, showers, and ablutions, 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 wall exhaust fan shall be provided with motorized or gravity dampers which close automatically when the fan is not running. Each ventilation or intake air fan shall be provided with an interlocked motorized damper which closes automatically when the fan is not running and shall be sized for and provided with filter and insect screen. Each fan shall be provided complete with vibration isolator, external lubricators, individual wall on/off switches, and all accessories and sound attenuators as necessary.

Consideration shall be given to wall-mounted fans (except for battery rooms) to reduce roof penetrations and possibility for water leaks (especially for metal roofs).

Intake or makeup air openings ventilation and for exhaust fans shall be provided with motorized dampers which are interlocked with the exhaust fans and provided with air filters and insect screens. The motorized dampers shall open or close when the ventilation or exhaust fan is on or off respectively. Louvered intake openings, or ventilation or exhaust fan system, shall be sized for a maximum static pressure (SP) drop (that includes filter resistance) of 25 Pa (0.10" of H<sub>2</sub>O) to prevent excessive negative pressurization of the building. Exterior outside door louvers and undercuts are not permitted except under special circumstances.

Maintenance shops and similar spaces that use solvents and oils shall be provided with mechanical exhaust air systems. Intake or makeup air openings for an exhaust fan system shall be provided as indicated above. The exhaust systems shall consist of a fan, ductwork, exhaust grills, and interlock controls. Design shall be in compliance with the latest addition of the Industrial Ventilation UFC 3-410-04N or ACGIH Industrial Ventilation manual.

To reduce sand and dirt migration, outside air intakes shall be installed as high as possible within architectural constraints or a minimum of 1.5 m (5') above the ground.

The design for the hospital rooms shall follow the UFC 4-510-01 Appendix A guidelines for both required air changes per hour in each room type, pressurization and filter requirements. The filters shall be located as recommended in UFC 4-510-01 with the MERV 8, pre-filter located on the return side of the supply fan, and the final filter located downstream of the supply fan near the supply diffuser.

### **5.9.1 CEILING FANS**

Ceiling fans shall be 5-bladed, 1320 mm, minimum, in diameter, and provided at one per 25 SM of floor space unless indicated otherwise. Fans shall be centered or distributed evenly throughout the 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 a minimum 2.5 m above the finished floor. The fan shall be provided without light kit. The finish shall be factory painted white. The controls shall be

wall-mounted from either a single pole switch or from two (2) 3-way switches to provide on/off operation. The electrical supply shall be as indicated. Install per manufacturers' instructions.

## **5.10 ELECTRIC HEATERS**

Electric trace heating cables for freeze protection shall not be provided as a substitute for space heating systems.

### **5.10.1 UNIT HEATERS**

Electric resistance unit heaters shall be installed in spaces where only heating is required. Generally, unit heaters shall be mounted as high as possible. Unit heaters shall be of the industrial grade, durable, and securely fastened to the ceiling, wall or structure. Electric heating unit shall be self-contained with heating elements and fan with at least two (2) speeds. Unit shall be provide control-circuit terminals and single source of power supply with disconnect. Heating wire element shall be nickel chromium. Limit controls shall be provided for overheat protection. Hard-wired integral thermostats shall be generally located under the unit or in the return air flow stream.

### **5.10.2 INFRARED HEATERS**

Infrared heaters may be considered for spot heating of a large area such as maintenance bays and warehouses. Infrared heaters shall use electricity. Contractor shall position the infrared heaters to direct the radiant heat to only those areas where people normally work. Coordinate with User. Infrared heaters shall be provided with control-circuit terminals and single source of power supply with disconnect.

### **5.10.3 TEST ON COMPLETION**

Upon 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. Contractor shall coordinate with the Contracting Officer on when the test shall be scheduled. Tests shall include all interlocks, safety cutouts, and other protective devices to ensure correct functioning. All such tests shall be carried out with full written records of the values obtained and the final settings and submitted to the Contracting Officer in writing.

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:

- 1) Ambient DB and WB temperatures.
- 2) Room Inside Conditions:
  - a) Inside room DB & WB temperatures.
  - b) Air flow supply, return, and/or exhaust.
  - c) Plot all temperatures on psychrometric chart.
- 3) Split-Pack Heat Pumps and Heaters the following readings shall be made:
  - a) Motor speed, fan speed, and input ampere reading for each fan.
  - b) Supply and return air temperature for each system.
- 4) Packaged 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:
  - a) Supply, return and outside air cmh (cfm) supplied by each air conditioning system.
  - b) Motor speed, fan speed, and input ampere reading for each fan.
  - c) Supply, return, and outside air temperature for each air-conditioning system.

5) Exhaust air fans the follow reading shall be made:

- a) Total cmh (cfm) by each fan.
- b) Speed in rpm.
- c) Amperes for each phase.
- d) Power input in kW.

6) Electric Motors: For each motor:

- a) Speed in rpm.
- b) Amperes for each phase.
- c) Power input in kW.

#### **5.10.4 ELECTRICAL REQUIREMENTS FOR HVAC EQUIPMENT**

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 British Standard 7671.

All thermostats shall be wall-mounted. 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. Wall-mounted thermostats shall be mounted 1.5 m (5') above the finished floor and be easily accessible. Thermostats for the latrine facilities shall be located near the unit return and mounted 1.5 m (5') above the finished floor. Operation of the control system shall be at the manufacturer's standard voltage for the unit.

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

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

### **5.11 MEDICAL WASTE INCINERATORS**

A medical waste incinerator shall be provided in quantities and capacities as required in Section 01010 and specifically designed by the manufacturer to dispose of all Bio-Hazard medical wastes. The unit shall be sized for 12 hours per day of continuous operation and be rated in quantity per hour (i.e. kg/hr or lbs/hr). Capacity calculations shall be provided in the design analysis (DA) for all incinerator sizing and be base on 1.0 kg/bed/24-hrs (2.2 lbs/bed/24-hrs) for hospitals and 2.0 kg/exam-room/24-hrs (4.5 lbs/exam-room/24-hrs) for medical clinics. Calculations shall clearly state, as a minimum, the minimum daily waste streams by weight, minimum incinerator burn rate capacities, and all relevant information required for the calculations.

Incinerator loading or charging of medical waste shall be batched-fed manually.

The medical waste incinerator shall be a self-contained diesel fuel fired unit with a minimum 100kg per load capacity.

## **6.0 PLUMBING**

### **6.1 GENERAL**

The Contractor shall design and build domestic cold and hot water systems, waste, drain and vent systems, compressed air, fuel-oil storage and distribution systems and as required in the facilities identified in Section 01010 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, adjusting, testing and balancing, and handing over in full operating condition all equipment and associated works.

## **6.2 SUB-CONTRACTORS QUALIFICATIONS**

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

## **6.3 STANDARD PRODUCTS**

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

## **6.4 CODES, STANDARDS, & REGULATIONS**

The design and installation of equipment, materials and work covered under the plumbing services shall conform to the standards, codes, and regulations provide in the paragraph, List of Codes and Technical Criteria, 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 and primarily in accordance with the ICC International Plumbing Code (IPC). Standards other than those mentioned 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.

## **6.5 EQUIPMENT PROTECTION**

Exterior plumbing equipment shall be pad-mounted. In addition, security fences and traffic bollards for exterior equipment shall be provided.

## **6.6 PLUMBING SYSTEM REQUIREMENTS**

### **6.6.1 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 except for the service line. 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. Electric heat trace cable for freeze protection shall not be provided as a substitute for space heating systems.

### **6.6.2 PIPING MATERIALS**

Domestic cold water shall be distributed by means of standard weight schedule 40 galvanized steel pipe, Polyvinyl Vinyl Chloride (PVC) or Polyethylene (PE) (ASTM D 2737) plastic piping. Domestic hot water shall be distributed by means of standard weight schedule 40 galvanized steel pipe, or Chlorinated Polyvinyl Vinyl Chloride (CPVC) piping. Domestic water joints shall be connected using either solvent cement or mechanical threads.

Waste and vent piping can be made of either galvanized steel pipe (schedule 40) or Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 2665. Flexible waste and vent lines from fixtures (i.e. Lavatories, Water Closets, etc.) and inserted into an adjacent pipe are not allowed accept for clothes washer installations.

Corrosion protection shall be provided if galvanized piping comes in contact with earth or masonry floors, walls or ceilings. The Contractor shall attempt to route all piping beyond the grasp of the occupants. All exposed domestic

water, waste, and vent piping shall be schedule 40 galvanized steel; wall mounting brackets for exposed domestic water, waste, and vent piping shall be spaced a maximum of 40 cm (16") apart to minimize vandalism.

Polypropylene (PP) pipe is NOT allowed as a substitute (where plastic piping is allowed) because connections, many times, are made using the fusio-therm technique which requires special training and maintenance equipment for installation and repair.

### **6.6.3 PLUMBING WATER FIXTURES**

The following typical plumbing fixtures shall be provided:

- 1) 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/hose bibb 300 mm (12") above finished floor on the right (from a perspective of standing inside of the cubicle and looking out) sidewall of the cubicle. All toilets shall be oriented in a culturally appropriate direction. Toilets shall be oriented north and south whenever possible. Toilets shall not face east or west.
- 2) Lavatories. All sinks shall be the trough-type constructed of block and concrete with ceramic tile exterior and lining capable of withstanding abuse. Provide maintenance access to waste piping and P-traps from under the sink. Lavatories inside prisoner cells shall be tamper-proof with integral spout, soap depression, and outlet connection to slip 40 mm (1.5") OD tubing.
- 3) Sink Faucets. Trough-type sink faucets shall be similar to service sink faucets with one-piece brass body construction, fixed short integral spout, hot and cold water manual mixing valves, and capabilities for withstanding abuse. Faucets shall be the low flow type. Use cross handles or knob handles. No goose neck faucet fixtures shall be used.
- 4) Service-Janitor's Sink. All janitor's sinks shall be floor mounted, enameled cast iron, and be provided with copper alloy rim guard. Provide hot and cold water valves with manual mixing. Faucet handles shall chrome plated brass or bronze alloy. Service sinks provided in maintenance areas shall be concrete. Service sinks in battery rooms shall be acid resistant. Include a stainless steel shelf and three (3) mop holders with janitor sinks.
- 5) Showers, Showerhead and faucet handles shall be chrome plated brass or bronze alloy. Provide hot and cold water valves for manual mixing. In addition to a shower head, provide each shower stall with a threaded faucet approximately 1.2 m (4') AFF with hot and cold-water controls, mixing valve, and diverter valve so water can be directed to either the shower or to the lower faucet. Shower shall be provided with a shower head. The shower head shall be heavy duty type and securely fastened to the wall.
- 6) Emergency Shower and Eye Wash Assembly. Provide emergency shower and eye wash assembly in facilities where lead-acid batteries are stored. Provide a floor drain in the area if appropriate (i.e. Non-freezing locations, etc.). Provide tempered (room temperature) water for 20 minutes usage.
- 7) Ablution Trenches. Provide trench drains with brass grating and strainer. Provide each station with hot and cold water valves with manual mixing. Faucet handles shall be copper alloy.
- 8) Floor Sinks. Provide floor sink, circular or square, with 300 mm (12") overall width or diameter and 250 mm (10") nominal overall depth. Sinks shall be provided with acid resistant enameled interior cast iron body, aluminum sediment bucket, and perforated grate of cast iron.
- 9) Floor or Shower Drains: Floor and shower drains shall consist of a cast iron or 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.

10) 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 m (40') of hose. Provide clean-up spray nozzle with hose assembly.

11) Provide P-Traps per IPC for all fixture drains, floor and trench drains, and shower drains. P-traps shall have minimum of 50 mm (2") water seal.

12) Service (Mop or Janitor's) Sink: All janitor's sinks shall be floor mounted, enameled cast iron or molded heavy-duty acrylic, and be provided with copper alloy rim guard. Provide a stainless steel shelf and three (3) mop holders with janitor sinks.

Provide hot and cold water heavy duty janitor's sink valves with manual mixing at the janitor's sink. Faucet handles shall chrome plated brass or bronze alloy.

## **6.7 HOT WATER**

Hot water shall be provided for the facility to supply 50 C (120 F) hot water to fixtures and outlets requiring heated water. Water of a higher temperature, 60 C (140 F) and above, shall be provided for special uses or processes as in kitchens (except hand wash lavatories) and for sterilization. All hot water piping shall be insulated. A hot water recirculating pump shall be provided if hot water piping run exceeds 30 m (100) in accordance with the IPC.

### **6.7.1 WATER HEATERS**

The hot water shall be generated by electric water heaters (WH). All WHs shall be factory insulated. Each water heater shall be equipped with a vacuum relief valve and temperature and pressure (T&P) relief valve that discharge into a nearby floor drain; discharge piping shall terminate 50 mm (2") above the floor drain. The larger floor-mounted units shall be located inside mechanical rooms, storage rooms, janitor rooms, or similar type spaces. Smaller wall-mounted units may be located in toilet-lavatory areas for single remote water closets. Multiple water heaters (two or more) shall be of equal size and connected by common inlet and outlet manifolds in a "**reverse return**" configuration to ensure equal flow and drawdown rates. All floor-mounted WHs shall be elevated on a 100 mm (4") raised concrete pads. In cases where the pressure of the water system violates the manufacturer's recommendations, a pressure reducer shall be installed in the line before the water heater.

The hospital hot water system shall be designed and provided with a pump driven "Loop" configuration that continuously circulates hot water throughout the system.

The water heaters shall be located in a metal panel enclosure with sloped metal roof panels adjacent to the Electrical-Communications-Mechanical Controls Room. A 100 mm thick concrete slab 1500mm x 6000mm with steel 150mm welded wire fabric 2.9 x 2.9 at mid-depth in slab. Provide full height door with pad lock. The eave of the enclosure for the water heaters shall be 2600mm above the concrete slab.

Water heater storage capacity (liters) and recovery capacity elements (kW or liters per hour) shall be sized in accordance with ASHRAE Fundamentals Handbook-HVAC Applications, "Service Water Heating," as follows:

"Industrial Plant""Hotel""Office Building". The unit(s) capacities shall be for commercially available tank and electric heating element gas burner sizes.

## **6.8 WASTE, DRAIN, & VENT SYSTEMS**

Every trap and trapped fixture shall be vented in accordance with the IPC. In order to minimize vent piping, incorporate either "Circuit Venting," "Combination Drain & Vent," or "Wet Venting" options systems in accordance with the IPC.

### **6.8.1 DESIGN & INSTALLATION CONSIDERATIONS**

The Designer and installer shall have in mind a vent option (i.e. Fixture Venting, Circuit Venting, Wet Venting, etc.) before designing the route of the waste line(s) in a building in order to comply and avoid inconsistencies with the IPC. **Under no circumstances shall VENT PIPING be routed horizontally under the floor due to blockages over time.** Every dry vent connection shall rise up vertically from the waste pipe no less than 45-degrees with the

horizontal (Note: In most cases, the connection will be 90 degrees for the horizontal or straight up. See IPC). Every dry vent shall rise up vertically at least 15 cm (6") above the flood level rim, of the fixture being vented, before going horizontally.

## **6.8.2 FLOOR DRAINS**

Floor drains shall be provided in each room that contains a water source. Floor drains shall be provided in the mechanical equipment and toilet/shower/ablution rooms. Floor drains shall be provided next to water heaters. In mechanical rooms, floor drains shall be provided to avoid running drain piping long distances above or over the floor. Drain outlet shall use a P-trap system to trap sewer gases and shall be a one-piece system without removable parts.

This style of floor trench shall be installed due to the kitchen wash down cleaning practices of the local national staff.

## **6.8.3 CLEANOUTS**

Cleanouts shall be provided no more than 8 m (25') apart when measured from the upstream entrance of the cleanout.

## **6.9 SPECIAL PLUMBING SYSTEMS**

Contractor shall design and construct compressor air storage and distribution, waste-oil collection and storage, fuel-oil storage and distribution and 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.

### **6.9.1 COMPRESSED AIR SYSTEMS**

~~Compressed air system shall be in accordance with UFC 3-420-02FA. 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 10 kPa (200 psig) maximum for 6 kPa (125 psig) normal units. High pressure system (above 10 kPa (200 psig)) shall be provided to supply compressed air to equipment where required. Provide an engine driven air compressor where generator electrical power is unreliable. Noise level of air compressor should not exceed acceptable db limits.~~

~~The air distribution system shall be provided with necessary regulator valves to maintain desired pressure. Compressed air drops shall be provided in each maintenance bay, tire shop, tool room, paint shop and other areas requiring compressed air service. 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.~~

### **6.9.2 FUEL STORAGE AND CONTAINMENT**

Fuel Storage shall be provided to support the operation of vehicle refuel points.

Bulk storage of fuels shall be designed around above-ground horizontal steel tanks with single-walls and containment dike. Double-walled tanks may be provided (without dikes) depending upon local availability and USACE approval. Under NO circumstances shall GALVANIZED tanks be provided for storage of fuel oil or diesel. Tanks shall be installed in accordance with NFPA 37.

The containment dike(s) shall be sized to contain the entire contents of the tank plus 10 percent. The dike structure shall be constructed of reinforced concrete. If more than one (1) tank is sharing a containment dike, then the dike need only be sized for the capacity of the largest tank, plus 10 percent.

Bulk storage tanks shall be designed and manufactured for horizontal aboveground installation. 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. Molded neoprene isolation pads shall be provided at locations where steel contacts concrete to isolate the tank. Steel tank supports

specifically are prone to encounter premature rusting due to constant exposure to moisture and their incompatibility with concrete.

Tanks of 3,880 to 45,400 liters (1,000 to 12,000 gallons) capacity shall be provided with 760 mm (30") diameter manways. Tanks larger than 45,400 liters (12,000 gallons) shall be provided with 900 mm (36") diameter manways. Tanks 3,800 liters (1,000 gallons) and larger shall be provided with a minimum of one (1) tank manway to allow for internal tank access. Piping shall not penetrate through access manways. Tank shall be provided with a combination cleanout and gauge connection.

Vent pipe sizing shall be not less than 32 mm (1-1/4") nominal inside diameter. Vent shall be the rupture disc type calibrated to burst at 14 kPa (2 psi) pressure, and operate at 80 percent of burst setting. Tank shall be provided with an overfill alarm system. Tank shall be provided with two (2) stick gauges graduated in m and mm. Stick gauge shall be of wood and treated after graduating to prevent swelling or damage from the fuel being stored. Each storage tank shall be provided with an automatic analog reading gauge which is directly mounted to a tank's manway cover. Cathodic protection shall be provided for metal components in accordance with the manufacturer's recommendations. Storage tanks shall be handled with extreme care to prevent damage during placement and shall be installed in accordance with the manufacturer's installation instructions. External platform/ladder access to tank top (i.e. manhole) shall be installed on a concrete pad.

Exterior surface preparation shall consist of abrasive blast cleaning according to SSPC-SP6, primed with a two-component zinc-rich aromatic polyurethane, at 2.5 to 3.5 mils DFT (dry film thickness), followed by an intermediate coat of polyamide epoxy, spray applied at 4.0 to 6.0 mils, and a finish coat of aliphatic acrylic polyurethane, spray-applied at 3.5 to 5.0 mils.

### **6.9.3 FUEL DISTRIBUTION SYSTEM**

Fuel shall be transferred from the bulk storage tank(s) by pumps at the dispensers and be fitted with in-line fuel filters within 2 m (7') of the tank shell.

Fuel piping shall be black steel for ALL piping above grade and either steel or fiberglass for underground. Rubber hoses shall not be allowed. Under NO circumstances shall GALVANIZED piping, fittings, valves, or other equipment be used for fuel oil or diesel conveyance. Secondary containment for underground fuel piping shall be provided with either double-wall fiberglass, double-wall black steel inner and steel outer with cathodic protection, double-wall black steel inner and fiberglass outer, or either black steel or fiberglass piping located in a concrete secondary containment trench with applied POL-resistant coating and removable covers (traffic-rated as applicable).

Piping shall be installed straight and true to bear evenly on supports. Piping shall be free of traps, not embedded in concrete or pavement, and drain toward the corresponding storage tank when elevation permits. Belowground nonmetallic pipe shall be installed in accordance with pipe manufacturer's instructions. Belowground piping shall be laid with a minimum pitch of 0.4 m per 100 m (0.4 percent slope).

### **6.9.4 FUEL OFF-LOAD SYSTEM**

A fuel filling system shall be provided for unloading fuel from fuel tanker trucks into individual bulk storage tanks and comprises of truck pad(s), and duplex fuel transfer pumps, piping manifold, and valves all in weather-proof cabinet. The system shall provide remote fuel level monitoring panels at the pad(s). Weather-proof cabinet shall be lockable shall contain any spillage encountered during tank filling

### **6.9.5 TANK/PIPE TESTING AND TURNOVER**

A tightness test shall be performed on each storage tank and associated piping. The tank tests shall be performed prior to making piping connections. Tests shall be capable of detecting a 0.1 ml/s leak rate from any portion of the tank while accounting for effects of thermal expansion or contraction. Each storage tank shall be pressurized with air to 35 kPa and monitored for a drop in pressure over a two (2) hour period during which there shall be no drop in pressure in the tank greater than that allowed for pressure variations due to thermal effects. Following the tank tightness test(s), each storage tank shall be leak tested in accordance with the manufacturer's written test procedure if the manufacturer's test procedure is different from the tightness tests already performed. Also following the tank tightness test(s) all associated piping shall be tested using the same procedures stated for testing the tank(s).

## **6.10 LPG-PROPANE COOKING STOVES**

Cooking areas shall be provided with canopy type exhaust and associated exhaust and makeup air fans. See paragraph, Mechanical, in this Section. New stoves shall be set into formed concrete openings such that they can easily be removed for replacement, maintenance, and cleaning.

### **6.10.1 COOKING STOVES/BURNERS**

Each LPG-propane stove shall be provided with three (3) burners and metal frame with four (4) legs. The stoves shall be of commercial quality and be capable of producing the highest heat output with all three (3) burners on. The center burner is low heat, center and middle burner is medium heat and all three burners is high heat. A gas flow regulating-adjusting valves shall be provided for each burner at the face of the appliance.

Stove dimensions are approximately 720 mm long by 720 mm wide by 500 mm high.

## **6.11 LPG-PROPANE FUEL STORAGE & DISTRIBUTION**

LPG/propane Storage and Distribution shall be provided to support operation of the LPG-propane appliances. LPG/propane storage tanks shall be provided and installed in accordance with NFPA 58.

### **6.11.1 GAS PIPING SYSTEMS**

Gas piping from the LPG-propane tanks to the respective gas appliances shall be wrought iron, ASTM B36.10M or steel (black or galvanized), ASTM A53. For stoves, the steel piping shall terminate in front of the stove with a shut off valve and quick disconnect nipple. A stainless steel flexible hose shall connect from the LPG-propane stove to the steel piping. Each end of the flexible hose shall be provided with quick disconnect fittings. Flexible rubber hoses are not allowed.

Installation of the LPG-propane piping in sleeves above the floor level (in the formed concrete openings for the stoves) is highly recommended. The piping may be surface mounted provided that it is not susceptible to damage or causes any safety hazards. LPG-propane piping shall not be trenched or embedded in the concrete floor. Piping passing through interior and exterior walls shall be provided with pipe sleeves.

### **6.11.2 FUEL STORAGE**

LPG-propane storage tanks shall be located outside and exterior to the building in a storage yard.

The storage of fuels shall consist of individual 100-pound (45 kg) portable bottle tanks of a quantity to store a 30-day supply of fuel. The Contractor shall provide calculations in the Design Analysis (DA) for the storage capacity required.

The LPG/propane storage tanks shall be installed on a concrete pad and placed within a covered, secure, enclosure to protect tanks from the elements and vandalism. The tanks shall be complete with fill fittings, tank gauge, vent, 2-stage and line regulators, and other fittings and appurtenances required for full and safe operation. Portable bottle tanks shall be secured with chains to prevent tipping.

The Contractor shall provide the tanks filled with LPG/propane fuel at time of completion.

The Contractor shall provide a chain link fence and gates around the entire LPG/propane storage facility. Fences shall match perimeter Force protection fence and provided with lockable gates.

## **6.12 TESTING & COMMISSIONING**

The Contractor shall test all piping systems in accordance with IPC International Plumbing Code. The final test shall include a pressure test for all piping. After completing the work, the Contractor shall demonstrate that all piping 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 Government and full written records of the test data and final settings shall be submitted to the Contracting Officer. After all tests are complete, the entire

domestic hot and cold water distribution system shall be disinfected. The system shall not be accepted until satisfactory bacteriological results have been obtained.

## **7.0 FIRE PROTECTION**

### **7.1 PORTABLE FIRE EXTINGUISHERS**

Portable fire extinguishers shall be provided inside all facilities and at exterior locations as required in accordance with NFPA 10. Generally, extinguishers will be of the multi-purpose dry chemical type except for occupancies requiring a special type extinguisher (e.g., carbon dioxide portable fire extinguishers for electrical rooms). Fire extinguishers shall be located in an accessible location, free from blocking by storage and equipment, near room exits that provide an escape route. The top of the extinguisher shall not be more than 1.5m above the floor and not less than 101mm above the floor. The extinguisher shall be easy to each and placed where it will not be damaged.

### **7.2 SPRINKLER SYSTEM**

The sprinkler system shall be a wet type of fire protection system with quick response fire sprinkler heads. The water supply for the wet system shall be the potable domestic water supply tanks. There shall be a 100mm (4") diameter tee that is located just prior to the domestic water pipe entering the building. The distance between the 100mm (4") tee and the stub up to the riser room shall be less than 3m (10'). Once the fire suppression line is in the riser room it shall be routed to a double check type back flow preventer. The fire riser shall include a fire pump, required shut off valves and check valves.

The fire pump shall be a horizontal or vertical shaft centrifugal pump. The pump shall be sized based on the hydraulic calculations for the piping layout, the most hydraulically demanding sprinkler must have the required pressure for full activation plus 10% additional pressure.

All sprinkler pendants shall be quick response type and activate at a temperature of 74C (165F).

## **7.3 ELECTRICAL**

### **7.3.1 GENERAL**

Contractor shall design and construct all electrical systems for the facilities to be provided. This includes design, construction, all necessary labor, equipment, and material for a fully functional system.

## **7.4 ELECTRICAL WORKERS QUALIFICATIONS**

Electrical work shall be performed by qualified persons with verifiable credentials who are thoroughly knowledgeable with applicable code requirements. Verifiable credentials consist of a certificate of graduations from an approved trade school and required amount of experience, depending on work being performed, and should be identified in the proposal that is submitted. A qualified person is one who has received training in and has demonstrated skills and knowledge in the construction and operation of electrical equipment and installations and the hazards involved. This includes the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment, to determine the nominal voltage of exposed live parts, the clearance distances and corresponding voltages to which the qualified person will be exposed.

### **7.4.1 SUPERVISORY ELECTRICIAN**

Supervisory electricians must be graduates of an approved trade school, and must have two years of relevant electrician experience. Approved programs include but are not limited to the Afghanistan Technical and Vocational Institute (in Kabul), the Kunar Trades Training Center Center, and the Commerical Technical Training Center (in Jalalabad). Work experience resumes and graduation certificates shall be submitted and approved prior to commencement of any design or construction involving electrical work. Approval is granted by the Contracting Officer's Representative with guidance by the Quality Assurance Branch and/or the Safety Office of the Afghanistan Engineer District, US of the Army Corps of Engineers.

## **7.4.2 ELECTRICIANS**

Electricians must be graduates of an approved trade school and must be able to provide upon request a certification of successful course work completion and graduation in addition to a resume of work experience.

## **7.5 DESIGN CRITERIA**

### **7.5.1 APPLICABLE STANDARDS**

Design shall be in the required units as stipulated herein.

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.

All electrical systems and equipment shall be installed in accordance with the requirements set forth in the documents referenced herein.

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 the National Fire Protection Association (NFPA) and the International Electrical Testing Association Inc. (NETA).

## **7.6 MATERIAL**

### **7.6.1 GENERAL**

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

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

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.

### **7.6.2 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.

### **7.6.3 DESIGN CONDITIONS**

All equipment shall be rated and designed for the maximum ambient temperature and altitude of the construction site. Equipment that is altitude and temperature sensitive, such as generators, shall be derated according to the manufacturer's recommendations. Generic derating criteria for altitude and for ambient temperature may be used to approximate the required size of such equipment during the design phase, but a stipulation shall be placed on the

construction plans to adjust the size according to the derating criteria specific to the manufacturer's equipment chosen before the equipment is ordered.

#### **7.6.4 RESTRICTIONS**

Aluminum conductors shall not be specified or used except as bare steel reinforced (ACSR) overhead conductors in an aerial primary distribution system. Aluminum windings shall not be used in transformers.

### **7.7 DESIGN REQUIREMENTS**

#### **7.7.1 ELECTRICAL DISTRIBUTION SYSTEM**

The contractor shall provide generator power as described in the paragraph **Generator Power System** as a prime source of power for the facilities

The contractor shall provide a prime power distribution system to distribute power to the site's facilities and other loads as required. The distribution system shall be underground.

The underground distribution system shall be in direct buried schedule 80 ductbanks, except for under roadways and heavy traffic areas, with the ducts not less than 1220mm below grade. Manholes and handholes shall be provided at changes of direction of more than 40 degrees and elsewhere as required to limit the pulling tension and sidewall pressure on the cables during installation to acceptable levels as defined by the cable manufacturer. Manholes shall be provided for ductbanks with more than 2 ducts. Handholes shall be provided wherever a manhole is not required by quantity of ducts or by cable manufacturer's installation recommendations. Underground ducts shall be not less than 100mm diameter Schedule 80 PVC for non roadway and light traffic areas and concrete encased for roadways and heavy traffic areas.

The contractor shall provide a street lighting distribution system to supply power to the site's street lighting circuits. The street lighting system shall be underground in direct buried schedule 40 PVC not less than 50mm in diameter and not less than 660mm below grade. The street lighting ducts shall be concrete encased in areas subject to vehicular traffic, such as road crossings and parking areas. Secondary electrical distribution system shall be 400Y/230V, 50 Hertz, 3 phase, 5 wire (4 wire plus circuit protective conductor using 5 wire Terra Neutral – Separate "TN-S").

Design of the electrical system within facilities shall include, but is not limited to (a) interior secondary power distribution system, (b) lighting and power branch circuit and devices, and (c) fire detection and alarm system. All systems shall be designed for the ultimate demand loads, plus 25% spare capacity.

The contractor shall provide service entrance feeders from the distribution system to the service entrance equipment located inside of each facility and sized to the rating of the service entrance equipment. Service entrance equipment shall include a distribution panelboard sized to supply the total load of each facility. Service entrance feeder lengths shall be kept as short as possible to minimize voltage drop. They shall be underground not less than 1220mm below grade in concrete encased 100mm minimum thin-wall PVC . A spare conduit of equal size shall be provided.

All panelboards shall be circuit breaker 'bolt-on' type panels. Minimum size circuit breaker shall be rated at no less than 16-amperes. Circuit breakers shall be connected to bus bar(s) within the panelboards. Daisy chain (breaker-to-breaker) connection(s) are not acceptable. Indoor distribution panels shall be flush mounted in finished areas and surface mounted in unfinished areas. All circuit breakers shall be labeled with an identification number corresponding to the panel schedule. 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 bridge to make a 3-pole breaker. All branch circuit wiring shall be copper, minimum #4 mm<sup>2</sup> (#12 AWG) installed in metal conduit. Wiring shall be concealed in finished areas and surface mounted in unfinished areas. Flush mounted panels shall be provided with spare empty conduits from panel to unfinished area for future use. All panels shall be provided with a minimum of 25% spare capacity for future load growth. Power receptacles (outlets) shall be duplex type 220 V, 50 hertz, 16 amp type CEE 7-7 three-wire grounded or better and shall be compatible with the required secondary power rated for 16A or better and shall be compatible with the required secondary power. All splicing and terminations of wires shall be performed in junction or device boxes. Proper wire nuts/connectors shall be used for splicing wire. No twist-wire connections with electrical tape wrapped around it shall be acceptable. All electrical installation shall be in accordance with British Standard (BS)

Wiring Regulations, International Electrotechnical Commission (IEC) standards, or Deutsches Institut für Normung (DIN) standards. For large panels (225 Ampere and above) provide an ammeter, voltmeter and kilowatt-hour meter to monitor energy usage. Selector switches shall be provided for each meter to read all 3 phases. Receptacle locations shall be coordinated with architectural requirements.

Contractor shall design and provide circuits for all mechanical equipment and any other equipment that requires power and make the final connections.

All loads shall be coordinated to provide balanced loading. Phase imbalance at each panel shall not exceed 5%.

Voltage Drop for branch circuits shall be limited to no more than 3%; voltage drop for branch and feeder circuits combined shall be limited to no more than 5%.

All circuit breakers shall use down-stream coordination to ensure the breaker nearest a fault or overload is the first to trip.

### **7.7.1.1 GENERATOR POWER SYSTEM-ELECTRICAL REQUIREMENTS FOR GENERATORS**

**Note:** The full specification for the generator consists of this section, Generator Power System-Electrical Requirements for Generators, in combination with the Mechanical Requirements for Generators specification found in the Mechanical portion of this Section 01015.

The generator power system, whether serving as the prime source or as a backup source of power, shall be configured as an N+1 system with the N representing the number of generators needed to supply the site's total load and the +1 representing the number of additional generators of the same size required as spares. The site's total load is defined as the site's total demand load + 25% spare capacity. The generators shall supply power at the utilization voltage of the facilities served.

Generators shall be derated as necessary for the ambient temperature and altitude of the site. . The derated capacity of the generator shall meet the site's total demand load requirement.

The main distribution panel (MDP) shall have one automatic load bank matched to 40% of the generator's rated capacity (with load steps every 20% of the load bank's rating) to prevent the generator from "wet stacking" under low load conditions. It shall be connected to the MDP via an appropriately sized circuit breaker.

Provide a back-up emergency power generator for the Hospital Building. The back-up generator power system shall be sized to supply power for only the lights and critical needs medical equipment in the operating room, emergency room, trauma room, post operating room, the blood bank coolers and the delivery room. This backup generator does not supply any power to the HVAC system. The generators shall supply power at the utilization voltage of the facility being served. Refer to Section 01010 for back-up generators bid options. This backup generator does not require a load bank.

The generator power system shall be provided with a make-before-break, 4-pole, automatic transfer switch (ATS) rated for the capacity of the system. The ATS shall be capable of automatically and manually transferring the site's distribution system to generator power upon loss of local utility power and transferring back automatically and manually to local utility power upon its restoration.

The ATS shall be equipped with synchronizing/paralleling equipment to allow the generators to share the load of the site. When generator power is required at least one (1) generator shall be online at all times. When the site's load reaches 90% of the online generator's capacity, the standby generator(s) shall start. The generator that synchronizes first shall come online and share the load equally. When the site's load drops below 80% of the online generators' combined capacity, the generator(s) shall drop off line, one at a time, keeping a minimum of one generator operating online.

Whenever a generator starts, it shall go through a cool down cycle prior to shutdown. All relaying shall be automatically reset for automatic restart and stopping of generators as the load increases or decreases. Load sharing by the standby generator(s) shall be adjustable between 50% and 95% of the load on the online generator(s). Sequence of operation shall be time clock controlled. A properly sized main switchboard shall be provided to distribute the power produced by the generator(s) to the facilities on the site.

For fuel storage requirements, see Mechanical paragraph: Generator Fuel Storage/Distribution.

## **7.7.2 LIGHTING**

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

Toilets, Showers, Latrines, washrooms	20 FC (200 Lux)
Mechanical/Electrical rooms	30 FC (300 Lux)
Corridors and Stairways	20 FC (200 Lux)
Offices (private)	50 h/5 v FC (500 h/50 v Lux)
Office areas (open)	30 h/5 v FC (300 h/50 v Lux)
Emergency Room	50 h/3 v FC (700 h/30 v Lux)
Waiting Areas	30 h/3 v FC (200 h/30 h Lux)
Patient Rooms (general)	Per UFC 4-510-01
Patient Rooms (critical)	Per UFC 4-510-01
Egress path (incl. exterior)	10 Lux
Areas adjacent to egress path	0.5 Lux

FC = FootCandle

h = horizontal component

v = vertical component

Indoor and exterior lighting systems for all areas shall be designed and installed in accordance with UFC 4-510-01. Moisture resistant/waterproof fluorescent light fixtures shall be provided in high humidity and wet areas such as latrines, showers and outside. 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 used. Every room shall be provided with a minimum of one light switch. Light fixtures shall be mounted approximately 2.5-meters (8 feet) above finished floor (AFF) minimum. Fixtures may be pendant or ceiling mounted, depending on the ceiling type and height.

## **7.7.3 LIGHT FIXTURES**

Lighting fixtures shall be a standard manufacturer's product. Fluorescent surface mounted light fixtures shall be power factor corrected and equipped with standard electronic ballast(s), except in medical facilities where magnetic ballast(s) shall be required. Electronic ballast are not recommended in areas of medical facilities where electronic (life support) medical equipment is used or areas where invasive procedures are performed, due to possible interference with the equipment. Some examples are operating rooms, delivery rooms, laboratories, special procedure rooms, MRI areas, Medical equipment repair and test areas and other areas of similar use. All light fixtures shall properly operate using standard lamps available locally. Fixtures shall be fully factory wired and designed for appropriate application i.e. appropriate for that location where installed.

## **7.7.4 EMERGENCY "EXIT" LIGHT FIXTURES**

Emergency "EXIT" light fixture shall be provided in accordance with NFPA requirements. Fixtures shall be single

or double sided as required by the location 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 a power outage. Unit shall have test/re-set button and failure indication lamp. Primary operating voltage shall be 220 volts. 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.

#### **7.7.5 ABOVE MIRROR LIGHTS**

Above mirror lights shall be provided in toilet rooms.

#### **7.7.6 EMERGENCY LIGHTING**

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

#### **7.7.7 LIGHT SWITCHES**

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. Three-way or four-way lighting shall be provided in all rooms / areas with multiple entrances.

#### **7.7.8 RECEPTACLES**

General-purpose receptacles shall be as required herein. All receptacles shall be duplex, unless otherwise specified in this section, the British Standards (BS), or other referenced standard.

Receptacles shall be placed at a maximum of 3-meter (10 feet) intervals. Areas with computer work-stations or similar equipment will have additional receptacles. Sinks will have a receptacle above, with one duplex 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 6 milliamperes or less. Total number of duplex receptacles shall be limited to five (4) per 16-ampere circuit breaker.

General Purpose Receptacles. General purpose multi-outlet branch circuits will be rated 16-amps with convenience straight blade type receptacles rated 16-ampere, 220-volt, 2-pole, 3-wire, grounded type. All other receptacles including those dedicated to medical equipment will not be of less than 16-ampere rating. Receptacles will normally be straight blade type. Provide a minimum of one general purpose 16-amp, 220 volt duplex receptacle outlet per wall in each room. In rooms where walls exceed 3 meters, provide an additional duplex outlet for each additional 3 meter of wall space fraction there of. Receptacle spacing shall not exceed 3.5 meters. The general purpose receptacles are in addition to the special purpose and dedicated outlets for special equipment. Do not provide receptacles in public toilets, staff toilets outside of the command areas and janitor closets.

Hospital Grade Receptacles. Hospital grade receptacles will only be provided where defined below. Final design electrical drawings will indicate "Hospital Grade" (HG) receptacles in the following locations Provide Specifications Grade Heavy Duty receptacles in all other locations:

1. General care patient bed locations.
2. Critical care patient bed locations.
3. Any location where a patient bed or patient care service console is located.
4. Anesthetizing locations:
  - (1) Operating Rooms.
  - (2) Delivery Rooms.

- (3) Oral surgery.
- (4) Cystoscopy (in Operating rooms and Clinics).
- (5) Cardiac Catheterization Lab.
- (6) Angiography / Special Procedures.
- (9) Medical Maintenance.
- (10) Intensive Care.
- (11) Emergency/ Trauma Rooms.

Duplex Receptacles. Not less than one duplex receptacle will be provided in each wall of all rooms and interior areas, except closets, scrub rooms, toilets and similar spaces. Electrical closets will be furnished with not less than one duplex receptacle from a dedicated 16 ampere, 220 volt branch circuit. Communication closets will be furnished with 16 ampere, 220 volt duplex receptacles on each wall and power will be supplied by two dedicated 16 ampere branch circuits on the same phase. One duplex receptacle will be provided per every 1 meter of casework in nurse's stations, subnurse's stations, reception counters, and control counters. Each administration type desk location will be provided with two duplex receptacles. Each data workstation will be provided with an additional identified duplex outlet. Each data outlet device plate will be marked "data power" with a steel stamp or silk screened 1/4 inch high letters. Circuits for data outlets will be an independent single phase 16 ampere, 220 volt circuit serving not more than four duplex receptacles and having a non-shared neutral.

Safety Receptacles. Hospital Grade tamper resistant receptacles will be provided in all hospital areas occupied by children, including playrooms, baths, toilets, pediatric waiting and pediatric bedrooms. Receptacles in psychiatric seclusion rooms (patient care areas, wards and rooms) will also be of the hospital grade tamper resistant type. The safety receptacles used in these areas will be designed to prevent shock hazards from metallic objects which might be inserted in the receptacle slots.

Maintenance Receptacles. Floor maintenance receptacles located in corridors will be flush mounted and will not be of less than 16-ampere rating. Determination of receptacle type, voltage, current rating, and spacing will be coordinated with the Using Service to provide the best utilization of existing floor maintenance equipment. Provide receptacles within 7 meters (25 feet) of all installed equipment which requires maintenance.

Receptacle Identification. Receptacles connected to the emergency system will be red and may be furnished with either metal or plastic plates. Metal plates will be finished in baked enamel and acrylic plastic plates will be impact resistant with integral color. Each device plate will be marked "EMERGENCY" and will identify the panelboard and circuit number at the top with steel stamped or silk screened letters not less than 1/4 inch high. Indentation of the steel stamp will be filled with black enamel or acrylic paint. Silk screened letters will also be of black enamel or acrylic paint. Pressure sensitive tapes with markings are not acceptable.

Ground Fault Circuit Interrupters (GFCI). Hospital Grade Class "A" GFCI receptacle protection will be provided at locations required by British Standards (BS) and "WET" locations. GFCI "WILL NOT BE PROVIDED" on circuits serving critical life support equipment.

Wet Locations. Those areas that are normally subject to wet conditions, including standing water on the floor, or routine dousing or drenching of the work area are classified as a wet location. Routine housekeeping procedures and incidental spillage of liquids do not define a wet location. GFCI receptacles will be used in the following locations:

1. Toilet areas with showers.
  - (a) Staff lockers with toilet areas.
  - (b) Patient toilet bathrooms.
2. Showers.
3. Janitor's Closet.
4. Outdoor receptacles.
5. Other locations required by British Standard (BS) Wiring Regulations
6. Receptacles accessible from a building roof.

Patient Bedrooms. Critical care patient bed locations will be provided with a minimum of eight identified duplex receptacles, and general care patient bed locations will be provided with a minimum of four duplex receptacles. Receptacle adjacent to the wash basin in patient bedroom toilets shall be provided with ground fault circuit interrupter protection for personnel. All receptacles will be hospital grade.

Nurseries. Each intensive care nursery provided with 16 simplex receptacles. Each intermediate care nursery will be provided with eight simplex receptacles. Each nursery in admission, observation, and continuing care will be provided with four simplex receptacles. Normal care nurseries will be provided with one simplex receptacle. Receptacles will be 16-ampere, 220-volt, 2-pole, 3-wire, straight blade, grounded type. Floor mounted receptacles will not be used. Ceiling mounted receptacles or groups of receptacles should be considered for nursery locations not adjacent to a wall or column. A minimum of one 60-ampere, 380-volt, 2-pole, 3-wire, twist lock, grounded type, flush mounted receptacle for mobile fluoroscopy unit will be provided in each nursery.

Operating Room and Delivery Room. Each operating and delivery room will be provided with 24 duplex receptacles, six on each wall mounted 1 meter above floor. Receptacles will be 16-ampere, 220-volt, 2-pole, 3-wire, straight blade, grounded type. Each operating and delivery room will also be provided with one 60-ampere, 380-volt, 2-pole, 3-wire, twist lock, grounded-type flush mounted receptacle for mobile fluoroscopy unit or laser photo coagulator.

Laboratory Receptacles. Above laboratory benches, 16 ampere duplex receptacles will be strip mounted 18 inches on center. Install strips of multi-outlet assemblies above laboratory bench countertops, with 16-ampere duplex receptacles placed 500 mm (18-inches) on center, or closer. Adjacent duplex receptacles will be connected to different circuits and not more than two duplex receptacles will be connected to each circuit.

Patient Care Grounding. General care areas and critical care areas including all anesthetizing locations will be provided with a grounding system. Grounding system design and initial testing will be included in the contract documents.

Inhalation Anesthetizing Location. All inhalation anesthetizing locations will be classified and designed as a nonflammable inhalation anesthetizing location. Operating rooms, delivery rooms, oral surgery, cardiac catheterization and other special procedure rooms are not considered wet areas. Isolated power systems will not be provided except for areas designated as critical care wet areas by the Using Service. Ground fault circuit interrupters will not be provided. Design will conform to the requirements of British Standards (BS). Each operating and delivery room will be provided with two three phase panelboards located within the room. Each panel will be fed from a separate critical branch subpanel and whenever practicable from separate critical branch automatic transfer switches. Panels will be connected to the same phase. Grounding in inhalation anesthetizing locations will be in accordance with paragraph "Patient Care Area Grounding" above.

### **7.7.9 ELECTROMAGNETIC SHIELDING FOR MEDICAL INSTRUMENTATION.**

Designated areas of hospitals and health research laboratories may require electromagnetically shielded enclosures. The degree of the attenuation required for the enclosure will be based on the manufacturer's recommendation for the instrumentation to be used in the designated space. Final design will specify the type of enclosure and the class of attenuation required. When shielded enclosures are not provided, other measures will be taken to limit RFI and EMI in rooms which contain sensitive medical equipment. Rooms will not be located near or directly above or below electrical equipment or mechanical rooms. High voltage feeders will not be routed in the vicinity of these rooms.

### **7.7.10 CONDUCTORS**

All cable and wire conductors shall be copper. Conductor jacket or insulation shall be color coded to satisfy British Standards (BS) requirements. The use of 75 or 90 degree C (minimum) terminals and insulated conductors is required. Use of higher degree C rated conductors on circuits with protective device terminals rated at a lower

degree C is allowed but must be derated to the rating of the device terminals.

### **7.7.11 GROUNDING AND BONDING**

Grounding and bonding shall comply with the requirements of BS 7671. Underground connections shall be exothermally 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 20 millimeters (0.75 inches) in diameter and 3 meters (~10 feet) long made of copper-clad steel. Final measurement of the ground resistance shall be in compliance with the requirements of the local authority but shall not exceed 25 ohms when measured more than 48 hours after rainfall.

### **7.7.12 ENCLOSURES**

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

### **7.7.13 FIRE DETECTION & ALARM SYSTEM**

A complete Fire Detection and Alarm System shall be provided throughout the buildings and installed in accordance with NFPA 72 requirements. System shall include, but not limited to, conventional Fire Alarm Control Panel (FACP), manual pull stations, horns, strobes, and smoke and/or heat detectors (with alarm verification feature). The system shall be capable of automatically transmitting the alarm signal, via telephone lines, to the local fire department/fire station or other location designated by the Contracting Officer. Fire alarm system shall be complete and a standard product of one manufacturer.

### **7.7.14 NURSE CALL AUDIO-VISUAL (NCAV) SYSTEMS.**

Communication of patient and staff calls for assistance will be provided from patient care locations to the nurse's station through combinations of tone and light signals, full duplex intercom, digital display, and radio page. All NCAV system shall comply with UL 1069. The system shall utilize an independent, dedicate industry standard local area network with industry standard protocols, equipment and cabling.

### **7.7.15 PUBLIC ADDRESS (PA) AND PROGRAM DISTRIBUTION SYSTEM.**

The system will consist of the headend equipment, loudspeaker, and system configurations.

The headend equipment shall contain the following equipment. Auxiliary Inputs with rack space and preamplifier input ports for two auxiliary inputs shall be furnished to support Using Service provided devices. Preamplifiers and Power Amplifiers shall be provided. Monitor panel with selector switch and speaker to check each zone output shall be provided. Voice Input and Zone Selection shall be provided. Microphone, zone selector switch and telephone interface module for paging shall be provided. Input Selection Switch shall be provided. Input selection switches for connecting program inputs to the distribution system.

A loudspeaker system shall be provided with Low power speakers will be used to provide uniform sound distribution at low volume levels. For maximum coverage, corridor speakers will be spaced at a maximum of twice the ceiling height apart. Speakers located in individual rooms will be provided with separate volume controls. Paging speakers in designated areas will be provided with a volume control and bypass relay for override during paging.

The system shall be configured in accordance with the following:

1. All Call. An all zone paging capability, which shall have priority over all other paging will be provided in every facility. All-call may be accessed via a microphone in the central communication room or via telephone. The microphone access has priority over the telephone access.
2. Wide Area Zone. Each hospital will be zoned by functional areas - nursing tower, outpatient clinics, energy plant, and ancillary areas. Wide area paging will have priority over all local paging. Microphone access has priority over the telephone access. These zones may be accessed via a microphone in the central communication room or via telephone.
3. Local Zones. For each ancillary or administrative department or outpatient clinic where patients are seen for diagnosis or treatment, such as radiology or physical therapy, paging zones will be established for both patient and staff areas. Local zones will be accessed using the telephone system. In ancillary areas which only provide support, such as central material services, only a staff zone will exist. The microphone access for the areas will be at the department secretary or NCOIC office. Local zone paging may be overridden by wide area zone or all zone paging. A music volume control with bypass relay for paging will be provided at the same location as the microphone.
4. Functional Area Zones. See table 10-3 for zones provided in functional areas.
5. Speaker Locations. Speakers will never be provided in the following: private or multi-occupancy offices; recovery rooms; exam rooms; patient bedrooms and staff sleeping rooms.
6. Dental Clinic Zoning. A separate zone for medical and a separate zone for dental will be provided in combined Dental clinics. An all call for the entire facility will be maintained.

#### **7.7.16 SECURITY CAMERA SYSTEM**

Design, provide, and install a security camera system. The camera system shall include, but is not limited to DVR, fixed security cameras, audio/visual signal wiring, power wiring, uninterruptible power supply (UPS), and all appurtenances required for a fully functional system. Provide monitor(s) at the monitoring station(s) capable of accessing and viewing all security cameras.

#### **7.7.17 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)**

Transient Voltage Surge Suppression shall be provided utilizing surge arresters to protect sensitive and critical equipment. As a minimum TVSS protection shall be provided at each panel serving electronic loads and shall be shown on the panel schedule. It is recommended that Metal Oxide Varistors (MOV) technology be used for such applications.

#### **7.7.18 CONDUIT RACEWAY SYSTEM**

Metal conduit (EMT) system shall be complete, to include but not limited to, necessary junction and pull boxes for all surface mounted conduit systems. PVC conduit, junction and pull boxes are allowed for raceways located in masonry walls. Smallest conduit size shall be no less than 20mm (0.75 inch) in diameter. All empty conduits shall be furnished with pull wire or cord or rope (depending on the size of conduit and length of run). System design and installation shall be per BS 7671 requirements. Exterior conductors below grade shall be installed in concrete encased PVC conduit at a depth of 1220 millimeters.

#### **7.7.19 CABLE TRAY RACEWAY SYSTEM**

Cable trays shall be ladder type and provided with, but not limited to, splices, end plates, dropouts and miscellaneous hardware. System shall be complete with manufacturer's minimum standard radius and shall be free of burrs and sharp edges. Nominal width of cable tray shall be 300mm (12 inch) and rung spaced at 150mm (6 inch). Nominal depth shall be 100mm (4 inch). System design and installation shall be per BS7671 requirements.

#### **7.7.20 IDENTIFICATION NAMEPLATES**

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

## **7.7.21 SCHEDULES**

All panel boards and load centers shall be provided with a directory. Directory shall be typed written in English, Dari and Pashto

### **Single Line Diagram**

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

## **7.8 OPERATIONS AND MAINTENANCE (O&M) FOR ELECTRICAL**

Contractor is required to provide a 12 month supply of parts for operation and maintenance of equipment according to the manufacturer's recommendations. In addition to this, the contractors shall provide an inventory of all items, location/address stored and secured, and commissioning plans.

The O&M manuals must be provided prior to any training activities. Manuals shall be "tri-lingual" in Dari, Pashto and English.

All control panels shall have tri-lingual name plates in Dari, Pashto and English.

The contractor shall provide an outline of the training lesson plan (to be approved by the Government) prior to conducting training. CD recordings of training on video shall also be provided, after training is conducted.

## **8.0 COMMUNICATIONS SYSTEM**

### **8.1 DESIGN CRITERIA**

#### **8.1.1 APPLICABLE STANDARDS**

Design shall be in the required units as stipulated herein. 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. All communications systems and equipment shall be installed in accordance with the requirements set forth in the documents referenced herein.

The Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by designation only.

United States Department of Agriculture, Rural Utilities Service

RUS Bulletin 1751F-643 (2002) Underground Plant Design

RUS Bulletin 1751F-644 (2002) Underground Plant Construction

RUS Bulletin 1753F-151 (2001) Construction of Underground Plant, Parts II & III

ANSI TIA/EIA 606-A (2002) Administration Standard for The Telecommunications Infrastructure

ANSI TIA/EIA 607-A (2002) Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

ANSI TIA/EIA 568-C.1 (2009) Commercial Building Telecommunications Cabling Standard

ANSI TIA/EIA 568-C.2 (2009) Balanced Twisted-Pair Telecommunications Cabling and Components Standards

ANSI TIA/EIA 568-C.3 (2008) Optical Fiber Components Standard

ANSI TIA/EIA 569-B (2004) Commercial Building Standard for Telecommunications Pathways and Spaces

ANSI TIA/EIA 758-A (2004) Customer-owned Outside Plant Telecommunications Infrastructure Standard

## **8.2 EXTERIOR COMMUNICATION SYSTEM**

The Contractor shall design, provide, and install two (2), 100 mm DB type Schedule 80 PVC underground conduits from the communications room to a communications handhole or pullbox located 5 meter beyond the building outside wall. The conduits shall be stubbed up, sealed, capped and tagged in the communications equipment room, and shall be sealed, capped, tagged and marked at the other end. All empty conduits shall be sealed with a mechanical, screw-type, reusable duct plug. Pull wire/rope must be provided in all conduits.

### **8.2.1 BUILDING INTERIOR COMMUNICATIONS SYSTEM**

The Contractor shall design, provide, and install the interior communications infrastructure. The interior communications infrastructure shall provide a pathway to all communications outlets and head-end equipment located in the building. The system shall include but is not limited to communications equipment racks, conduit, pull boxes, communications outlet boxes, plywood backboards, and communications grounding/bonding infrastructure. Communications head-end equipment, cabling, RJ45 jacks, and faceplates shall be provided by others. The design and construction of the systems shall be in accordance with the references and the requirements contained herein.

#### **8.2.1.1 OUTLET BOXES**

Outlet boxes shall be a single gang box (51 mm x 102 mm x 57 mm) or double gang box (119 mm x 119 mm x 57 mm boxes). The contractor may use an equivalent sized outlet box.

#### **8.2.1.2 CONDUIT SYSTEM**

The Contractor shall design, provide, and install the horizontal and backbone conduit system. Conduit shall be installed from each outlet box location to the communications equipment rack location. Conduit shall be sized and installed in accordance with ANSI TIA/EIA 569-B. Provide all empty conduits with a pull rope. Properly sized metallic conduit and cable tray shall be used as appropriate to distribute the telephone/data cabling throughout the building. Minimum conduit size shall be 20 mm inside diameter. Label the conduit on both ends with room number and outlet box number.

#### **8.2.1.3 PULLBOXES**

Pull boxes shall be placed in conduit runs where a continuous conduit length exceeds 30 meters or where there are more than two 90-degree bends. Pull boxes shall be placed in straight runs of conduit and shall not be used in lieu of a bend. Pull boxes shall be sized and installed in accordance with ANSI TIA/EIA 569-B.

#### **8.2.1.4 EQUIPMENT RACKS**

Contractor shall coordinate the location of the communications rack to be installed in Communications Room. Equipment racks shall be standard floor mounted 475mm steel telecommunications racks. Equipment racks shall have a minimum 900 mm of space both in front of and behind the rack and behind any installed equipment. A minimum side clearance of 600 mm shall be provided on end racks.

#### **8.2.1.5 PLYWOOD BACKBOARD**

A minimum of one wall of the Telecommunications Room shall be covered with 19 mm A-C plywood, void free, 2.4 m high, and securely fastened to the wall. Plywood shall be fire-rated (fire retardant) to meet applicable codes. To reduce warping, fire-rated (fire retardant) plywood shall be kiln-dried to a maximum moisture content of 15%.

### **8.2.1.6 GROUNDING**

The contractor shall provide a grounding and bonding system in accordance with ANSI TIA/EIA 607-A. The grounding system shall include but is not limited to a Telecommunications Main Grounding Bus bar (TMGB), Telecommunications Grounding Bars (TGB) where applicable, Telecommunications Bonding Backbone (TBB), Grounding Equalizer (GE), and Bonding Conductors.

**-END OF SECTION-**

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# INDEX OF DRAWINGS

## ARCHITECTURAL

## MECHANICAL

AS BUILT

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## ELECTRICAL

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DP01-HH-E00		09-26-2005	50 BED REGIONAL HOSPITAL DRAWING LIST
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DP01-HH-E01		09-26-2005	50 BED REGIONAL HOSPITAL OUTDOOR LIGHTING PLAN
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DP01-HH-E02		09-26-2005	50 BED REGIONAL HOSPITAL GROUNDING AND LIGHTNING PROTECTION PLAN
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DP01-HH-E03		09-26-2005	50 BED REGIONAL HOSPITAL LIGHTING SYSTEM PLAN
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DP01-HH-E22		09-26-2005	50 BED REGIONAL HOSPITAL DETAILS - 2
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DP01-HH-E23		09-26-2005	50 BED REGIONAL HOSPITAL DETAILS - 3
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DP01-HH-E24		09-26-2005	50 BED REGIONAL HOSPITAL DUCT TYPE ALARM SENSORS CONNECTION DIAGRAM
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APR.	DATE	DESCRIPTION
	06.05.06	REVISED AS BUILT
	11.16.05	100% DESIGNS

DESIGNED BY :	DATE :	REVISED BY :	FILE NO :
B.IRMAK	06.05.2006	IRMAK	DP01-HH-G2
DWN BY :			
B.IRMAK			
CHK BY :			
G.IRMAK			


**US Army Corps of Engineers**  
 Afghanistan Engineer District  
 Kabul, Afghanistan  

**KOLIN** CO.INC in association with  
 IRMAK, STAND, BESELI, DELTA OM  
Design/Builder

DESIGN/BUILD  
 50 BED REGIONAL HOSPITAL  
 HERAT , AFGHANISTAN  
 DRAWING OF WORK AS-BUILT  
 INDEX OF DRAWINGS

SHEET  
 REFERENCE  
 NUMBER :  
 DP01-HH-G2



REV	DATE	DESCRIPTION
1	15-Aug-2011	BASE DESIGN SUBMITTAL
2	10-May-2011	BASE DESIGN SUBMITTAL
3	17-Apr-2011	BASE DESIGN SUBMITTAL
4	27-Sep-2011	BASE DESIGN SUBMITTAL

DESIGNED BY: [Blank]	DATE: [Blank]	REV:
DRAWN BY: [Blank]	DESIGN FILE NO: [Blank]	
CHECKED BY: [Blank]	DRAWING CODE: [Blank]	
APPROVED BY: [Blank]	FILE NAME: [Blank]	
	PROJECT DATE: 09-Dec-2010	

Project No: W0535E-10-D-0016 TO 0003
AND/OR
FOR THE
LOCATION: gah Province, Afghanistan
GENERAL LEGENDS

SHEET REFERENCE NUMBER: E-01

LEGENDS	
	(SURFACE /PENDANT) FLUORESCENT L.F 2--LAMPS, 220V, 36W, 50HZ, MOUNTING HEIGHT=2700mm ELECTRONIC BALLAST TYPE
	(SURFACE /PENDANT) FLUORESCENT L.F 2--LAMPS, 220V, 18W, 50HZ WATER PROOF, MOUNTING HEIGHT=2700mm ELECTRONIC BALLAST TYPE
	SURFACE MOUNTED L.F WITH WRAP AROUND ACRYLIC PLASTIC LENS IP55, 1 LAMP ,220V ,36W, 50Hz, MOUNTING HEIGHT= 2700mm ELECTRONIC BALLAST TYPE
	EMERGENCY LIGHT 220V-50Hz-20W RECHARGEABLE
	EXIT LIGHT 220V-50Hz-20W RECHARGEABLE
	FLOOD LIGHT 400W-220V-50Hz
	CEILING FAN COMPLETE SET 220V-50Hz-50W
	E.X. FAN COMPLETE SET 220V-50Hz-50W
	BASE BOARD HEATER 220V-50Hz-2000W
	RECESSED MOUNTED DUPLEX RECEPTACLE 1PH. 240V 20A, 50Hz, GROUNDING DIN TYPE MOUNTING HEIGHT =450mm ABOVE FINISH FLOOR LEVEL
	SPLIT UNIT SYSTEM 220V-50Hz-1430W & 1320W
	ELECTRICAL PANEL BOARD MOUNTING HEIGHT = 1800mm FROM FINISHED FLOOR
	TELEPHONE BOX
	ONE WAY SWITCH, 220V, 20AMP MOUNTING HEIGHT = 1200mm ABOVE FINISH FLOOR LEVEL
	3 WAY SWITCH, 220V, 20 AMP MOUNTING HEIGHT = 1200mm ABOVE FINISH FLOOR LEVEL
	NON FUSED DISCONNECT SWITCH 2 POLE, 240V, NEMA1, 20A,32A,40A (U.O.N)
	SMOKE DETECTOR (BATTERY BACKUP)
	KILOWATT METER
	VOLT METER
	AMPERE METER
	T.V.S.S (TRANSIENT VOLTAGE SURGE SUPPRESSION).SERVICE MULTIPOLE 50Hz,IMPULSE CURRENT 25KA,PROTECTION LEVEL 2.5KV,NORMAL VOLTAGE 230V,MAX CONT OPERATING VOLTAGE 255V.
	SEARCHLIGHT, (1000 WATTS/220 VOLTS) , 50 Hz.
	GFCI MOUNTED DUPLEX RECEPTACLE 1PH. 240V 20A, 50Hz, GROUNDING DIN TYPE MOUNTING HEIGHT =450mm ABOVE FINISH FLOOR LEVEL

NOTES

- DISCONNECT SWITCHES LEVEL IS 1200mm AFF UNLESS OTHER WISE NOTED.
- RECEPTACLES LEVEL IS 450mm AFF UNLESS OTHER WISE NOTED.
- ELECTRICAL PANELS LEVELS IS 1800mm TO THE HIGHEST POINT OF BOARD.
- ALL EXTERNAL CABLE P.V.C CONDUIT ARE UNDER GROUND AT (1220 mm)48".
- EACH P.V.C UNDER GROUND PIPE SHALL HAVE ONE SPARE.
- ALL WIRING SHALL BE COPPER MINIMUM #12AWG INSTALLED IN METAL CONDUIT . WIRING SHALL BE RECESSED IN FINISHED AREAS AND SURFACE MOUNTED IN UN FINISHED AREAS.
- THE GROUNDING RESISTANCE SHALL NOT EXCEED 25 OHMS
- FOR EXACT LOCATION OF MECHANICAL EQUIPMENT REFER TO MECHANICAL DRAWING.
- THE MINIMUM HEIGHT OF G.F.C.I SOCKETS ARE 1380mm FROM FINISH FLOOR LEVEL.
- THE HEIGHT OF EMERGENCY L.F 2500mm FROM F.F.L
- ALL RECEPTACLES IN WET AND DAMP LOCATION SHOULD BE WEATHER PROOF AND G.F.C.I TYPE.

ABBREVIATION

- M.C.B - MAIN CIRCUIT BREAKER
- C.B - CIRCUIT BREAKER
- EX.F - EXHAUST FAN
- G.F.I - GROUND FAULT INTERRUPTER
- L.F - LIGHTING FIXTURE
- S.T.L.F - SINGLE TUBE (1 LAMP 36W) LIGHTING FIXTURE
- A.F.F - ABOVE FINISH FLOOR
- E.W.H - ELECTRICAL WATER HEATER
- M.D.P - MAIN DISTRIBUTION PANEL
- S.D.B - SUB DISTRIBUTION BOARD
- L.P - LIGHTING BOARD (PANEL)
- P.P - POWER PANEL
- A.T.S - AUTOMATIC TRANSFER SWITCH
- T.V.S.S. - TRANSIENT VOLTAGE SURGE SUPPRESSION.
- R.S.C - RIDGED STEEL CONDUIT