

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 119
2. AMENDMENT/MODIFICATION NO. 0002		3. EFFECTIVE DATE 19-Jan-2009	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)
6. ISSUED BY AFGHANISTAN ENGINEER DISTRICT US ARMY CORPS OF ENGINEERS KABUL APO AE 09356		CODE W917PM	7. ADMINISTERED BY (If other than item 6) See Item 6		CODE
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				<input checked="" type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. W917PM-09-R-0028	
				<input checked="" type="checkbox"/> 9B. DATED (SEE ITEM 11) 27-Dec-2008	
				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 _____ 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.					
2. 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.					
4. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)					
a. The purpose of this Amendment is to make changes to the following Sections of the RFP (All revisions are incorporated in this Amendment 0002): (1) SF 1442, Block 13D: No. of calendar days is changed from "300" to "90". (2) Section 00010, Proposal Schedule: Section 00010 is replaced in its entirety. (3) Section 00110, Proposal Preparation: Section 00110 is replaced in its entirety. (4) Section 00800, Clause 52.211-10 Commencement, Prosecution and Completion of Work: No. of calendar days is changed from "180" to "300". (5) Section 01010, Scope of Work - Design Build: Section 01010 is replaced in its entirety. (6) Section 01015, Technical Requirements - Design Build: Section 01015 is replaced in its entirety. (7) Appendix A, Drawings: All Appendix A drawings are replaced with new drawings and are attached to this Amendment 0002.					
b. The proposal due date and time of 5 February 2009, 5:00PM Kabul Time remains unchanged.					
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: _____		
5B. CONTRACTOR/OFFEROR		5C. DATE SIGNED	16B. UNITED STATES OF AMERICA		16C. DATE SIGNED
_____ (Signature of person authorized to sign)			BY _____ (Signature of Contracting Officer)		19-Jan-2009

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION 00010 - SOLICITATION CONTRACT FORM

The offeror acceptance period has decreased by 210 from 300 to 90.

The following have been modified:

SECTION 00010

**SECTION 00010
PROPOSAL SCHEDULE**

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

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

0001 Design Program:

0001AA	Site Survey / Master Planning A & E Design	1	LS	xxx	\$ _____
0001AB	As-Built Drawings	1	LS	NTE	\$20,000 (Not to Exceed)

Sub-Total Design Program: \$ _____
(Including NTE Amount)

0002 Site Development / Improvements:

0002AA	Mobilization, Demobilization, Field Office, and General Site Work	1	LS	xxx	\$ _____
0002AB	Security Measures	1	LS	xxx	\$ _____
0002AC	Wadi Diversion/ Mitigation	1	LS	xxx	\$ _____
0002AD	Potable Water Supply System	1	LS	xxx	\$ _____
0002AE	Sanitary Sewer and Treatment System	1	LS	xxx	\$ _____
0002AF	Site Electrical Distribution System	1	EA	\$ _____	\$ _____
0002AG	Perimeter Wall/Fencing	1	LS	xxx	\$ _____
0002AH	Primary ECP	1	EA	\$ _____	\$ _____
0002AI	Guard Towers	8	EA	\$ _____	\$ _____
0002AJ	Access Road to the Camp (Paved finish)	1	LS	xxx	\$ _____
0002AK	Camp Inside Roads, and Walkways (Paved finish)	1	LS	xxx	\$ _____
0002AL	Trash Collection Points	6	EA	\$ _____	\$ _____

Sub-Total Site Developments / Improvements: \$ _____

0003 Buildings & Building Complexes:

No.	Description	Qty	Unit	Unit Price	Total Amount
0003AA	BOQ Barracks	9	EA	\$ _____	\$ _____
0003AB	Enlisted Open Bay Barracks	4	EA	\$ _____	\$ _____
0003AC	Dining Facility with Storage Yard	1	EA	\$ _____	\$ _____
0003AD	Battalion HQs Buildings	1	EA	\$ _____	\$ _____
0003AE	ToiletShowerAblutionLaundry Facility	1	EA	\$ _____	\$ _____
0003AF	Vehicle Refueling Point	1	EA	\$ _____	\$ _____
0003AG	Motor Pool Gravel Parking	1	LS	XXX	\$ _____
0003AH	CSB Vehicle Maint. Bldg (9 Bay)	1	EA	\$ _____	\$ _____
0003AI	Communication Building	1	EA	\$ _____	\$ _____
0003AJ	POL Storage	1	EA	\$ _____	\$ _____
0003AK	General Warehouse Storage	1	EA	\$ _____	\$ _____
0003AL	Arms Storage Building	1	EA	\$ _____	\$ _____
0003AM	Vehicle Wash Rack	1	LS	xxx	\$ _____
0003AN	Non-Organic Vehicle Maint. (9 Bay)	2	EA	\$ _____	\$ _____
0003AO	Non-Organic Vehicle Maint. (9 Bay)	1	EA	\$ _____	\$ _____
0003AP	GSE Comm. and Armament Maint.	1	LS	xxx	\$ _____
0003AQ	Temporary Facilities	1	LS	xxx	\$ _____
0003AR	Bunkers	8	EA	\$ _____	\$ _____

Sub-Total Buildings & Building Complexes:

\$ _____

**TOTAL BASE BID ITEMS:
(Including NTE Amount)**

\$ _____

2. Optional Bid Items:

0004	MWR GYM and outside Volleyball	1	LS	\$ _____	\$ _____
0005	Irrigation System for Camp Gamberi	1	LS	xxx	\$ _____

TOTAL ALL OPTIONAL BID ITEMS: \$ _____

0006 **DBA Insurance** **1** **LS** **xxx** \$ _____

TOTAL PROPOSAL: \$ _____

(total of all above costs – Base and all Options including NTE and DBAInsurance)

PROPOSAL SCHEDULE NOTES

1. Offeror shall submit prices on all items. Scope of work on each items are described in Section 01010.
2. Only one contract for the entire schedule will be awarded under this solicitation. This project will be awarded as a lump sum contract. This Proposal Schedule is an accounting tool for allocating funds to applicable budget.
3. Costs associated with this project shall include design and construction costs, site development, and utility installation.
4. DESIGN COSTS DEFINITION: Design costs shall consist of design analysis, drawings, and specifications of all facilities.
5. COST LIMITATION: The established design cost limitation for all Design Costs, as defined in paragraph 4, shall not exceed 6 percent of the total construction cost.
6. The government has the right to reduce the number of units in a bid item or choose to delete a base bid item entirely if necessary after the proposals are received.
7. EVALUATION OF OPTIONS: The award will be made to the offeror whose proposal represents the best overall value to the Government. For pricing purposes the Government will evaluate both the Base Proposals and Option Proposals. The Government is not obligated to exercise the options.
8. EXERCISE OF OPTIONAL BID ITEMS: Optional bid items (if any) may, at the option of the Government, be added to the contract at any time within 120 calendar days after receipt of the notice to proceed for Base Proposal.
9. ORDER of WORK: The following order of work shall apply before start of optional bid items: All base bid contract line items have priority.
11. Period of performance is per Section 01010 Scope of Work – 5.0 Completion of Work, from receipt of notice to proceed; Liquidated damages are assessed at **\$3,291.90 per day** for every day of delay past the period of performance as stated per Section 01010 Scope of Work – 5.0 Completion of Work until contract completion for either the Base Items or the Optional Items whichever is applicable.

-END OF SECTION-

SECTION 00100 - BIDDING SCHEDULE/INSTRUCTIONS TO BIDDERS

The following have been modified:

SECTION 00110

SECTION 00110

PROPOSAL PREPARATION

1. OVERVIEW

1.1 This is a "Best Value" solicitation for the Design and Construction of ANA Corps Support Battalion located at Camp Gamberi, Afghanistan. The Government will evaluate the proposals in accordance with the criteria described in section 00120, and award a firm fixed price contract to the responsible offeror, whose proposal conforms with all the terms and conditions of the solicitation and whose proposal is determined to represent the overall best value to the Government.

1.2 INQUIRIES

Perspective offerors should submit inquiries related to this solicitation by writing or calling the following (collect calls will not be accepted):

All questions will be submitted in writing by letter or e-mail to:

U.S. Army Corps of Engineers (USACE)
Afghanistan Engineer District (AED)
Qalaa House, Attention: **Jesusa Labial**
Kabul, Afghanistan

E-MAIL ADDRESS: Jesusa.G.Labial@usace.army.mil

Please include the solicitation number, and project title with your questions. Written inquiries must be received by this office not later than **14 calendar days** prior to the date set for receipt of offers.

Oral explanations or instructions are not binding. Any information given to an offeror which impacts the solicitation and/or offer will be given in the form of a written amendment to the solicitation.

As this is a competitive negotiation acquisition, there is no public bid opening and no information will be given out as to the number of offerors or the results of the competition until all awards are made.

1.3 DIRECTIONS FOR SUBMITTING PROPOSALS

Offers must be in sealed envelopes/packages, marked and addressed as follows:

MARK PACKAGES:
Solicitation No. W917PM-09-R-0028
Offer Closing Date: **05 February 2009**
Offer Closing Time: **5:00 PM**
(LOCAL KABUL TIME)

ADDRESS PACKAGES TO:
U.S. Army Corps of Engineers (USACE)
Afghanistan Engineer District (AED)
Qalaa House, Attention: Contract Specialist: **Ms. Jesusa Labial**
Kabul, Afghanistan

Special Instruction Pertaining to Hand Carried Offers: Hand-carried offers must be delivered to the

USACE AED offices, Qalaa House, Kabul, Afghanistan. Offers who desire to hand-deliver their offers notify the Contract Specialist **in advance** in order to be met at the entrance gate to Qalaa House Compound.

1.4 PREPROPOSAL CONFERENCE / SITE VISIT

The Pre-proposal Conference shall be held on **07 January 2009** at the USACE Afghanistan Engineer District Headquarters, Qalaa House Compound in Kabul, Afghanistan at 13:00 Local Time. Contractors interested in attending the Pre-proposal Conference must submit the following information to AED: Name of personnel, Company Name, Email, and telephone number. No more than two representatives from each company may attend. Send all information to Eric Aubrey at Eric.A.Aubrey@usace.army.mil , cell phone 070-01-7994, no later than Close of Business on Saturday 03 January 2009.

~~The Site Visit is tentatively planned for 08 January 2009.~~ **The site visit was cancelled.**

IMPORTANT NOTES. (1) Remarks and explanations addressed during the conference shall not qualify or alter the terms and conditions of the solicitation. (2) The terms and conditions of the solicitation remain unchanged unless the solicitation is formally amended in writing.

1.5 TELEGRAPHIC OFFERS - - TELEGRAPHIC OFFERS ARE NOT ACCEPTABLE.

However, offers may be withdrawn by written or telegraphic notice. Any telegram to withdraw an offer sent to this office must be received in the office designated in the Request for Proposal (RFP) for receipt of offers not later than the exact date and time set for receipt of proposals. A telegraphic withdrawal of an offer received in such office by telephone from the receiving telegraph office not later than the exact date and time set for receipt of proposals shall be considered. However, the telephone message shall be confirmed by the telegraph company by sending a copy of the written telegram that formed the basis for the telephone call. The written telegram shall be sealed in an envelope by a proper official and sent to the office designated in the RFP for receipt of offers. The official shall write on the envelope (1) the date and time of receipt and by whom, and (2) the number of the RFP, and shall sign the envelope. The offeror is responsible to inform the telegraph company of these requirements. No one from this office will be dispatched to the local telegraph office to pick up any telegram for any reason.

1.6 FACSIMILE OFFERS

Facsimile offers, modifications thereto, or cancellations of offers will not be accepted.

1.7 PROPOSAL FORMAT

1.7.1 (1) Submit only the hard-copy paper documents and the electronic files specifically authorized and/or required elsewhere in this section. Do not submit excess information, to include audio-visual materials, electronic media, etc.

(2) Use only 8 ½ by 11 inch paper for hard copy submissions, unless another paper size is specifically authorized elsewhere in this section for a particular submission. Contractor may use fold-outs (e.g., 11" x 14" or 11" x 17" sheets) only for concept drawings specifically authorized in Design Technical section for a particular submission. Do not use a font size smaller than 10, an unusual font style such as script, or condensed print for any submission. All page margins must be at least 1 inch wide, but may include headers and footers.

(3) The preferred method for assembling your proposals is to use three-ring binders; however, the use of pressboard or other report covers with compression or other type fasteners is acceptable. Do not use spring clamps or exceed the recommended capacity of the fastener or binder. Do not use plastic multi-hole/spiral binding systems, heat binding systems, or other systems which do not facilitate the ready insertion of additional pages.

(4) "Confidential" projects cannot be submitted to demonstrate capability unless all of the information required for evaluation as specified in section 00120 can be provided to the Government as part of the Offeror's technical proposal. Offerors that include in their proposals information that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, must be clearly marked in accordance with the instructions at FAR 52.215-1, "Instructions to Offerors—Competitive Acquisition", paragraph (e), "Restriction on disclosure and use of data".

(5) In the case of an Offeror that is part of a large, multi-segmented business concern, provide information directly pertaining to the specific segment of the business concern (i.e., the division, group, unit, etc.) that will perform work under the prospective contract.

(6) For submissions with page limitations, the pages will be counted as follows: One side of the paper is one page; information on both the back and front of one sheet of paper will be counted as two pages. Where authorized, fold-out pages (11" x 14" or 11" x 17") will count as one page. Pages furnished for organizational purposes only, such as a "Table of Contents" or divider tabs, are not included in the page limitation.

~~(7) Number of copies:—Submit one original and four (4) copies of drawings and printed matter (Bound Volumes), as well as Two (2) CDs.— DELETED~~

1.8 SUBCONTRACTING PLAN/ UTILIZATION LOCAL AFGHAN LABOR CONCERNS

Provide percentage of subcontractor contract amount utilizing local Afghan labor.

2.0 GENERAL

Instructions for the preparation and organization of each proposal are included herein. The proposal submittal shall include **(a) one original and four copies of Volume I and (b) one original and two copies of Volume II**. The Volume II proposal and all copies thereof shall be sealed in a single package separate from the Volume I proposal and all copies thereof, and both packages shall be clearly marked. The proposal shall be submitted as required herein and elsewhere in the RFP.

Volume I shall be typed, with numbered pages and sections tabbed. A cover sheet shall identify the offeror and the project and the second sheet shall be a table of contents. The Volume I proposal is limited to no more than 70 single-sided or 35 double-sided pages, printed on 8-1/2" x 11" sheets, not including the cover sheet, designs/sketches, table of contents and letters of recommendation / evaluations / related certificates. Do not use condensed print. Do not submit any extraneous materials with your proposal.

2.1 VOL I - MANAGEMENT-TECHNICAL PROPOSAL PREPARATION

The Management/Technical proposal shall include the information as described below and shall be presented in the sequence listed.

2.1.1 Factor 1 – Experience

Factor 1 template format guidance provided at the end of section 00110.

The Offeror should demonstrate the experience of the team, including sub-contractors, on projects similar to that described in this RFP which use the design-build process. Provide a list of no less than three and no more than ten similar design-build projects that are at least 50% complete or completed in the last **five** years within Afghanistan that best demonstrates your experience, with at least one project over \$10 million, and all other projects must be at least \$ 5 million. The list of projects shall include the following information (Template 1):

- a. Project name and location.
- b. Nature of firm's responsibility (design/build or design or construction).

- c. Project owner's name, address, **telephone**, email (to be contacted by the Government).
- d. Contractor a prime or sub-contractor for this project
- e. Project completion date (estimated if in progress, as well as current portion completed)
- f. Construction cost
- g. Brief explanation of experience that illustrates your design/build capabilities and relevant job experiences. Explain your technical approach in the referenced projects, design rationale, floor plan schematic, structural type of construction, mechanical system used, electrical system used, anti-terrorism force protection considerations, site utility design, and material shipment scheduling for long lead items where applicable to the proposed project.
- ~~h. Schematic site/land use plan showing the proposed project facility placement and orientation, vehicular circulation, and other site improvements. DELETED~~

2.1.2 Factor 2 - Project Management and Security Plan

Factor 2 template format guidance provided at the end of section 00110.

The Offeror shall 1) identify the major conditions, challenges and key issues on each of the following areas, 2) provide alternatives and solutions to the challenges and issues, and 3) describe the action plan and measures to ensure successful execution. The Project Management and Security Plan must address the following matters (Template 2):

2.1.2.1. An Organizational Chart: (include key personnel Names and their titles:

- a. Show the key design personnel
- b. Show the key construction personnel
- c. Show other firms involved such as partnerships and sub-contractors if applicable
- d. Show the relationship between the quality control and health & safety personnel, project level management and corporate management

2.1.2.2. An explanation of the quality control process for design.

2.1.1.3. An explanation of the quality control management throughout the construction process including;

- a. Testing
- b. Inspection
- c. Safety

2.1.2.4. An explanation of how the offeror plans to manage interactions with the Corps of Engineers and the roles that different team members will play when dealing with:

- a. Resolving problems with modifications to the contract (design and/or construction)
- b. Resolving potential design and/or construction delays
- c. Reviewing and approving submittals
- d. Attending progress meetings
- e. Facilitating contract completion and closeouts
- f. Explain process to control cost over runs while maintaining the project budget during design and construction.

2.1.2.5. Provide innovative but realistic and specific solutions to the following potential project management challenges:

- a. Identifying a qualified design firm and ensuring timely delivery of Design Plans and construction documents.
- b. Providing Site security, local community engagement, and access arrangement.
- c. Procuring the required materials and developing a transportation and security strategy that will ensure that the materials get to the construction site
- d. Organizing and using the engineering, technical, management personnel and local labor force in a manner that ensures successful completion of the project.

- e. Providing a construction and engineering methodology that will ensure success of the project.
- f. Provide a construction schedule that is efficient and effective.

2.1.2.6 Capacity: The contractor shall submit a list of ALL current ongoing contracts or projects. The list shall include the contract number, contract amount, original contract completion date, current official contract completion date, and the current progress. The contractor shall identify the key personnel assigned to each of those projects. See FACTOR 3, Personnel for the titles of the key personnel that should be identified. The contractor shall provide a narrative that explains how award of this contract will affect current contracts or projects and how the current contracts or projects will affect this contract if it is awarded to the contractor. The contractor shall provide a narrative that explains their capability and plan to implement an additional project and the resources available to them without adversely affecting current contract or projects.

The Offeror's commitments provided in the Project Management and Security Plan will be used as the basis for agreements between the government and the awardee. The government intends to enforce the agreement based on the awardee's Project Management and Security Plan and evaluate the contractor's performance accordingly.

2.1.3 Factor 3 – Personnel and Resources

Factor 3 template format guidance provided at the end of section 00110.

2.1.3.1 Personnel

The Offeror must provide professional resume data on the following individuals who will be key personnel on the project team. Key personnel identified in this section should be senior working-level people who will be involved in design and construction on a day-to-day basis, as opposed to departmental level supervisors or executives. By identifying these personnel, the offeror makes a commitment that, barring unforeseen circumstances; they are the personnel who shall be assigned to the project.

2.1.3.2. The following key personnel shall have a minimum of **ten** years of documented professional experience.

- a. Project Manager for design and **Program Manger** for construction
- b. Project Architect with accreditation or licensing
- c. Senior Structural Engineer
- d. Senior Civil Engineer
- e. Senior Mechanical Engineer
- f. Senior Electrical Engineer
- g. Construction Superintendent
- h. Project Security Manager

2.1.3.3. The following personnel shall have a minimum of **five** years of professional experience.

- a. Quality Control Manager
- b. Construction Foreman
- c. Safety Officer

2.1.3.4. Information to be provided for key personnel should be limited to no more than **one page** per person and shall include:

- a. Name and title
- b. Project assignment(s)
- c. Name of firm with which associated
- d. Years experience with this firm and with other firms

- e. Education degree(s), year, specialization
- f. Active registration, year first registered
- g. Other experience, accreditation, and qualifications relevant to the proposed project
- h. Provide the proposed use of Afghan contractors and labor in numbers or percentages.

2.1.3.5 Resources

The Offeror shall submit a list of ALL current ongoing contracts or projects. The list shall include the contract number, contract amount, original contract completion date, current official contract completion date, and the current progress. The Offeror shall identify the key personnel assigned to each of those projects. See FACTOR 3, PERSONNEL for the titles of the key personnel that should be identified. The Offeror shall provide a narrative that explains how award of this contract will affect current contracts or projects and how the current contracts or projects will affect this contract if it is awarded to the contractor. The Offeror shall provide a narrative that explains their capability and plan to implement an additional project and the resources available to them without adversely affecting current contract or projects.

2.1.4 Factor 4 – Past Evaluations/Performance. Factor 4 template format guidance provided at the end of section 00110.

For the projects listed under Paragraph 1.1.2, Factor 1 - Experience, the Offeror shall provide the following information (Template 4):

- a. Project Manager's (for the customer) name, **telephone**, email.
- b. List the problems encountered and the corrective actions taken.
- c. List of change orders and circumstances associated with them.
- d. Construction time duration beyond the contract time and why.
- e. Construction cost in dollars beyond the contract amount and why.
- f. Safety record and accident report.
- g. The offeror may also provide letters of recommendation, references, performance evaluations or other evidence of successful performance of the project.

The Source Selection Evaluation Board may attempt to contact the references provided in the list of projects. They may also contact Government personnel who have worked with the offeror. References' comments may affect the scoring of proposals. It is important to verify that the points of contact listed are still available at the phone number and addresses provided and that they are individuals who have sufficient knowledge of the project and your performance to be able to offer meaningful comments.

In the event that an offeror does not have a record of past performance, a written explanation of the reasons why no record is available is requested. In the case of an offeror without a record of relevant past performance or for whom information on past performance is not available, the offeror will not be evaluated favorably or unfavorably on past performance. A neutral rating will be assigned.

2.2 NOTES

2.2.1 JOINT VENTURE PROPOSAL REQUIREMENTS

Any contractors submitted in the proposal as part of a joint venture must submit a **legally binding joint venture agreement**. The Government will not evaluate the capability of any contractors that are not included in the joint venture agreement. Joint ventures must include a copy of the legal joint venture signed by an authorized officer from each of the firms comprising the joint venture with the chief executive of each entity identified and a translation in English, if the original agreement is in a language other than English. Incomplete evidence of a joint venture results will not be considered.

If submitting a proposal as a Joint Venture, the experience, past performance, management plan and equipment submittal of each of the Joint Venture Partners can be submitted for the Joint Venture Entity.

The experience for each Joint Venture Partner will be considered the experience of the Joint Venture entity.

The proposal may receive a higher rating if the proposal contains evidence of the Joint Venture Entity working successfully together previously on relevant projects.

2.2.2 Credit For Others

If an Offeror wishes to be credited with a subcontractor or supplier, i.e. a firm that is not the prime contractor or part of the joint venture, a letter of commitment signed by the subcontractor must be submitted. The commitment letter must be submitted even if the firm is in some way related to a joint venture partner (for example, the subcontractor is a subsidiary of a joint venture partner, or a subsidiary of a firm to which the joint venture partner is also a subsidiary). In regard to the Experience and Past Performance factors, if an Offeror submits projects demonstrating experience in one of the factors or sub-factors, and that project was completed by a subcontractor, a subsidiary, or a supplier, as opposed to the prime or one of the joint venture partners, the Offeror MUST submit a signed letter of commitment from the contractor who performed and completed the work. If a letter of commitment is not submitted, the experience will not be considered.

3.0 VOLUME II - PRICE PROPOSAL PREPARATION

3.1 PROPOSAL SCHEDULE

Offeror's shall provide a signed cover letter and complete the Proposal Schedule by filling out the pricing data blanks. An executable Proposal Schedule is included in Section 00010. Overhead and profit shall be applied proportionally to each category and shall not be required to be shown separately. The proposal shall include allowances in the Price Proposal and shall schedule any contingency for weather delays for severe weather in accordance with weather requirements. All prices shall be firm.

4.0 CLARIFICATIONS AND FINAL PROPOSAL REVISION

4.1 General

Any conflicting criteria which cannot be resolved by the terms of this RFP shall be brought to the attention of the Government by the offeror as part of the written clarification requirement of the proposal. In the absence of such request for clarification, the offeror shall perform to the most beneficial criteria as determined by the Government.

4.2 Written Clarification Requirement

In the event that clarifications are required prior to submitting the proposal, contact the individuals listed on the RFP letter; such contact shall be in writing. All RFP holders shall be advised of significant clarifications affecting the scope of the project.

4.3 Clarifications Submitted with Proposals

If ambiguities remain in the RFP at the time and date that proposals are due, written clarifications may be included in the proposal for consideration by the Government. Clarifications submitted with proposals shall clearly identify the understanding of the RFP documents and how this understanding is reflected in the cost proposal. Qualifications, exclusions and exceptions in the form of clarifications may be considered by the Government to be non-responsive and may be grounds for rejection of the proposal.

4.4 Final Proposal Revision(s)

4.4.1 The Government intends to award a contract on the basis of the initial offers received without further discussions or negotiations. Offers should contain the offeror's best terms from a cost and management standpoint.

4.4.2 The Government may contact those firms whose proposals are within the competitive range and conduct discussions/negotiations concerning their proposal. Following resolution of the discussions/negotiations, offeror's in the competitive range shall be given the opportunity to submit their Final Proposal Revision (otherwise known as 'Best and Final offer').

- End of Section -

TEMPLATE FORMAT GUIDANCE ONLY**Template 1: EXPERIENCE**

- a. Project Name & Location:
- b. Contract Number if applicable:
- c. Project type: Construction: (Y/N) Design: (Y/N) Design/Build: (Y/N)
- d. Project owner's name:
Address:
Telephone:
eMail:
- e. Prime Contractor: (Y/N) Sub-Contractor: (Y/N)
- f. Project completion Date:
- g. Construction Cost:
- h. Brief explanation that illustrates your design/build capabilities and relevant experiences:
- ~~i. Schematic site plans~~ **DELETED**

Template 2: PROJECT MANAGEMENT & SECURITY PLAN

1. Provide an Organizational Chart: (include key personnel Names and their titles)
 - a. Show the key design personnel
 - b. Show the key construction personnel
 - c. Show other firms involved such as partnerships and sub-contractors if applicable
 - d. Show the relationship between the quality control and health & safety personnel, project level management and corporate management
2. Explain the quality control process for design:
3. Explain quality control management throughout the construction process including;
 - a. Testing
 - b. Inspection
 - c. Safety
4. Explain the interactions with the Corps of Engineers and the roles that different team members will play when dealing with;
 - a. Resolving problems with modifications to the contract (design and/or construction)
 - b. Resolving potential design and/or construction delays
 - c. Reviewing and approving submittals
 - d. Attending progress meetings
 - e. Facilitating contract completion and closeouts
 - f. Explain process to control cost over runs while maintaining the project budget during design and construction.
5. Provide innovative but realistic and specific solutions to the following potential project management challenges:

- a. Identifying a qualified design firm and ensuring timely delivery of Design Plans and construction documents.
- b. Providing Site security, local community engagement, and access arrangement.
- c. Procuring the required materials and developing a transportation and security strategy that will ensure that the materials get to the construction site
- d. Organizing and using the engineering, technical, management personnel and local labor force in a manner that ensures successful completion of the project.
- e. Providing a construction and engineering methodology that will ensure success of the project.
- f. Provide a construction schedule that is efficient and effective.

6. Provide a list of all current ongoing contracts or projects:

- a. Contract Number
- b. Contract Amount
- c. Original Contract Completion Date
- d. Current Official Completion Date
- e. Current Progress
- f. Key Personnel assigned to each of those projects
- g. The Offeror shall provide a narrative that explains how award of this contract will affect current contracts or projects and how the current contracts or projects will affect this contract if it is awarded to the contractor.
- h. The Offeror shall provide a narrative that explains their capability and plan to implement an additional project and the resources available to them without adversely affecting current contract or projects.

Template 3: PESONNEL & EQUIPMENT RESOURCES PLAN

SUB-FACTOR 1: KEY PERSONNEL for the following:

- a. Project Manager for design and **Program Manager** for construction
- b. Project Architect
- c. Senior Structural Engineer
- d. Senior Civil Engineer
- e. Senior Mechanical Engineer
- f. Senior Electrical Engineer
- g. Construction Superintendent or Manager
- h. Project Security Manager

The above key personnel shall have a minimum of **10** years of professional experience. The following information is required for each of the key personnel below: Information to be provided for key personnel should be limited to no more than **one page** per person.

SUB-FACTOR 1: PERSONNEL for the following:

- a. Quality Control Manager
- b. Construction Foreman
- c. Safety Officer

The above personnel shall have a minimum of **5** years of professional experience. The following information is required for each of the key personnel below: Information to be provided for key personnel should be limited to no more than **one page** per person.

- a. Name:
- b. Project Title:
- c. Project Responsibilities:

- d. Years of Experience: with this Company: with other firms:
- e. Education: Degree(s) Year: Specialization:
- f. Active Registration: First year Registered:
- g. Other relevant experiences, accreditation, & qualifications:
- h. How many or the percentage of the Afghan contractors & laborers who will be working on this project:

Template 4: PAST EVALUATIONS/ PERFORMANCE

(The following projects are to be the same projects submitted under Factor 1 Experience.)

1. Project Name & Location:
2. Customer Point of Contact: (Note: the Government may contact this customer to verify the information provided on this form)
Name:
Address:
Phone number:
Email Address:
3. Problems encountered and corrective actions taken:
4. List Change Orders and their circumstances:
5. Project scheduled Completion date Actual Completion date:
IF the above dates are different, explain reason for the change:
6. Initial Project Budget (US Dollars)
Final Actual Project cost (US Dollars)
IF the above dates are different, explain reason for the change:
7. Safety record and accident reports:
8. References: Submit the following, Customer Satisfaction letters, Letters of Appreciation, Performance Evaluations, Certification of Achievements, Letters of Recommendations. (Note: A neutral rating will be assigned IF no past performance is submitted) ATTACHMENT-B4 (CONTRACTOR PERSONNEL'S EXPERIENCE & QUALIFICATION)

SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS

The following have been modified:

SECTION 01010

SECTION 01010

SCOPE OF WORK – DESIGN BUILD

1.0 GENERAL

The project consists of the design and construction of a new Afghanistan National Army, Corps Support Battalion and related support facilities on Camp Gamberi, Jalalabad, Afghanistan. Site is located on the eastern side of the existing installation. **Contractor is required to take partial design provided in the Appendices and CD and complete the design to meet all the requirements and applicable criteria and codes.** The project is defined as the design, material, labor, and equipment to construct buildings, parking, utilities and other infrastructure. The work within this contract shall meet and be constructed in accordance with current U.S. design and International Building Codes (IBC), Life Safety Codes (NFPA-101), Force Protection and security standards. A partial listing of references is:

IBC, International Building Codes 2006
 NFPA 101, Life Safety Codes
 UFC 4-010-01, DoD Minimum Anti-Terrorism Standards for Buildings.

Table 1.0 Population for Corps Support Battalion				
SENIOR	Officer	NCO	LOW	TOTAL
BN CDR	O2-O5	E7-E8	E1-E6	
1	44	325	295	665

*Contractor shall design and construct infrastructure for Electrical distribution, Water distribution, and Sanitary Sewer Treatment systems for effective end-state population of **1640** personnel.

1.1 ENGLISH LANGUAGE REQUIREMENT

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

1.2 SUBMITTALS

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

1.3 CQM TRAINING REQUIREMENT

Before project design and construction begin, the Contractor's Quality Control Manager is required to have completed the U.S. Army Corps of Engineers CQM course, or equivalent. Courses are offered at regular intervals. For enrollment and course information, contact Reed B. Freeman at the following:

Reed B. Freeman, PhD, PE
Quality Assurance Branch
Afghanistan Engineer District, USACE
Email: reed.b.freeman@usace.army.mil
Telephone: 079-760-4396

A copy of the course completion certificate shall be included in the Design Analysis submittal.

USACE Guide Specification 01451, entitled "Contractor Quality Control", 3.5.D. requires approval of the Contractor's CQC Plan. That approval is contingent upon the successful completion of this course by the Contractor's Quality Control Manager.

2.0 LOCATION

The site is located in next to Camp Gamberri, Jalalabad, Afghanistan, as shown on attached drawings.

3.0 UNEXPLODED ORDNANCE (UXO)

3.1 UXO REMOVAL AND CLEARANCE

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

It is the responsibility of the Contractor to be aware of the risk of encountering UXO or 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 or mine, unless they have appropriate accreditations from MAC.

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

4.0 SUMMARY OF WORK

4.1 CONTRACTOR REQUIREMENTS

The contractor shall design and construct the facilities as a design-construct contract and shall be in accordance with the requirements stated in Section 01015: Technical Requirements. Refer to attachment following this section for more specifics for required spaces. Design and construction work shall include but not be limited to that shown within attached tables and described below.

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.

4.1.1 GENERAL REQUIREMENTS FOR FACILITIES

All requirements set forth in the Scope of Work, but not included in the Technical Requirements, shall be considered as set forth in both, and vice versa. Provide heating, ventilation, and cooling for all facilities

unless otherwise stated in sections 1010 or 1015. All toilets shall be eastern -style. All eastern-style toilets shall face North or South.

All standard construction amenities and details such as heating, lighting, site drainage, utility connections, etc. shall be implied as a design and construction requirement. Drawings referenced are contained in the Appendices. Concrete walkways are required to connect all buildings, facilities, and features such as parking lots, power plants, etc.

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

Provide signage for each facility on the exterior of the buildings in Dari and Pashto. Contractor shall coordinate signage with COR.

The design and construction work shall include but not be limited to the following sub-paragraphs.

In general, this project consists of design and construction of the following:

4.1.1.1 Base Bid

- Design Cost, Site Survey, and Master Plan
- As-Built Drawings
- Mobilization, Demobilization, and General Site Work
 - 4.2 Wadi Diversion and Mitigation
 - 4.4- 4.6 Potable Water Supply System
 - 4.7 Sanitary Sewer and Treatment System
 - 4.8 Site Electrical Distribution System
 - 4.12 Primary Entry Control Point
 - 4.12 Guard Towers (partial Design Available)
 - 4.13 Perimeter Walls and Fencing (partial Design Available)
 - 4.14 Road Network and Sidewalk
 - 4.15 Trash Collection Points
 - 4.16 Officer Barracks with Toilet/Shower/Ablution (partial Design Available)
 - 4.16 Enlisted Barracks (partial Design Available)
 - 4.17 Dining Facility (DFAC) and Dry Storage Yard (partial Design Available)
 - 4.18 Battalion Headquarters Building/ Admin (partial Design Available)
 - 4.19 Toilet/Shower/Ablution/Laundry Facility (partial Design Available)
 - 4.20 Vehicle Refueling Point
 - 4.21 Motor Pool Gravel Parking
 - 4.22 CSB Organic Wheeled Vehicle Maintenance Facility (9 Bay) (partial Design Available)
 - 4.23 Communication Building (partial Design Available)
 - 4.25 POL Storage Building (partial Design Available)
 - 4.26 General Warehouse Storage (partial Design Available)
 - 4.27 Arms Storage Building (partial Design Available)
 - 4.28 Vehicle Wash Rack
 - 4.31 General Non-Organic Wheeled Vehicle Maintenance Facility two (9 Bay) (partial Design Available) (refer to 4.22 drawings)
 - 4.32 General Non-Organic Wheeled Vehicle Maintenance Facility (9 Bay) (partial Design Available) (refer to 4.22 drawings)
 - 4.24 GSE Communication and Armament Maintenance Facility
 - 4.34 Temporary Facilities

4.35 Bunkers

4.1.1.2 Option Items

- 4.29 MWR GYM and outside volleyball courts
- 4.33 Irrigation System for entire Camp Gamberi Installation

See Appendix A for facilities drawings.

* Facilities with listed with (partial Design Available) additional drawings will be available on CD at the Corps of Engineer Afghanistan District Headquarters, Qalaa House Compound in Kabul. Contractors should contact the Contract Specialist in advance for CD request and pick up CD at COE HQs. CADD files will be provided to the successful offeror after award.

4.1.2 SECURITY MEASURES

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. This may include but not limited to: Security guards, temporary fencing, material during delivery, and control access to the construction site.

4.2 SITE PLANNING

Preliminary site investigation indicates there may be a need for major drainage structures due to existing wadi(s) at the site. Contractor shall divert or mitigate the impact of erosion and flooding due to existing wadi(s) in the Master Plan. Contractor shall clearly outline and show their design proposal for diversion or mitigation. The location of the facilities on the site plan may have to be adjusted in coordination with any diversion or mitigation of Wadi proposal.

It is highly recommended that the Contractor visit the site before preparing and submitting their bid proposal.

The Contractor shall prepare a site boundary survey and site plan based on information contained in the Request for Proposal. The Concept Site layout provided in the Appendix is only a "Concept" and may not capture the total scope. The Contractor must incorporate all the requirements in the 1010 and 1015 and provide provisions for future expansion. The development of the master plan will include participation in design charrettes conducted at the Afghanistan Engineer District Headquarters Office in Kabul, Resident Office, or Area Engineer Office as determined by government Contracting Officer's representative (COR) or Project Manager (PM). Contractor shall verify all space requirements and code compliance in accordance with sections 1010 and 1015 of this contract.

The Project construction site is about 380 meter by 1000 meter at approximately 380,000 SM. Nearly half of the project construction site is already part of the existing Camp Gamberi Installation. Contractor is responsible to verify actual site condition before bidding.

The contractor shall arrange the facilities involved in vehicle maintenance on post so as to support a logical progression of work. First, vehicles freshly arrived from the field shall be washed prior to maintenance. The wash rack should be located at a higher elevation than other maintenance facilities to allow proper filtration and gravity drainage of wastewater, and shall be located as far from fuel dispensing or storage sites as possible to avoid any mixing of wastewater and fuel.

Second, vehicles shall be able arrive at maintenance bays in a reasonably clean condition - meaning place the wash rack a relatively short distance from maintenance bays.

Third, after maintenance is performed, vehicles shall be driven to the vehicle refueling point over such a route so as not to interfere with vehicles proceeding to either the wash rack or maintenance facilities. The vehicle refueling point shall be at a lower elevation than the drinking well, and contractor shall ensure the refueling point is a minimum distance of 30.5 meters from the drinking well. Similar safety distances between fuel lines and all water lines shall be maintained.

Fourth, once refueled, vehicles shall be driven to appropriate parking areas, again without crossing traffic undergoing other stages of maintenance.

Refer to UFC 3-230-07a, Table 5-2 for minimum distances from pollution sources to water wells. Building sewer = 50 feet, Septic Tank = 50 feet, disposal field = 100 feet. Seepage pit = 100 feet. Dry Well = 50 feet, and Cesspool = 150 feet.

Contractor shall Master plan for **1640 personnel** to include future expansion space for additional 625 personnel (ESB) Engineer Support Battalion, 350 personnel (FSD), as well as the 665 personnel for CSB. Future ESB shall include Barracks, Battalion Admin Office Facility, and Vehicle Maintenance Facility. The Future FSD shall include Barracks, Admin Office, and Warehouses.

4.3 DEMOLITION AND GRADING

Minor site demolition is required prior to construction of new work. Grading at the site is required and shall conform to requirements within references herein.

Native crushed stone 100 mm thick shall be placed around all buildings, from the building wall or building landscaping out to a distance of 2m and all areas of anticipated foot or vehicle traffic in order to reduce erosion and to provide dust control. Concrete walkways minimum 100mm thick and 1.2m wide shall be installed between buildings and parking areas.

4.4 WATER SYSTEM

Contractor shall conduct preliminary water exploration to site and develop potable water supply wells for sufficient quantity and quality. The Contractor shall determine placement and well design for water supply points and shall preserve and protect the well(s) for future use. Placement of any well (test or production) will include collection and preservation of intact samples (split spoon or core samples) every five (5) meters. Intact samples and drill cuttings will provide for evaluation of a continuous well log and well construction design. Contractor shall draft a lithologic well log using an accepted standard classification system such as ASTM D2487-00, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

The Contractor shall perform pump test calculations and water quality analysis prior to beginning work on water distribution system. Water quality analysis should meet or exceed World Health Organization (WHO) Guidelines for drinking-water quality for water quality standards. If a well or borehole is identified for abandonment, the Contractor shall follow proper abandonment procedures and provide documentation.

Produce a geotechnical report detailing field subsurface investigation procedures, field test results and laboratory test results for water quality, water supply well design and construction and foundation placement.

Design and construct a Potable Water System (PWS), to include a well and submersible pump as a source of water, protected in an enclosed well house, a water chlorination and filtration system, a water storage tank or tanks, booster pumps, and pressure tank housed in a pump house to deliver water, and an underground pipe distribution network system. The Average Daily Demand (ADD) shall be calculated

for an effective population of 1,640, using a per capita consumption rate of 50 gallons (190 liters) per person per day. This demand shall be multiplied by a capacity factor of 1.5 to account for future growth and peak demand, per UFC 3-230-07a, paragraph 1-3, and UFC 3-230-03a, paragraph 3-1.

The booster pumps shall be constructed to deliver a minimum 345-414 kPa (50-60 psi) at a flow rate equal to twice the ADD. Water tank or tanks shall provide storage capacity for a minimum of one day's ADD. The distribution system shall be designed to provide a minimum 276 kPa (40 psi) at ground level at all points in the delivery system. Minimum pressures of 207 kPa (30 psi), under peak domestic flow conditions, can be tolerated in isolated areas as long as all peak flow requirements in the entire system can be satisfied. Maximum water pressures in distribution mains and service lines shall not exceed 517 kPa (75 psi) at ground elevation. Maximum velocity of flow in the system shall be 8 fps. Refer to IPC Commentary Section 604, and UFC 2-230-10a, Chapter 8 for designing for maximum flow. Water demand required for fire fighting and for irrigation and landscaping needs shall not be included in design demand calculations.

It is acknowledged that water may not be available at the site despite contractor good faith efforts to find it. The Contractor shall drill a minimum of two wells at the site to a minimum depth of 120 meters. If this is done without result, the Contractor will be considered to have fulfilled the terms of the contract and will be entitled to the full price of the contract CLIN for well drilling. However, the Contractor must still furnish all other parts of the water distribution system as described in the specifications.

The well house, tank, and pump house shall be surrounded by a chain link fence with lockable gate, topped by outriggers and barbed or concertina wire.

Any wells not used in the system must be de-commissioned in accordance with ASTM D 5299. The contractor must submit a written plan for de-commissioning wells.

4.4.1 PUMP HOUSE

Construct a permanent insulated pump house with a concrete slab floor at the new well site. Contractor shall furnish two booster pumps, each capable of delivering twice the average daily demand. Contractor shall furnish a hydro-pneumatic tank to work in conjunction with the booster pumps. Installation shall be per manufacturer's requirements. The Contractor shall provide manufacturer's catalog information and shop drawings to the Contracting Officer for approval. The floor of the pump house shall slope away from the pumps at a 1% slope and shall have drains with screens at each corner. Elevation of floor of pump house shall be a minimum 150mm above grade. The pump house design should allow easy access to pumps for maintenance. The pump house walls and roof shall be insulated and a heating unit installed to protect valves and piping from freezing. Further protection shall be provided by insulating piping within the pump well house, as well as intake discharge piping underneath and outside the walls. The pump house shall be furnished with a heavy duty metal entry frame and insulated, lockable door.

4.5 WELL HOUSE

Construct a permanent insulated water well house with a concrete slab floor at a new well site. Contractor shall furnish a chlorination and filtration shelter per chlorine and filtration manufacturer's requirements. The Contractor shall provide manufacturer's catalog information and shop drawings to the Contracting Officer for approval. The floor of the well house shall slope away from the casing at approximately 3mm per 300mm and drain to the outside through pipes at each corner. Pipes shall be fitted with screens. Elevation of floor of the well house shall be a minimum 150mm above grade. The well casing will extend a minimum 50cm above the floor of the well house. The well house design should be such that the well pump, motor, and drop pipe can be accessed through a lockable, insulated roof hatch by mobile crane. The well house shall be insulated and a heating unit installed to protect valves and piping from freezing. Further freeze protection shall be provided by insulating piping within the well

house, as well as discharge piping beyond the check valve. The well house shall be furnished with a entry frame and door that shall be lockable, insulated, and made of heavy-duty metal. Well house shall be surrounded with a security fence with lockable gate and outriggers equipped with barbed and concertina wire. Provide a chlorination system.

4.6 WATER TANK

Contractor shall provide a circular steel or concrete ground storage reservoir tank (GST) located on a slab set a minimum of 150mm above grade. Volume of the GST shall be a minimum storage volume of a full day's ADD. 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. Water tank shall be lockable.

Total volume of the tank shall be a minimum storage volume of a full day's water demand. The contractor shall verify storage volume requirements based on final design population.

4.7 SANITARY SEWER & TREATMENT SYSTEM

Contractor shall investigate the existing Sanitary Sewer and Treatment System at the installation to determine existing capacity.

If the existing Sanitary Sewer and Treatment system will support the additional sanitary load of **1,640** personnel (as defined above and 1015 Technical Requirements), then the Contractor shall design and provide all necessary materials and labor to construct an extension of the sanitary sewer distribution system for the sanitary load, to include the future master planned facilities, and connect to the existing system. This may include installing a new force main directly to the WWTP, any collection or lift stations as applicable, and new distribution lines.

If the existing Sanitary Sewer and Treatment system will not support an additional personnel, (as defined above and 1015 Technical Requirements), then the Contractor shall design and construct a separate sanitary sewer distribution system served by a package waste water treatment plant. Installation package waste water treatment plant shall be modular, constructed steel units assembled onsite from pre-fabricated components. The system shall provide treatment for the sewage load based on 80% of Average Daily Demand. The system shall combine aeration, settling, and solids treatment in a single multi-compartment tank.

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.

Geotechnical investigation of the proposed sewage treatment site is required, and the contractor shall design the sewage treatment system to be compatible with site and soil conditions.

The sanitary sewer collection system shall consist of gravity sewer pipe network and accessories such as manholes, cleanouts, and building service connections. The Contractor shall design a sanitary system layout following requirements of Section 01015 this contract. Pipe, fittings, and connections shall conform to the respective specifications and other requirements as listed in Contract Section 01015 and all of its referenced codes.

The gravity sewer collection system shall connect to the base Waste Water Treatment Plant. The Contractor shall design a package system all tank geometry, hydraulic loading, inlet and outlet configurations, number of compartments and related site preparation and earthwork. Design will be per specifications provided in Section 01015.

4.8 SITE ELECTRICAL DISTRIBUTION SYSTEM

Preliminary utility investigation found that the existing electrical distribution system would support the additional load for this project including future master planned 1640 person load. Current Power Plant is designed to support nine (9) 1 megawatt generators. Currently 6 of the 9 generator pads will have a 1 megawatt generator installed on them. Four generators will be utilized to power the existing facility and two will be spare. Three (3) available spaces will be left for future generators.

The Contractor shall perform its own investigate and determine if the existing installation electrical distribution system will support the electrical load of this project, including all future master planned additions, for an additional total future personnel.

If the existing electrical distribution system will support the additional load of this project, contractor shall design and construct connection to the existing system and **provide the additional generator(s) in the existing power plant facility and fuel storage tank(s) to support additional loads.**

If the existing electrical distribution system will not supply the addition of this project including the future planned 1640 person load, then the contractor shall design and construct the entire electrical distribution system to include but not limited to: generator power plant, electrical distribution, fuel storage tanks, and connection to all facilities.

The contractor shall design an electrical power system to supply and distribute power to all facilities included in the contract (including master planned future facilities) to include generation and fuel storage, and underground. All electrical design and installation shall meet NEC (NFPA 70) requirements. Conductors and circuits shall be sized for the specific loads. The site Primary power distribution shall be 20000/115550 V, 50 Hz manhole duct bank system. The secondary voltage shall be 380/220 VAC, 50 Hz. Secondary power distribution shall be pad mounted transformer substations (PTS). Each PTS shall be a standard manufactured substation with a secondary distribution switchboard. Each substation switchboard shall have a secondary distribution circuit breaker for each facility, to include all future Master Planned facilities. The Contractor shall provide secondary distribution manhole or hand hole duct bank distribution system to each facility to be constructed, to include all future Master Planned facilities, from the PTS switchboard. The Contractor shall provide a 100mm conduit stubbed out from the closest manhole or hand hole **(within the roadway right of way at the limits)** for each future facility. **The Contractor will not be responsible for the construction of service lines from Contractor installed distribution lines to future facilities.** Each 100mm conduit shall have a pull string, be capped off, and have a duct bank marker above the conduit. All electrical design and installation shall meet NEC (NFPA 70) requirements. Electrical receptacles shall be provided as indicated in section in 01015, Technical Requirements. Conductors and circuits shall be sized for the specific loads. All wiring shall be run and pulled through conduits.

4.8.1 POWER PLANT GENERATORS: Generator size is not to exceed 1MW (1,000kW); in the event more than one generator is required to handle the entire load, the generators shall be provided with a synchronizer-switch, so that when total power demanded from one generator reaches 90% of the generators maximum, an additional generator shall automatically start and supplement the running generators, sharing the load between the generators equally. Contractor shall provide generators based on the N+2 concept. Where 'N' would be the required number of generator(s) and '2' being a 'stand-by' unit. Generation shall supply 125% of the maximum calculated demand load plus the stand-by generator in reserve. Contractor shall utilize the existing spare generators prior to adding any additional generators. There shall be a total of two spare generators at the power plant at the end of this contract.

4.9 GENERATOR BUILDING

Generator Fuel Storage. The work shall include the fabrication and installation of the entire fuel storage and distribution system. Tanks shall be skid mounted. Tanks of this type that have a capacity above 2640 L will be provided with either a dike or a spill containment system. The dike or spill containment system should have enough capacity for the entire contents of the tank, plus 10 percent. Provide a molded neoprene isolation pad to isolate an above-ground tank from the concrete pad underneath. Steel tank supports specifically are prone to encounter premature rusting due to constant exposure to moisture and their incompatibility with concrete. Tank shall be designed and manufactured for horizontal installation. Tank shall be mounted on the tank manufacturer's standard support skid. Skid shall span the entire length of the tank and shall separate the tank from the reinforced concrete slab by a minimum of 200 mm. Indicate on the drawings the number and size of each tank man way required. Tanks of 3,780 to 45,430 L to capacity will be provided with 760 mm diameter man ways. Tanks larger than 45,430 L will be provided with 915 mm diameter man ways. Tanks 3,780 L and larger will be provided with a minimum of 1 tank man way to allow for internal tank access. Piping will not penetrate through access man ways. Tank shall be provided with a combination cleanout and gauge connection. Vent pipe sizing shall be not less than 32 mm nominal inside diameter. Vent shall be the rupture disc type calibrated to burst at 13.8 kPa pressure, and operate at 80 percent of burst setting. Tank shall be provided with an overfill alarm system. Tank shall be provided with 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 man way cover. Provide an in-line centrifugal pump as part of the day tank package for fuel transfer from the bulk storage tanks to the day tank. Day tanks shall provide sufficient fuel for four hours of generator operation without refill. Provide cathode protection for metal components. 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. Piping shall be inspected, tested, and approved before buying, covering, or concealing. Piping shall be installed straight and true to bear evenly on supports. Piping shall be free of traps, shall not be embedded in concrete pavement, and shall drain toward the corresponding storage tank. Any pipe, fittings, or appurtenances found defective after installation shall be replaced. Below ground nonmetallic pipe shall be installed in accordance with pipe manufacturer's instructions. Belowground piping shall be laid with a minimum pitch of 25 mm per 6 m.

External Fuel Fill Point: for each specific site, the contractor shall coordinate with the Resident Engineer and provide a fuel unloading point outside of the perimeter wall to facilitate transfer of fuel from the commercial fuel tanker to the bulk fuel storage at the Power Plant. This transfer shall include interconnecting piping and valves between the fuel point and the two bulk fuel storage tanks.

4.10 LIGHTING

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

Exterior lighting shall be high intensity discharge luminaries on 10 meter high minimum spun aluminum or galvanized steel poles. If to be installed on an existing installation, type of luminaries shall match existing predominant type within installation.

Searchlights shall be provided as indicated and shall be equivalent to the following:

- prison grade
- nickel reflectors (bullet resistant)
- 65 million candlepower (1000 watts)
- manual operation from below with one hand
- xenon lamp
- weatherproof design

4.11 GEOTECHNICAL

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

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

4.12 FORCE PROTECTION

Facilities shall be sited with FP design in mind. As much as possible and practicable FP designs shall be accomplished by appropriate stand-off distances and setbacks away from potential threats. Force Protection design shall be in accordance with section 1015, Technical Requirements. Force Protection Design shall include the following components:

- A complete Perimeter Security Wall with vehicular and pedestrian Access Gates

- Primary Entry Control Points (ECP)

- Guard Houses

- Guard Shacks

- Active Vehicle Barrier

- Passive Vehicle Barrier

- Checkpoints

- Rejection Lanes

- Sliding Gates

- Cable Lift Gates

- Rolling Beam Barrier

- Guard Towers, **(8) total**, coordinate location with COR

- Compound Illumination System

- Security Communication System

- Loudspeakers and Alarm System

4.13 PERIMETER WALL, FENCING, AND BARRICADES

Perimeter Wall and Fencing shall consist of the types shown or described herein and provided in drawings in the Appendix A. Barricades shall consist of either Hesco Bastion Container barriers or concrete type. Refer Drawings for required types and locations. Barricades are not intended to resist a certain horizontal load and are not required to be permanently anchored to ground. The estimated perimeter wall distance is **1.8 kilometers**. This is only an estimate; the Contractor is responsible to verify all actual distances and dimensions.

4.14 ROAD NETWORK, SIDEWALK, AND PARKING

The Contractor shall design and construct the entire road and parking network. The roads shall be designed to carry traffic of up to a **60** ton three-five axle vehicle at a minimum at least but not limited to: from main entry control point to all the vehicle maintenance facilities, wash rack, fuel point, and motor pool parking areas. A storm drainage system shall also be included. The road layout shall provide

access to entry control points, parking lots, vehicle maintenance facilities, fuel points, generator yard, sewage septic treatment plant, and the trash collection point. Contractor shall connect new road system to the existing installation road system. Contractor shall connect new road system to main road system outside of the compound approximately **300 meters long** service road from Main Entry Control Point to existing service road. Provide compacted gravel parking areas for vehicles as listed in 4.21 Motor Pool.

Provide a **convoy assembly area accommodating 2 sets of vehicles parallel parked** at near approach to the main Entry Control Point. The Assembly area shall be paved at least 100 meters in length and at least 14 meters in width including road network.

Road design shall be designed per Section 01015, Technical Requirements. Roadways and sidewalks are required as shown on attached drawings and shall be designed and constructed based upon recommendations from geotechnical analysis as required herein.

The Contractor shall design and provide landscaping for the compound. Design and provide a network of concrete sidewalks to connect the buildings. Sidewalks shall be wide enough to be used as fire-lane or service roads. Provide outdoor benches, lighting, and gathering areas.

4.15 TRASH POINTS

The Contractor shall design and construct, in locations convenient for easy removal, **six (6)** trash collection points. It shall be located inside the compound walls. The trash points shall be a 1.8 m x 1.8 m concrete pad with a 1.8 meter tall chain link fence around the perimeter. One side shall have a 1.2 m wide gate entrance. Trash Points shall have a metal roof covering.

4.16 BARRACKS

Table 4.16 Net Sleeping Area per Soldier with Breakdown by Rank (NSM)			
SENIOR	Officers	NCO	LOW
Private Room	Private Room	Two to Room	Open Bay
17	12	14	5

Design and construct the barracks building(s) in accordance with the drawings contained in Appendix A. **provide nine (9) BOQ Type “B”, and provide four (4) Enlisted Open Bay Barracks.** Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal except PVC shall be used for interior doors at toilet, shower, and ablution rooms. Provide split pack air conditioning for the BOQ Type “B” buildings.

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

- (a) Enlisted Type “A”, Provide Ceiling fans shall be designed for summer ventilation electrical base heaters for winter.
- (b) Clotheslines shall be installed behind each barracks, approximately 5m in length with 4 lines across spaced 410mm apart and of sufficient strength to prevent sagging when all of the lines are loaded
- (c) Concrete stoops with boot scrapper shall be provided at all exterior doors.

- (d) Barracks shall have a dedicated storage area sized to 0.5 SM per person assigned to the barracks.
- (e) At least one power outlets every 4 m. In the BOQ Type "B", provide at least one per wall in bedrooms.
- (f) Toilet/shower rooms shall be finished with ceramic tile from floor and ceiling, slope floor to drain.

Master Plan shall provide for future facilities at about the same ratio for ESB and FSD. Refer to 4.2 SITE PLANNING for population count of future expansion.

4.17 DFAC, Dining Facility and Storage Yard

Design and construct the **2204 SM** DFAC in accordance with the drawings contained in Appendix A. Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal except PVC shall be used for interior doors at toilet, rooms. Include all the features listed in 4.17.1. This facility will provide for 500 seats with the capacity to provide up to 1000 seats.

This facility shall provide cafeteria-style feeding of short order and regular style meals. Spaces include dining areas and kitchen facilities outfitted with built-in liquid propane-burning stoves installed in accordance with manufacturer's instructions. Include all the features listed in 4.17.1.

4.17.1 The Contractor shall incorporate the following special features into the DFAC:

- (a) The kitchen shall be physically separated from the rest of the dining facility with a 2-hour fire rated wall with 90 minute rated doors. At openings for serving line and dirty dish return provide 90 minute fire rated shutters.
- (b) The backsplash and front and side surfaces of stove enclosures shall be terrazzo with heat resistant grout. The top of the stove enclosure shall be finished concrete. Edges will be covered by a [metal "L" angle] [rubber-like material "L" angle] to prevent damaging edges during pot movement. [Option – the backsplash can be of sheet metal if the designer feels adhesives & grouting for terrazzo tiles will not withstand normal usage]
- (c) The height of the stove from the floor to the burners shall be 50cm
- (d) The floor in front of the row of burner enclosures shall be slightly sloped towards the floor drain to direct water overflowing from pots or spigots near the pots away from the work area in front of the stove enclosures.
- (e) New propane stoves shall be installed with consideration to ease of cooking operation and daily cleanup. New stoves shall be set into a formed concrete openings such that they can easily be removed for replacement, maintenance and cleaning. Stove dimensions are 72 cm long x 72 cm wide x 50 cm high. Height includes the grill. Desired stove to stove clearance is 72 cm.
- (f) Each propane stove shall be provided with three burners. The propane stoves shall be of commercial quality and be capable of producing the highest BTU heat output with all three burners on. The center burner is low heat, center and middle burner is medium heat and all three burners is high heat. A shut off valve for each burner shall be provided at the face of the propane appliance.
- (g) Propane storage tanks shall be provided and installed in accordance with NFPA 58. The propane storage tanks shall contain **15 days** supply and shall be installed on a concrete pad, and placed within a covered, secure enclosure to protect tanks from the elements. Provide an access gate for

removal and replacement of propane tanks. The access gate shall be able to be secured and locked. Propane tanks shall be secured such that none move or topple over.

- (h) The Contractor shall coordinate with the DFAC staff and Contracting Officer in determining amount of propane fuel required daily for the DFAC. The propane fuel requirement shall be calculated based on consumption of fuel every cooking cycle, cooking frequency, and required "surge" capacity. The Contractor shall provide an agreed to amount of fuel tanks filled with propane fuel at time of project completion.
- (i) Piping from propane tanks to their respective propane stoves shall be of wrought iron, ASTM B36.10M or steel (black or galvanized), ASTM A53. The steel piping shall terminate in front of the propane stoves with a shut off valve and quick disconnect nipple. A stainless steel flexible hose (Gastite or equal) shall connect the propane stove to the steel piping per NFPA 58 section 5.8.6. Each end of the flexible hose shall be provided with quick disconnect dielectric fittings.
- (j) Propane supply piping shall be installed in concrete trenches. Piping may also be surface mounted provided it is not susceptible to damage, or causes any safety hazards.
- (k) Piping passing through the exterior wall shall be provided with pipe sleeves.
- (l) Ventilation hoods
- Hoods shall be designed to capture and confine cooking odors, vapors, and residues.
 - Hood exhaust rate shall be 400 cubic feet per minute per linear foot (CFM/ft) (620 L/s per m) of open hood.
 - Hoods shall be constructed of 20 gauge stainless steel.
 - Hoods shall be provided with a side panel at each end to close in the area between the stove and the hood. Side panels shall be the width of the hood and shall extend to the rear wall at 45 degrees. Approximate dimensions are 37 inches by 37 inches by 45 degrees (925mm by 925mm by 45 degrees). If a non-combustible wall abuts a stove, then a side panel shall not be required on that side of the hood.
 - Joints, seams and penetrations shall be externally welded or brazed to form a watertight seal with a smooth surface that is readily cleanable.
 - All surfaces shall be designed to be easily and thoroughly cleanable.
 - Hoods shall be securely supported with non-combustible materials.
 - Hoods shall extend a minimum of 9 inches (225mm) beyond the front edge of the stove and shall be installed a maximum of 4 feet (1200mm) above the surface of the stove.
 - Hoods shall be sealed to the rear wall.
 - The center hood of each bank of fans shall have one electrical switch on the front face to operate the exhaust and make-up air fans.
 - Grease filters will not be required. Hoods shall be constructed so that grease filters can be installed at a later date.
- (m) Ductwork
- Ductwork shall be protected against corrosion.
 - Ducts shall be constructed of 18 gauge stainless steel.
 - Supply and exhaust systems for each hood shall be independent of other duct systems.
 - Joints and seams shall be continuously welded or brazed.
 - Bracing and supports shall be constructed of non-combustible material securely fastened to the structure. Bolts, screws, rivets, and other fasteners shall not penetrate the duct walls.
 - Airflow in the ductwork shall be not less than 500 feet per minute (150m/min).
 - Ducts shall be placed a minimum of 18 inches (450mm) from combustible material or 3 inches (75mm) from gypsum wallboard attached to non-combustible structures.

- Ductwork terminating through the roof shall extend a minimum of 18 inches (450mm) above the roof.
- Where roof terminations are not possible, ducts may be terminated through an exterior wall. All ductwork terminating through an exterior wall shall be located a minimum of 3 feet (900mm) from exterior openings. Ductwork shall be pitched to drain back to hood.
- All ductwork terminations shall be a minimum of 10 feet (3000mm) horizontally from other buildings and property lines.

(n) Exhaust Fans

- Exhaust fans shall be located outside the airstream.
- Fan discharge shall not impinge on the roof, other equipment or appliances, or parts of the building.
- Discharge outlet of exhaust fans shall be a minimum of 40 inches (1000mm) above the roof.
- Up-blast fans shall be hinged and supplied with a flexible weatherproof electrical cable to permit inspection and cleaning.
- Connection between ductwork and exhaust fan shall be flanged, gasketed, and bolted.
- Each exhaust fan shall be electrically interlocked with its corresponding make-up air fan to prevent system operation without both fans in service.

(o) Make-up Air Fans

- Make-up air inlet locations shall take into consideration the prevailing wind direction and shall be placed upstream of exhaust outlets.
- Wherever possible, make-up air inlets shall be located a minimum of 10 ft (3m) from exhaust outlets.
- Where make-up air inlets are located within 10 ft (3m) of an exhaust outlet, the make-up air inlet shall be located a minimum of 3 ft (0.92m) below the exhaust outlet.
- Each make-up air fan shall supply a maximum of 110 CFM/ft (170 L/s per m) of perforated diffuser.
- Each make-up air fan shall be electrically interlocked with its corresponding exhaust fan to prevent system operation without both fans in service.

(p) Testing

- A performance test shall be conducted upon completion and before final acceptance of the system installation.
- The test shall verify the rate of exhaust and make-up air flow.
- The test shall be witnessed by the COR.]

(q) ...

(r) Floor trench drains shall be incorporated into the dining area with the floor sloped to drain.

(s) Trench type floor drains shall be installed in the kitchen cooking and dishwashing areas.

(t) Hand wash stations in the entry vestibule shall be provided. Trough type sinks shall be used.

(u) Install several large wash basins with a low rim height designed for washing very large pots.

(v) Run water lines to and install wall mounted spigots next to each cooking station in order to permit pots to be filled during cooking without having to move them..

- (w) The Contractor shall provide and install **walk-in refrigerators and wall-in freezers** as shown in drawings.
 - (x) Fire protection is to be provided by fire extinguishers throughout the facility at easily accessible locations.
 - (y) Install wall mounted forced air electric heaters to provide heat throughout the dining area.
 - (z) The Contractor shall design and construct a chain-link fenced storage yard for food and install facilities for the storage of both dry goods and refrigerated items.
-
- (aa) Provide Latrines for facility workers
 - (bb) Provide Janitor room with Mop sink
 - (cc) Provide Office space for minimum two personnel
 - (dd) Provide dining areas for officers and enlisted
 - (ee) Provide Dish washing area
 - (ff) Provide Food preparation area
 - (gg) Provide Serving area
 - (hh) Provide fenced in Dry storage yard area adjacent to DFAC
 - (ii) Grease Separator shall be a hydro-mechanical model as defined in Standard PDI G101, revised 2007.
 - (jj) Provide ducted package heat pump system for heating and cooling, and ceiling fans for air circulation.

4.18 BATTALION HQ ADMINISTRATION BUILDING

The Contractor shall design and construct **one (1)** Battalion HQ Administration facilities at **500SM** for the CSB in accordance with the drawings contained in Appendix A.

- (a) No office space is required for the Low ordinary ranking personnel.
- (b) Provide 100 meter x 100 meter Parade ground located near the Battalion HQ Administration Building. No grass or extra landscaping needed. Elevate and grade the grounds to ensure the site drainage does not erode the field.

The Master Plan shall provide space for two additional future HQ Administration Building (ESB and FSD).

4.19 TOILET/SHOWER/ABLUTION/LAUNDRY FACILITY

Design and construct a **466SM** toilet, shower, ablution, and laundry building in accordance with the drawings contained in Appendix A. Windows shall be extruded aluminum or extruded PVC. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal except PVC shall be used for interior doors at toilet, shower, laundry, and ablution rooms. HVAC system requirements: **refer to 1015.**

The Contractor shall design and construct a toilet, shower, ablution, and laundry building. Plumbing fixtures shall be provided in accordance with the International Plumbing Code. Latrines for LN residents shall be eastern-style units and installed to face North and South. The Contractor shall incorporate the following special features into the building:

- (a) All eastern style toilets shall be provided with a wall-mounted hose bib on the right side of the occupant as he faces the stall door.
- (b) All sinks shall be trough type constructed of block and concrete with ceramic tile exterior and lining capable of withstanding abuse.
- (c) Shower stalls shall be large enough to allow room to dress and undress between an outer and inner shower curtain. no less than 2 m x 1.5 m and shall have a solid door on the outside.
- (d) Showers shall contain a single mixing valve for hot and cold water mixing and a wall mounted shower head.
- (e) Ablution area shall be trough type, constructed by depressing slab 200mm out to 600mm from wall mounted faucets. Finish for trough shall be sealed concrete.
- (f) The laundry room shall have **concrete trough sinks** capable of withstanding abuse. Size of basins shall be approximately 600mm wide x 600mm long x 350mm deep. Provide clothes line for drying outside the building.
- (g) Electric hot water heaters shall be installed to provide hot water to the showers and sinks.
- (h) Electric cabinet heaters or electric unit heaters suitable for wet areas shall be utilized to provide heat in the facility.
- (i) The building shall be constructed with exhaust fans to ventilate steam to the outside environment and, where required, insulated piping to prevent freezing of water pipes in winter.
- (j) All exposed water supply plumbing galvanized metal. PVC may be used where water supply piping is concealed.
- (k) Accessories shall include but not limited to; toilet paper holders, soap dishes, curtains and curtain rods, robe hooks, mirrors, paper towel dispenser, metal shelf, and grab bars.

Master Plan shall provide for one additional future facility for ESB and FSD.

4.20 VEHICLE RE-FUELING POINT

The Contractor shall design and construct a low profile vehicle re-fueling point, as specified in Section 01015, capable of storing **20,000 liters (5283 gallons) of diesel** and **10,000 liters (2641 gallons) of MOGAS**. The Contractor shall provide a full supply of fuel to the tanks at the time of turnover to the Government. Vehicle Re-Fueling Point shall have a metal roof covering. Provide explosion proof lighting and control.

4.21 MOTOR POOL GRAVEL PARKING

The Contractor shall design and construct unit vehicle parking area to accommodate:

- Provide GOV parking adjacent to or near CSB Organic Large Vehicle Maintenance for 30.
- Provide GOV parking adjacent to or near CSB Organic Vehicle Maintenance for 30.
- Provide GOV parking adjacent to or near General Vehicle Maintenance for 150.
- Provide GOV parking at CSB Motor Pool for 382 Trucks and 248 Trailers.
- Provide GOV parking at ESB Motor Pool for 266 Trucks and 72 Trailers
- Provide POV parking adjacent to or near Battalion HQs Admin for 10.
- Provide POV parking adjacent to or near Barracks for 40.

GOV parking spaces shall be 4 x 8 meters, and POV parking spaces shall be 3 x 6 meters.

Security fencing shall be provided around the Vehicle Maintenance Facilities and GOV parking areas.

4.22 CSB ORGANIC VEHICLE MAINTENANCE FACILITY (9 Bay)

Design and construct the **1395 SM** vehicle maintenance facility in accordance with the drawings contained in Appendices. Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal except PVC shall be used for interior doors at toilet, shower, and ablution rooms. Provide forced air electric space heaters for heating, and ceiling fans for air circulation.

The Contractor shall design and construct Vehicle Maintenance Facility incorporating **18** vehicle maintenance bays to support 630 CSB and 360 ESB logistic Support vehicles with maximum size of 42' long x 12' wide (7.7m long x 3.7m wide). The Vehicle Maintenance Facility shall have a concrete foundation and concrete floor to support a minimum loading of a 3-axle, **30,000 kg** vehicle without failing. Concrete will be floated for a smooth finish. Floor will be slightly sloped toward the front to the garage to facilitate drainage. There will be a concrete ramp from the outside into the garage area. The roof structure shall be a hip or gable minimum 2:12 slope roof consisting of steel columns, steel beams, metal hat channels and corrugated roof panels. The clear distance between the finished floor and the bottom of the roof structure shall be no less than 8m (26' – 3"). **Garage doors shall be minimum 5m high by 5m wide**, manual metal overhead coiling style, drums to interior side and designed to resist wind loads and installed with wind locks. *Overhead Bridge Cranes are not required and shall be removed from the provided design.*

Contractor shall provide concrete handstand apron outside all garage doors at minimum **10 meters width**. Concrete handstand apron shall support a minimum loading of a 3-axle, 30,000 kg vehicle without failing. There shall be at least **18 meters clear distance** around the vehicle maintenance facility before any parking or between any other facilities.

Provide 1.5cm dia x 1.0m high concrete filled steel bollards to protect jams of roll-up doors. The service pit will be constructed into the floor with interior dimensions of 1.5m wide, 6.0m long and 1.5m deep. The pit will be centered on an imaginary line that runs from the center of the garage door opening to the rear-most corner, opposite of the doors. The pit will have a lip around its entire perimeter, such to prevent small items from falling in. Removable covers will be designed to cover the pit when not in use. Steel grating will be rated for HS 20 loading or covers designed for a minimum **point load of 5000 kg** without deforming. Removable covers will weight no more than 30-kg. a piece and have a handle designed into it to facilitate removal. The handle will lay flat when not in use.

Mechanical: Provide an overhead vehicle tailpipe exhaust removal system. Coordinate the location of the system such that it does not interfere with vehicle access and that the exhaust hose will connect to the vehicle exhaust tail pipe. Provide a low pressure (less than 862 KPa) compressed air system to include air compressor, piping, hose reel, and hose. Locate air compressor outside and to the rear of the building. Coordinate location of hose reel and hose such that it will not conflict with vehicle access and such that hose will easily access the maintenance bay. Provide emergency eye-wash stations every other two bays on both sides, alternate sides.

Electrical: Provide switched lighting that will illuminate the entire area. Lights will be capable of operating in the year-round temperature ranges expected to occur in this area. Electrical receptacles will be installed, equally spaced, with three receptacles on the all walls. Provide receptacles on the garage door walls for drop lights and other electrical power tools. Receptacles may be grouped together but will have dedicated circuits and will be configured to draw no more than 16 amperes. One dedicated circuit will be installed for the use of a 10.5 kg/sq cm (150 psi) electric air compressor. Provide charging outlets in Battery Room every 500 mm along back wall.

Revise the battery room(s) configuration to meet the standard battery room require provided in the Appendix A.

Provide Tool rooms, Toilets, janitor rooms, office spaces, battery storage room with emergency eye wash station, tire room, and equipment storage.

Only provide floor trench drains in the Toilet rooms. Do not provide any floor drains in the vehicle maintenance bays.

4.23 COMMUNICATION SYSTEM BUILDING

Design and construct the **375 SM** Communication system building in accordance with the drawings contained in Appendix A. Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal except PVC shall be used for interior doors at toilet rooms. Provide ductless split pack heat pumps for heating and cooling, and ceiling fans for air circulation.]

Design and construct a communication system building. The facility will serve as the installation's center for telecommunications, switching, and automation networking (including internet service) and shall have year-round climate control in all rooms for the sensitive electronic equipment. A communication building shall have an uninterruptible power supply (UPS) room with ventilation to outdoors. Power to the building shall meet the ultimate demand load plus 20% spare capacity, but shall not be less than a 250 amp service. A grounding grid tested to 5 ohms or less shall be distributed throughout the UPS and equipment rooms.

Provide a 3m x 5m roof covered concrete pad outside the UPS room with a backup generator with an adjacent 2m x 3m concrete pad with a spill dike for a 500 gallon or larger fuel tank. Backup generator shall be sized to meet the ultimate demand load of the communications building, plus 20% spare capacity. A 15 cm diameter or larger conduit shall connect the generator pad to the UPS room and shall use long sweep elbows totaling no more than 180 degrees for any bends. Backup generator for Communications building shall be provided. When sizing the generator, ensure it is de-rated for altitude and temperature in accordance with the manufacturer's recommendations for the site conditions.]

Design a Communications Building and installation wiring system. The facility will serve as the installation's center for telecommunications, switching, and automation networking (including internet service) and shall have year-round climate control for the sensitive electronic equipment. Split pack air conditioning, in addition to ceiling fans, shall be provided for the communications room. The A/C shall be sized to accommodate eight (8) personnel with eight (8) computers and twelve (12) radios. The communications room shall have raceways/duct banks going to each facility requiring communications. Communication duct will be run to future building locations on the site plan and duct will have a pull sting. All voice telephone wiring, data and emergency wiring, including any planned or future fiber optical runs, will originate and/or terminate in this communications room. All buildings shall have a communication closet (2 m² or larger) to house all telephone and computer network equipment and all distribution boxes shall be routed to the communications room. All admin buildings will include a minimum of 50-pair 24 AWG copper UTP cable each run from the building's communication room directly back to the barracks, DFAC, administration, Provide a UPS room only (14 m²) without equipment. Install four (4) 50mm conduit passing from the communications room to the roof of the building. The roof penetration shall have

a weatherproof box on top and shall be flashed or patched as necessary to prevent water leakage. The four (4) 50mm or larger communication conduits shall be typical with the following installation criteria: Manhole or hand-hole systems shall have no more than 150 meters between access points. Per NEC Code, there shall not be more than 3 bends per run of conduits. The radius bends shall be between 609mm to 914mm radius bends.

4.24 GSE COMMUNICATION AND ARMAMENT MAINTENANCE FACILITY

Design and construct approximately **4475 SM GSE Communications and Armament Maintenance Facility** in accordance with the schematic drawings contained in Appendix A. Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal except PVC shall be used for interior doors at toilet, shower, and ablution rooms. The facility shall be completely enclosed by a 1.83 meter high chain-link fence topped with barbed wire outriggers that extend .46 meter above the height of the fence with a lockable, gated opening a minimum of 3.66 meters in width. The fence shall be a minimum of 10 meters from the facility. Provide an access road from the gate to the nearest road. Provide and install air conditioning in all offices for the facility and heat and ventilation for the remainder of the facility. Provide emergency eye-wash stations every other bay. Only provide floor trench drains in the Toilet rooms. Do not provide any floor drains in the vehicle maintenance bays.

4.24.1 Design and construct the approximately **740 SM Communications Maintenance Facility** within the GSE Facility. The interior of the facility shall be divided into distinct areas including, but not limited to, Office and Conference Space, COMSEC repair and Storage, VHF Repair, HF Repair, Automation/Power Management Repair, Storage areas, and restroom facilities. All rooms entrance shall have single doors, unless otherwise noted. Provide wood work benches in all repair rooms. Outlets at work benches must have emergency shut off switches installed. Provide split pack air conditioning units for heating and cooling, and ceiling fans for air circulation.

Communications Maintenance Area

The Communication functions shall consist of the following areas;

1. VHF Office: 74 SM
2. HF Office: 74 SM
3. ComSec Repair and Storage: 142 SM
4. COMSEC Storage: 46 SM
5. Janitor Closet 2.5 SM
6. Toilets 22 SM
7. CMDR Office: 18 SM
8. Admin Office: 28 SM
9. Conference Room: 28 SM

4.24.2 Design and construct the approximately **1200 SM Armament Maintenance Facility** within the GSE Facility. The interior of the facility shall be divided into distinct areas including, but not limited to, Office space, Tank Turret Repair/Reactive Weapons Space, Artillery Repair Space, Weapons Storage, Weapons Cleaning and Bluing Spaces, Small Arms Repair, and restroom facilities. All offices shall have a single door. All Storage shop, maintenance, and mechanical spaces shall have double doors (except for Weapons Storage which shall have a single door). Provide and install two (2) exterior roll-up doors with a minimum size of 6.1 meters high and 4.57 meters wide in the Tank Turret Repair/Reactive Weapons Space. Provide and install one (1) exterior roll-up door with a minimum size of 6.1 meters high and 4.57 meters wide in the Artillery space. Construct Loading Dock with a minimum width of 10 meters and a depth of 3 meters adjacent to the Supply/ Receiving area. Provide concrete handstand in front of the roll-up doors at least 8 meters width and the entire distance of the Armament Maintenance facility.

Armament Maintenance Area

The Armament Maintenance functions shall consist of the following areas;

1. Weapons Storage: 100 SM
2. Weapons Cleaning: 100 SM
3. NCOIC Office: 18 SM
4. Janitor Closet: 2 SM
5. Toilet: 25 SM
6. Turret Artillery Room with Loading Doct: 400 SM minimum
7. Small Arms Repair Room with Receiving: 400 SM minimum

4.24.3 Design and construct the approximately **1665 SM Services Division Facility** within the GSE Facility. The interior of the facility shall be divided into distinct areas including, but not limited to, office and Conference Spaces, Welding/Machine Shop, Metal/Body Shop, Paint Shop, Direct Exchange, and restroom facilities. Provide and install four (4) exterior roll-up doors with a minimum size of 4.57 meters high and 3.66 meters wide in the Welding/Machine Shop (Welding/Machine Shop shall include the Metal/Body Shop with two (2) exterior roll-up doors. Provide two (2) exterior roll-up doors with minimum size of 4.5 meters by 3.66 meters wide in the Direct Exchange area. Provide four (4) exterior roll-up doors in the Paint Shop. Minimum size of roll-up doors shall be 3 meter high and 2.4 meters wide. Provide one (1) 6.1 meter by 18.3 meter paint booth in the Paint Shop workspace. Provide for Class 1 Div. 1 explosion-proof lighting and receptacles, proper vapor containment and adequate ventilation.

Services Division Area

The **Services** functions shall consist of the following areas;

1. Paint Shop:400 SM minimum
2. Storage: 120 SM
3. Direct Exchange: 150 SM
4. Office 28 SM
5. Machine Storage: 100 SM
6. Office 25 SM
7. OIC Office 14 SM
8. NCOIC Office 21 SM
9. Office 28 SM
10. Toilet 25 SM
11. Break room: 40 SM
12. Welding/Machine Shop 800 SM minimum

4.24.4 Design and construct the approximately **870 SM Precision Measurement Equipment Laboratory (PMEL/TMDE)** within the GSE Facility. The interior of the facility shall be divided into distinct areas including, but not limited to, offices, Calibration and Repair Space, Technical Library, Cleaning room, shipping/Receiving, and restroom facility. Provide one (1) exterior roll-up door with a minimum size of 2.5 meters high and 3 meters wide. And canopied or covered vehicle access into the Shipping/Receiving space. Provide air lock entrance to the Calibration room.

The **PMEL/TMDE** functions shall consist of the following areas;

1. Shield Room: 20 SM
2. Equipment Storage: 20 SM
3. Mechanical Room: As required
4. Utility Room: As Required
5. Calibration room: 320 SM
6. Shipping & Receiving Area: 150 SM
7. Air Locks: As required
8. TMDE Chief Office: 15 SM
9. Asst TMDE Office 9 SM
10. TMDE Supervisor / Driver : 18 SM
11. TMDE Supervisor/NCO: 15 SM
12. PC Chief: 10 SM

13. Technical Library: 20 SQ
14. Janitor Room: 8 SM
15. Toilet Room: 20 SM
16. Cleaning Room: 14 SM
17. Conference/ Break room 25 SM

4.25 POL STORAGE BUILDING.

Design and construct a **25SM** POL storage building in accordance with the drawings contained in Appendix A. Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Provide forced air electric space heaters for heating and ceiling fans for air circulation.

4.26 GENERAL WAREHOUSE STORAGE

Design and construct **800SM** general warehouse building(s) in accordance with the drawings contained in Appendix A. Windows shall be extruded aluminum. Exterior doors shall be insulated hollow metal. Interior doors shall be hollow metal. Provide forced air electric space heaters for heating and ceiling fans for air circulation.

4.27 ARMS STORAGE BUILDING

Design and construct the **350 SM** arms storage building in accordance with the drawings contained in Appendix A. Exterior doors shall be heavy duty steel security grade. Provide wooden racks for storing long-arm weapons vertically. Racks shall not be furnished with locking bars. The facility shall be of solid reinforced concrete (200mm thick concrete roof slab and solid CMU wall) with no windows, high security door, and explosion-proof lighting. The Contractor shall provide power outlets in walls no more than 4 m apart. Concrete stoops shall be provided at all exterior doors. Wall mounted electric forced air AC units shall be used to maintain a minimum temperature of 18 degree Celsius during winter and maximum 30 degree Celsius during summer. The floor is smooth concrete finished with gray colored floor paint, walls, and ceilings flat paint finish.

4.28 VEHICLE WASH RACK

Design and construct **1292 SM** Vehicle Wash Rack in accordance with the drawings contained in Appendices, and UFC 4-214-03, Central Vehicle Wash Facilities.

Design and construct new pull thru concrete wash facility capable of servicing **10 vehicles** at one time. Each wash bay shall have an independent water hose connection that is of a freeze proof design connected to the nearest potable water source. The water source piping shall be sized to adequately support 10 bays in simultaneous operation. The Contractor shall design for adequate water pressure and flow rate as measured at the nozzle (75 psi and 25 gpm, per UFC 4-214-03, paragraph 4-8 (c)) to properly support wash facility operation. A pressure booster pump may be required and this shall be included in the contractor's proposal along with the proper pump enclosure to protect the pump from the elements. The facility shall be sized and capable of accommodating and to support a minimum loading of a 3-axle, **30,000** kg vehicle without failing. Each wash facility will be separated by a CMU partition. Each wash bay shall be **minimum 7.6 meters wide** and 7.6 meters high to allow adequate personnel access during washing operations. The wash facility shall not be inclined but rather be built on an elevated pad above the surrounding grade to prevent flooding by surface water runoff.

Each bay will have a separate drain that connects to a common drain pipe that is sized adequately to carry the waste water without blockage. A gravity fed oil/water separator shall be installed in a way that would allow periodic draining and maintenance. Each floor drain shall have a cover or grate that will

prevent drain blockage caused by debris getting into the drain pipes. Drain pipes shall be extended away from the facility an adequate distance to prevent water saturation of the soil around the facility. Drain pipes will terminate into natural watercourses or ditches/drains formed during the construction of the wash facility. All drains shall have an adequate number of clean outs placed to facilitate maintenance.

Contractor shall design and construct recirculation system for wastewater re-usage. Refer to the UFC 4-214-03 Central Vehicle Wash facilities for recirculation system to include but not limited to: Wash Facility, Sediment Basin, Equalization Basin, Dosing Tank, Intermittent Sand Filter, Water Quality Testing Value, Water Supply Basin attached to Makeup Water supply. Provide smooth concrete floor for the entire facility with broom finish.

All concrete shall be reinforced with rebar and shall be 5-7% air entrainment. Concrete surface finishes shall provide traction for pedestrians and vehicles. A concrete apron a minimum of **10 meters in width** extending the full length of the building shall be constructed on the entrance and exit of the wash facility. The wash facility apron on the entrance and exit shall be pitched to drain water away from the entrance and exit of the facility.

All exposed piping shall be pitched to drain any standing water to prevent freezing, be capable to self draining or be of the freeze proof yard hydrant design. The potable supply line to the wash rack shall have a shut off valve that is clearly marked and protected from damage, flooding by surface runoff water and freezing.

Site grading will be necessary to connect the proposed wash facility location to the nearest existing street or roadway. Design and construct 10 meter wide aggregate by-pass road to the nearest street or roadway.

Provide bay length trenches and secondary trenches across door openings. Provide adequate wash bay ventilation to avoid condensation damage to building materials. Adjacent to the facility provide a Vacuum/Trash Island with three (3) permanent, outdoor, wet/dry vacuums, two (2) trash receptacles, and concrete stanchions to prevent vehicular damage to the equipment on the island. The exterior of the building shall include an adjacent parking area designed to accommodate two (2) trucks with low-boy trailers, two (2) large wheeled vehicles, and six (6) standard wheeled vehicles. There shall be adequate spacing around the Vacuum/Trash Island to simultaneously provide parking for one (1) large wheeled vehicle, and three (3) standard wheeled vehicles. An access road shall connect from the nearest road to the exterior roll-up doors at each Washing Station and the Vacuum/Trash Island.

Provide ditches and culverts along the wash facility location and entrance road as required to provide proper drainage of wash water.

4.29 MWR GYM (OPTION ITEM)

Design and Construct a total **300 SM** multi-use athletic facility/ Gymnasium and meet the following requirements:

Provide 4 entries (including a double access door all with emergency push bars and kick plates (one entry in each corner of the facility).

Provide smooth concrete floor finish for the entire gym facility. Provide Rubber matting for Free Weight Area. Provide multiple purpose storage room. The interior of the building shall column free. Provide split unit heat pumps for heating, and cooling, and exhaust fans for air ventilation.

(2) Outside Volleyball Courts: Provide sand volleyball courts. Provide and install permanent pole sleeves, with removable tennis, and volleyball court poles and nets.

4.31 GENERAL NON-ORGANIC VEHICLE MAINTENANCE FACILITY- two (9 bays)

Design and construct two (2) **1395 SM** vehicle maintenance facility in accordance with the drawings contained in Appendices. The Contractor shall design and construct the Vehicle Maintenance Facility building incorporating **9** vehicle maintenance bays. Refer to 4.22 for other requirements and drawings.

4.32 GENERAL NON-ORGANIC VEHICLE MAINTENANCE FACILITY (9 Bays)

Design and construct a **1395 SM** vehicle maintenance facility in accordance with the drawings contained in Appendices. The Contractor shall design and construct the Vehicle Maintenance Facility building incorporating **9** vehicle maintenance bays. Refer to 4.22 for other requirements and drawings.

4.33 IRRIGATION SYSTEM (Option Item)

Design and construct the necessary pump house, piping, and storage tank to utilize the exhausted waste water from the existing waste water treatment plant as a non-potable water system for irrigation. Provide a distribution point next to each existing and new Battalion Complex at Camp Gamberi. Provide color code exterior faucet and label in Pashto and Dari "NON-POTABLE WATER, FOR IRRIGATION ONLY".

4.34 TEMPORARY FACILITIES

Temporary construction: At the start of all work, the contractor shall provide temporary facilities (housing, latrine, showers, DFAC Kitchen) with temporary utilities for 665 soldiers until the barracks, Toilet/Shower/Ablution/Laundry, and DFAC are complete and ready to turn over to the customer. Temporary facilities must provide protection from the weather and be enclosed. No temporary sit down dining area are required. Once the permanent facilities are turned over, the contractor shall remove the temporary facilities and temporary utilities from the site.

4.35 BUNKERS

The contractor shall construct eight (8) 5ft x 5ft x 20 ft (1.52 m x 1.52 m x 6.09 m) x 6 inches (15 cm) thick in accordance to the Culvert Bunker drawings in the Appendix A. The actual size of the culvert will be dictated by local availability. The bunker shall be constructed from steel-reinforced culvert sections with overlapping sandbags and covered with heavy duty plastic covers.

5.0 COMPLETION OF WORK

All work required under this contract shall be completed within **[300]** calendar days including government review time from Notice to Proceed.

All work under this contract shall be completed and buildings ready for beneficial occupancy in accordance with the following schedule:

- Design Cost, Site Survey, and Master Plan
- As-Built Drawings
- Mobilization, Demobilization, and General Site Work

4.34 Temporary Facilities (PRIORITY #1) (Must be completed by August 01, 2009)

Work Items to be completed no later than **180** calendar days after award: **(Priority)**

- 4.4- 4.6 Potable Water Supply System
- 4.7 Sanitary Sewer and Treatment System
- 4.8 Site Electrical Distribution System
- 4.12 Primary Entry Control Point
- 4.12 Secondary Entry Control Point
- 4.12 Guard Towers
- 4.13 Perimeter Walls and Fencing
- 4.14 Road Network and Sidewalk
- 4.15 Trash Collection Points
- 4.16 Officer Barracks
- 4.16 Enlisted Barracks
- 4.17 Dining Facility (DFAC) and Dry Storage Yard
- 4.18 Battalion Headquarters Building/ Admin
- 4.19 Toilet/Shower/Ablution/Laundry Facility

Work Items to be completed no later than 240 calendar days after exercise/award of items:

- 4.20 Vehicle Refueling Point
- 4.21 Motor Pool Gravel Parking
- 4.22 CSB Organic Wheeled Vehicle Maintenance Facility (9 bay)
- 4.25 POL Storage Building
- 4.26 General Warehouse Storage
- 4.29 Vehicle Wash Rack

Work Items to be completed no later than 300 calendar days after exercise/award of items:

- 4.23 Communications Building
- 4.31 Non-Organic Wheeled Vehicle Maintenance Facility (two- 9 bay)
- 4.32 Non-Organic Wheeled Vehicle Maintenance Facility (9 bay)
- 4.24 GSE Communication and Armament Maintenance Facility

- 4.27 Arms Storage Building
- 4.30 MWR GYM with outside volleyball courts
- 4.33 Irrigation System for entire Camp Gamberi Installation
- 4.35 Bunkers

6.0 SPARE PARTS

Refer to other sections herein for requirements.

7.0 REFERENCES

Refer to Section 01015 for required references.

-- End of Section --

SECTION 01015**SECTION 01015****TECHNICAL REQUIREMENTS – DESIGN/BUILD****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

These design and product requirements are minimum requirements. The Contractor is encouraged to propose alternate design or products (equipment and material) that are more commonly used in the region; will be equally or more cost effective or allow for more timely completion, but furnish the same system safety, durability, ease of maintenance and environmental compatibility. The Contractor will be required to submit information as requested by the Contracting Officer to make a comparison of the proposed alternate. All variations 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)****1.4.1.1 UXO/Mine Discovery during Project Construction**

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

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

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

Hansie Heymans, Chief Information Officer,
Email: hansie@unmaca.org
Cell: +93 070 294286

1.4.1.1 Explosives Safety

1.4.1.1.1 General Safety Considerations

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

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

1.4.1.1.2 Activity Hazard Analysis (AHA) briefings

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

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

1.4.1.2 Notification of Noncompliance

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

1.5 LIMITATION OF WORKING SPACE

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

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

1.6 TEMPORARY STRUCTURES

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

1.7 SUBCONTRACTORS

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

1.8 LIST OF CODES AND TECHNICAL CRITERIA:

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

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

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

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

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

ARI - Air Conditioning and Refrigeration Institute

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

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

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

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

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

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

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

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

ASME - American Society for Mechanical Engineering

ASTM - American Society for Testing and Materials

AWS - American Welding Society

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

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

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

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

IBC - International Building Codes, 2006 or latest edition (and its referenced codes including those inset below)

IEEE C2, National Electrical Safety Code (NESC), latest edition

IFGC – International Fuel Gas Code
IMC – International Mechanical Code
IPC – International Plumbing Code
Lighting Handbook, IESNA, latest edition
MIL-HDBK-1190, Facility Planning and Design Guide
Codes and Standards of the National Fire Protection Association (NFPA)
[as applicable and enacted in 2002 or later, unless otherwise noted]
National Electrical Safety Code (NESC), Institute of Electrical and Electronic Engineers (IEEE C2), 2002 edition
NFPA 10, Portable Fire Extinguishers, 2002 edition
NFPA 30, Flammable and Combustible Liquids Code, 2003 edition
NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages, 2003 edition
NFPA 54, National Fuel Gas Code, 2002
NFPA 58, Liquefied Petroleum Gas Code, 2004
NFPA 70, National Electrical Code, 2005 edition
NFPA 72, National Fire Alarm Code, 2002 edition
NFPA 75, Standard for the Protection of Information Technology Equipment
NFPA 90A, Air Conditioning and Ventilating Systems, 2002 edition
NFPA 101, Life Safety Code, 2006 edition
NFPA 110, Standard for Emergency and Standby Power Systems, 2005 edition
Plumbing and Drainage Institute (PDI-WH-201) water hammer arrestors
SMACNA - Sheet Metal and Air Conditioning Contractors' National Association, Standards and Guides, latest editions
International Mine Action Standards, latest edition; (see <http://www.mineactionstandards.org> for copy of standards)
TM 5-785 Weather Data
TM 5-802-1 Economic Studies
TM 5-805-4 Noise and Vibration
TM 5-811-1 Electrical Power Supply and Distribution
UFC 1-200-01, Design: General Building Requirements, 20 June 2005
UFC 1-300-07A Design Build Technical Requirements
UFC 3-230-03a, Water Supply, 16 Jan 2004
UFC 3-230-04a, Water Distribution, 16 Jan 2004
UFC 3-230-06a, Subsurface Drainage, 16 Jan 2004
UFC 3-230-07a, Water Supply: Sources and General Considerations, 16 Jan 2004
UFC 3-230-08a, Water Supply: Water Treatment, 16 Jan 2004
UFC 3-230-09a, Water Supply: Water Storage, 16 Jan 2004
UFC 3-230-10a, Water Supply: Water Distribution, 16 Jan 2004
UFC 3-230-13a, Water Supply: Pumping Stations, 16 Jan 2004
UFC 3-230-17FA, Drainage in Areas Other than Airfields, 16 Jan 2004
UFC 3-240-03N, Operation and Maintenance: Wastewater Treatment System Augmenting Handbook, 16 Jan 2004
UFC 3-240-04a, Wastewater Collection, 16 Jan 2004
UFC 3-240-07FA, Sanitary & Industrial Wastewater Collection: Gravity Sewers, 16 Jan 04
UFC 3-240-09FA, Small Treatment Systems
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 3-310-01, Structural Load Data, 25 May 2005
UFC 3-400-01, Design: Energy Conservation, 5 July 2002
UFC 3-410-01FA Heating, Ventilating and Air Conditioning, Change 1, 15 May 2003
UFC 3-410-02A, HVAC Control Systems. 15 May 2003
UFC 3-410-04N, Industrial Ventilation, 25 October 2004
UFC 3-420-01, Plumbing Systems Design, 19 June 2003
UFC 3-430-01FA, Heating and Cooling Distribution Systems, 27 July 2003
UFC 3-460-01, Petroleum Fuel Facilities, 16 January 2004

UFC 3-501-03N, Electrical Engineering Preliminary Considerations, 16 Jan 2004
UFC 3-520-01, Interior Electrical Systems, 10 June 2002
UFC 3-530-01AN, Design: Interior and Exterior Lighting and Controls, 19 Aug 2005
UFC 3-535-01, Visual Air Navigation Facilities, 17 November 2005
UFC 3-540-04N Design: Diesel Electric Generating Plants, 16 Jan 2004
UFC 3-550-03FA Design: Electrical Power Supply and Distribution Systems, 1 Mar 2005
UFC 3-600-01, Design: Fire Protection Engineering for Facilities, 26 Sept 2006
UFC 4-010-01, Design: Minimum DoD Antiterrorism Standards for Buildings, 22 Jan 2007
UFC 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings, 19 Jan 2007
UFC 4-020-01FA, Security Engineering: Project Development, 1 Mar 2005
UFC 4-020-02FA, Security Engineering: Concept Design, 1 Mar 2005
UFC 4-020-03FA, Security Engineering: Final Design, 1 Mar 2005
UFC 4-020-04FA, Electronic Security Systems: Security Engineering, 1 Mar 2005
UFC 4-021-01, Design and O&M: Mass Notification Systems, draft 1 May 2006
UFC 4-022-01, Security Engineering: Entry Control Facilities/Access Control Points, 25 May 2005
UFC 4-214-03, Central Vehicle Wash Facilities, 16 January 2004
UFC 4-722-01, Design: Dining Facilities, 27 January 2003
Underwriters' Laboratories (UL) Fire Protection Equipment Directory (2002)
UL Standards (as applicable)
UL 710, Exhaust Hood for Commercial Cooking Equipment, latest edition
UL 737, Fireplace Stoves, latest edition
UL 752, Bullet Resisting Equipment, 2000 or later
USCINCCENT OPORD 97-1

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

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

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

2.0 SITE DEVELOPMENT

2.1 GENERAL

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

2.2 ENVIRONMENTAL PROTECTION

2.2.1 Applicable regulations

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

2.2.2 Notification

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

2.2.3 Spillages

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

2.2.4 Disposal

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

2.3 CIVIL SITE DEVELOPMENT

2.3.1 Site Plan

The contractor shall prepare plat or plan of property as part of the design package consisting of a Boundary Survey of Camp Gamberi located in Nangarhar Province in the city of Jalalabad, Afghanistan. Site address is as follows, at the north end of Camp Gamberi. 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 the centerline of all adjacent roads. The contractor shall place property corner markers and a monument on the property showing site elevations, coordinate grid systems and WGS 84 latitude longitude. This survey shall meet the requirements of World Geodetic System 1984 (WGS 84 UTM Zone 42 S) in decimal degrees. The survey design shall include a topographic map showing locations of all building corners, structures, major trees, road names, dimensions, and easements, right of way, setbacks, parking and paved areas, storage containers, stoops, sidewalks and walkways, underground and above-ground utilities, and Bunker locations. The contractor shall identify and show perimeter security walls, fences, hesco barriers, guard towers, and entry control point structures. The Contractor shall locate all facilities in general agreement with drawings included and any requirements in the Scope of Work, Section 01010. All site features shall be clearly defined and dimensioned on the site plan. Buildings shall be provided access for emergency, service, and fire fighting vehicles. Roads and parking areas shall be designed for the 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 largest vehicle's worst case turning radius. Design and construction of roads and pavements shall be based upon recommendations from the geotechnical investigation required herein.

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

WGS 1984 UTM Zone 42 S

2.3.2 Demolition

Demolition shall include removal of all structures, foundations, pavements, and utilities, and clearing and grubbing. All refuse and debris shall be disposed of off site at a site approved by the Contracting Officer. Scrap metal shall be the property of the Host Government. The scrap metal on site shall be moved to an area away from the site perimeter as directed by the Contracting Officer's Representative and left for the Host Government to salvage.

Demolished fencing and concertina wire shall be neatly rolled up for reuse by the host government. Likewise, used fence posts and outriggers shall be neatly stockpiled for reuse by the host government.

Holes and depressions shall be backfilled. Fill materials shall be composed of satisfactory soils or aggregates defined in ASTM D 2487 as GW, GP, GM, SP, SM, SW, CL-ML. Minimum soil compaction shall be 95 percent of maximum density as defined in ASTM D 1557.

2.3.3 Site Grading & Drainage

The contractor will provide all necessary 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 ground floor finished elevation shall be a minimum 150mm above adjacent grade and outside grade shall slope away from the building on all sides at a minimum slope of 5% for a distance of 3 meters. Holes and depressions shall be backfilled. Fill materials shall be composed of satisfactory soils or aggregates defined in ASTM D 2487 as GW, GP, GM, SP, SM, SW, CL-ML. Minimum soil compaction shall be 95 percent of maximum density as defined in ASTM D 1557.

2.3.4 Paving

Roads

Paved roads are required within the base area. All pre-existing conditions are undeveloped land with gentle slopes, without substantial vegetation and with natural drainage channels of moderate size and spacing that are dry most of the time. All roads shall be of wearing surface 7.3 meters (24 feet) wide, unless otherwise noted, graded for proper drainage, provided with necessary drainage structures, and completed with prescribed surfaces in accordance with applicable sections of TM 5-822-2 and TM 5-822-5. Installation roads subgrade shall be scarified and compacted to 95% proctor density. Base course shall be minimum 250 mm (10 inch) compacted to 100% of laboratory maximum dry density, and surfaced with a minimum 75 mm (3 inch) hot mix asphalt concrete, unless otherwise noted. The Contractor shall notify the Contracting Officer immediately if initial site survey determines that area hydrology requires major drainage structures or bridges. The Contractor shall notify the Contracting Officer immediately if required lengths of road or preexisting conditions are determined to be substantially or materially different than the above-described conditions or estimates.

2.3.4.1 Bridges and Site Grading Plan

Preliminary investigation indicates there may be a need for major drainage structures due to existing wadi(s) at the site. The contractor shall design a site grading plan that provides positive drainage and minimizes the requirement for major structures in a cost effective manner.

2.3.4.2 Parking Areas and Motor Pools

Contractor shall construct aggregate surfaced parking and storage areas. Subgrade shall be scarified and compacted to 95% proctor density. Aggregate base course shall be 150mm (6 inches) for parking areas, and 250mm (10 inches) for motor pools. Aggregate Base Course (ABC) material must be well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction. Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 or equivalent DIN, BS, or EN standards.

2.4 FORCE PROTECTION DESIGN

The Contractor shall design and construct force protection measures to include a complete perimeter wall, Guard Towers, Compound Illumination System, Security Communication Systems and Entry Control Points (ECP). ECP shall be composed of a Primary ECP, a Stand-Off ECP, and a Secondary ECP. The Force Protection design shall incorporate minimum setbacks for new facilities to maximum extent possible as permitted by size of the site and the requirements of the user. Force protection design shall be in accordance with Joint Security Directorate Antiterrorism/Force Protection Guide, March 2002. Force

Protection design shall also meet the requirements of UFC 4-010-01, Design: Minimum DoD Antiterrorism Standards for Buildings, 8 Oct 2003 and UFC 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings, 8 Oct 2003 and Joint Security Directorate Antiterrorism/Force Protection Guide, March 2002.

See Appendix A for Gate House, Guard Shack, and Guard Tower building designs and standard details for Perimeter Security wall, and Active and Passive Vehicle Barriers.

2.4.1 Perimeter Security Wall

Provide Native stone veneer walls with reinforced concrete core walls, 600mm thick, shall be constructed around the perimeter of the site. The height of the walls shall measure at least 3.0 meters from the inside grade and inside grade shall in all cases be higher than outside grade. The wall shall be capped with a precast concrete capping. Steel outriggers to support barbed wires and a single-coil concertina style razor wire shall be provided and installed by the contractor. Site grading must slope away from the walls for at least a distance of 5 meters. The wall shall be designed to prevent visual access to the inside of compound by all pedestrian and vehicular traffic outside the compound which may require the wall to be built at a higher level in some locations.

2.4.1.1 Perimeter Wall Access Gates

2.4.1.1.1 Swinging Gates

Gates shall be swing type and be constructed of steel and be a pair of 3.65 m wide x 2.4 m high steel leaves, constructed of 6mm steel plate skins, steel tube frame, and steel tube intermediate posts and rails. Gate design shall insure it is dimensionally stable, square, true and planar. Gate leaves shall not rack, shake or deflect during operation and the hinges are to be designed and constructed to support the entire weight of each leaf. Gates shall have a sufficient number of hinges, anchor mounted to the exterior masonry walls, to support each gate leaf. Provide a locking mechanism that holds the gates together when in the closed position as well as a drop bolt that engages a steel sleeve embedded in the pavement.

2.4.1.2 Outriggers

Outrigger supporting arms shall be "Y" shaped with post securely embedded into the top of the wall. Posts shall conform to ASTM F 1083, Pipe, Steel, Hot Dipped Zinc Coated (Galvanized) Welded.

2.4.1.3 Reinforced Barbed Tape

Reinforced barbed tape shall be 600 mm diameter concertina style coil consisting of 31 loops. Each loop shall consist of 19 barb clusters per loop. Adjacent coils loops shall be alternately clipped together at three points about the circumference to produce the concertina effect upon deployment. Spacing between attachments points when deployed shall be 400 mm. The reinforced barbed tape shall be fabricated from 430 series stainless steel with hardness range of Rockwell (30N) 37-45 conforming to the requirements of ASTM A 176. Each barb shall be a minimum of 30.5 mm (1.2 inch) in length, in groups of 4, spaced on 102 mm (4 inch) centers. The stainless steel core wire shall have a 2.5 mm (0.098 inch) diameter with a minimum tensile strength of 895 MPa. Sixteen gauge stainless steel twistable wire ties shall be used for attaching the barbed tape to the barbed wire. The reinforced barbed tape shall be equivalent to NSN: 5660-01-457-9852.

2.4.1.4 Chain-Link Fence and Gates

Provide chain-link fence and gates around Well House, all vehicle maintenance facilities including GOV parking and all facilities with fencing requirements per 1010 and 1015. 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 and gates shall be provided with outriggers and reinforced barbed tape as indicated above. Post sizes shall be as shown on drawings.

The gates shall be swing type. Hinged gates shall be a pair of 3.65 m wide x 2.4 m high leafs, constructed of a steel tube frame and steel tube intermediate posts and rails. The design of the gates shall insure that it is dimensionally stable, square, true and planar. Gate leafs shall not rack or deflect when turning on its hinges. Gates shall have a sufficient number of hinges, anchor mounted to the exterior masonry walls, to support each gate leaf. Provide a locking mechanism that holds the gates together when in the closed position as well as a drop bolt that engages a steel sleeve embedded in the pavement.

2.4.1.5 Sniper Screen

Sniper screen material will be ultraviolet light resistant and guaranteed against sunlight degradation for five years. Material will allow wind to blow through, without stretching the material, or distorting the frame. Sniper screen material will be fastened to standard galvanized fencing (see above) mounted to a rigid frame. The frame shall be securely embedded into the top of the wall. Frame components shall conform to ASTM F 1083, Steel Pipe, Hot Dipped Zinc Coated (Galvanized Welded).

2.4.2 Entry Control Point (ECP), Primary & Secondary

Primary and Secondary ECP shall be laid out and constructed by the Contractor to facilitate secure entrance of authorized vehicles into the compound. A Gate House shall be provided inside the compound as part of the Primary ECP. Entrance to the Primary ECP shall be paved, and shall have a single-leaf manually operated sliding steel gate or a two-leaf steel swinging gate. The gate shall be considered the Active Vehicular Barrier (AVB). A drop arm and guard shack shall be provided and located at a distance of one and a half vehicles away from the entrance to serve as a checkpoint. Jersey Barriers or other approved alternatives shall be used to design and construct a Passive Vehicular Barrier (PVB) beyond and away from the checkpoint to significantly slow down approaching vehicles. The PVB shall be laid out to force approaching vehicles into a snake-like manoeuvre while approaching the checkpoint and to significantly slow them down. See Appendix A for Gate House (Reception Building) and Guard Shack drawings.

Provide a rejection lane after vehicle inspection and before entrance to the compound.

2.4.2.1 Vehicle Barriers

2.4.2.1.1 Active Barriers - Drop Arm Gates

The height of the beam shall be a minimum of 30 inches above finished grade. The crash beam must be capable of blocking a minimum road width of 4.0 meters. The crash beam shall be manually raised and lowered with less than 30 pounds of force. The end of the crash beam should include a locking pin with padlock acceptance for securing the beam when it is in the down position capable of stopping large (10,000 lb.) trucks, in addition to heavy duty steel gates into the compound.

2.4.2.1.2 Active Barriers – Tire Shredder

Additional active barriers shall be tire shredder type with manual latch down capability. Shredders shall extend the entire width of the roadway opening where installed. At minimum provide one shredder at rejection lane entrance to prevent unauthorized gate access.

2.4.2.1.3 Active Barriers – Cable Lift Barrier

A Cable Lift Gate will be provided in addition to the sliding gate. Cable lift gate will normally be in the

raised (deployed) position. Cable lift gate shall be certified to stop a 6,800 KG truck travelling 80 KPH. Shall be able to be balanced by counterweights so it can be manually raise or lowered by one man in seconds. Deployed height will be at least 1 M. Cables shall be a minimum of 25mm diameter braided steel.

2.4.2.1.4 Passive Barriers - Concrete

Barriers shall be concrete blocks of one meter by one meter by one meter dimensions. Similar arrangements of large stones (one cubic meter size), jersey barriers or equal sized obstacles may be used.

2.4.2.1.5 Passive Barriers – Hesco Barriers

Hesco barriers shall be made of geo-textile fabric shall be 2mm (0.08") non-woven polypropylene and bound with 8 gauge galvanized steel wire mesh size 7.62 cm (3") grid. The coil hinges and joining pins shall be 8 gauge hardened steel. Fill material shall be a mixture of sand and gravel. The gravel shall not be more than 1.8 cm ($\frac{3}{4}$ ") in size. The materials shall be compacted in lifts no greater than 25 cm (10").

Bastions shall be provided with suitable foundations as recommended by the manufacturer depending on the height, and filled with a sand & gravel mixture. Provide a gravel base at least 50 cm (20") deep, and extending around the bottom edge of the barrier by at least 50 cm (20"), for proper support and drainage. The gravel base material shall have no stones large than 2.5 cm (1"), due to the risk of becoming projectiles in a blast.

Protection from UV light shall be provided with an application of a protective coating such as UV CAM, cement slurry not greater than 0.3 cm (1/8") thick. The cement slurry is a mixture of cement powder and water, mixed to a proportion of 1:1, but this may be adjusted to suit the application method. Sand may also be added as necessary.

Submittal Requirements:

- a. The manufacturer of this product must have been in this business for at least 5 years.
- b. Installers must be certified by the manufacturer.
- c. Welded mesh and wire must be ASTM A641 Class 3
- d. Geo-textile shall be ASTM D4632, D6241, D4355, D4751 & D4491.
- e. Structural calculations must be prepared by a licensed engineer and must be submitted and approved by the Government prior to installation

2.4.3 Entry Control Point (ECP) stand off- NOT USED

2.4.4 Loudspeakers and Alarm System

Install Loud Speaker & Alarm System that can alert the entire compound via panic button from any tower or guard post station. Speaker & Alarm System shall be exterior grade components to withstand severe weather conditions of cold, heat, rain, sleet, and dust storms, and speech transmitted shall be completely understandable during these conditions from any point within the compound. All wires shall be installed in conduits.

2.5 CIVIL UTILITIES

2.5.1 General

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

2.5.2 Water

2.5.2.1 General

Infrastructure design and construction shall serve the demand. The Contractor shall install water distribution mains, branches, laterals, lines and service connections to include all pipe, valves, fittings and appurtenances. Exterior water line construction shall include service to all buildings as described in the Scope of Work Section 01010. The required Average Daily Demand (ADD) approximation is derived from [189] liters per capita per day (lpcd) or [50] gallons per capita per day (gpcd). In the event potable or non-potable use water is required prior to completion of the water facilities infrastructure the Contractor may be issued a Request for Proposal to provide non-potable (tank truck) and potable (bottled or other reliable source) consumption. Provide a minimum of one (1) outside water hydrant (hose spigot) for any building or facility for which a water supply is provided for landscaping purposes. This demand shall be multiplied by a capacity factor of 1.5 to account for future growth and peak demand, per UFC 3-230-07a, paragraph 1-3, and UFC 3-230-03a, paragraph 3-1.

2.5.2.2 Water Quality Sampling and Analysis

The Contractor shall perform water quality sampling and testing at the source. The Contractor shall utilize well-qualified and equipped testing capability in the project site area, if available. If professional testing services are not available in the area, the Contractor will submit an alternative practical testing source for approval. Raw water quality criteria for Water Quality and Criteria Standards, and shall address the following:

WATER QUALITY ANALYSIS TABLE
Physical Characteristics

Physical Characteristics	
Color	Temperature
Threshold odor number	pH value
Turbidity	
Chemical Characteristics (Expressed as mg/L)	
Arsenic	Total Hardness as CaCO ₃ (3)
Barium	Cadmium
Chromium	Copper
Lead	Mercury
Selenium	Silver
Zinc	Sulphates as SO ₄ (4)
Fluoride as F	Chlorides as Cl
Manganese as Mn (dissolved and total)	Conductivity
Iron as Fe (dissolved and total)	Nitrites as NO ₂ (2)

Total Dissolved Solids
total coliform/fecal coliform (bacteria)

Nitrates as NO(3)

2.5.2.3 Well House

Construct a permanent insulated water well house with concrete slab floor at a new well site. Contractor shall also furnish a chlorination and filtration shelter per chlorine and filtration manufacturer's requirements. The Contractor shall provide manufacturer's catalog information and shop drawings to the Contracting Officer for approval. The floor of the well house shall slope away from the casing at approximately 3 mm per 300 mm and drain to the outside through pipes at each corner. Pipes shall be fitted with screens. Elevation of floor of the well house shall be minimum 150mm above grade. The well casing will extend a minimum 50cm above the floor of the well house. The well house design should be such that the well pump, motor and drop pipe could be removed readily. Provide an insulated roof hatch directly above the well casing with 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 and a heating unit installed. The entry door shall be made of heavy duty metal and metal frame with no louvers. 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. See Appendix A for Well House concept drawings. Provide a chlorination system.

- 2.5.2.3.1 Design shall observe safety setback distances between pollution sources and water wells given in UFC 3-230-07a, Table 5-2. Petroleum products in underground and/or above ground tanks should be located at least 100 feet away from wells.

2.5.2.4 Raw Water Disinfection

Contractor shall perform disinfection of the well water in accordance with AWWA A 100 or equivalent. 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.

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

Contractor shall provide a booster pump station with end suction or split case double suction horizontal split case (frame mounted) centrifugal pumps arranged in parallel for pumping water storage into the main distribution system. The pumps and controls shall be designed to supply and maintain acceptable system pressure throughout the distribution network given the full range of flow conditions (low flow to peak). For conditions of low demand and to prevent short cycling of primary pumps, provide a low demand jockey pump with capacity of one-third (1/3) of the Average Daily Demand (ADD). Each booster pump, two (2), shall be capable of delivering 2 times (2x) the ADD. Provide suitable expansion tank. 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.

2.5.2.6 Water Storage Tank

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

2.5.2.7 Disinfection & Chlorination System

Use hypochlorite compounds for disinfection. A hypo-chlorinator shall be used to feed a sodium hypochlorite solution of 5-15% available chlorine into the system. Hypochlorite compound may be either in liquid or solid form. The hypo-chlorination system shall consist of a chemical solution tank for hypochlorite, diaphragm-type pump, power supply, water pump, pressure switch and storage tank (optional hydro-pneumatic/storage). 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) adequate to deliver 5% available hypochlorite solution adjustable to the quantity of water being produced from the source. 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 0.2-0.4mg/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

2.5.2.8 Chlorine Shelter

Contractor shall furnish a shelter as per chlorine manufacturer's installation requirements. The Contractor shall provide manufacturers catalog information and shop drawing to the Contracting Officer for approval.

2.5.2.9 Pump House

Contractor shall provide a booster pump station with two end suction or split case double suction horizontal split case (frame mounted) centrifugal pumps arranged in parallel for pumping water storage into the main distribution system. The pumps and controls shall be designed to supply and maintain acceptable system pressure throughout the distribution network given the full range of flow conditions (low flow to peak). For conditions of low demand and to prevent short cycling of primary pumps, provide a hydro-pneumatic tank. Each booster pump shall be capable of delivering twice the ADD to the system. 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.

2.5.3 Water Distribution System

2.5.3.1 General

To calculate Average Daily Demand (ADD) use an estimated per capita usage rate of 190 L or 50 gallons per day, multiplied by a capacity factor of 1.5 to account for future growth and peak demand.

The Contractor shall provide a water distribution system described as follows: Pipe diameters used in the network shall be 300mm (12 inch), 250mm (10 inch), 200mm (8 inch), 150mm (6 inch) and 100mm (4 inch), as calculated, using ductile iron (DI) conforming to AWWA C151, installed in accordance with C 600 or polyvinyl chloride (PVC) as per ASTM D 1784 and 1785. All pipes and joints shall be capable of at least 1.03 MPa (150 psi) and 1.38 MPa (200psi) hydrostatic test pressure unless otherwise specified. Pipes should be adequate to carry the maximum quantity of water at acceptable velocities 0.9 to

1.5m/sec (3 to 5 ft/sec) at maximum flows not to exceed 2.8m/sec (9.2ft/sec). Refer to UFC 2-230-10a, Chapter 8, when designing for maximum flow.

Minimum pressure shall be 276kPa (40psi) to all building connections. Minimum pressures of 207 kPa (30 psi), under peak domestic flow conditions, can be tolerated in isolated areas as long as all peak flow requirements all each building connection can be satisfied. **Maximum pressure shall be 517kPa (75psi).** If high pressures (greater than 690kPa) cannot be avoided, pressure-reducing valves shall be used. Water service connections to buildings shall vary from 19mm, 25mm or 38mm to 75mm, as calculated, depending on the usage requirement. Pipe service connections from the distribution main to the building shall be either Polyvinyl Chloride (PVC) plastic Schedule 80 ASTM D 1785 or copper tubing conforming to ASTM B 88M, Type K, annealed. After choosing piping material type, use similar piping materials for all buildings for efficiency of future maintenance activities. The distribution network shall be laid out in a combination grid and looped pattern with dead ends not exceeding 30m (99 feet). Dead end sections shall not be less than 150mm (6 inch) diameter, and shall either have blow off valves or flush valves installed for periodic flushing of the line. Any pipe with a blow off or flush valve the line shall be at least 150mm (6 inch) in diameter. Water supply distribution shall connect to a building service at a point approximately 1.5m (5 feet) outside the building or structure to which the service is required. Adequate cover must be provided for frost protection. A minimum cover of 800mm (2'-8") is required to protect the water distribution system against freezing. Water lines less than 1.25 meters (4 feet) deep under road crossings shall have a reinforced concrete cover of at least 150 mm (6 inch) thickness around the pipe extending out to 1m from each road edge.

2.5.3.2 Pipe

The Contractor shall provide pipe of adequate strength, durability and be corrosion resistant with no adverse effect on water quality. The exterior surface of the pipe must be corrosion resistant. If the pipe is installed underground pipe shall be encased with polyethylene in accordance with AWWA C105. Water distribution pipe material shall be PVC or Ductile Iron (DI). Ductile iron pipe shall conform to AWWA C104, etal. DI fittings shall be suitable for 1.03MPa (150psi) pressure unless otherwise specified. Fittings for mechanical joint pipe shall conform to AWWA C110. Fittings for use with push-on joint pipe shall conform to AWWA C110 and C111. Fittings and specials shall be cement mortar lined (standard thickness) in accordance with C104. Polyvinyl Chloride (PVC) pipe shall conform to ASTM D 1785. Plastic pipe coupling and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. PVC screw joint shall be in accordance with ASTM D 1785, etal, Schedules 40, 80 and 120. PVC pipe couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. Pipe less than 80mm (3 inch), screw joint, shall conform to dimensional requirements of ASTM D schedule 80. Elastomeric gasket-joint, shall conform to dimensional requirements of ASTM D 1785 Schedule 40, All pipe and joints shall be capable of 1.03 MPa (150psi) working pressure and 1.38 MPa (200psi) hydrostatic test pressure.

2.5.3.3 Hydrostatic, Leakage and Disinfection tests

The Contracting Officer will be notified not less than 48 hours in advance of any water piping test and will be given full access for monitoring testing procedures and results. Where any section of water line is provided with concrete thrust blocking for fittings or hydrants, tests shall not be made until at least 5 days after installation of concrete thrust blocking, unless otherwise approved.

2.5.3.4 Pressure Test

After the pipe is laid, the joints completed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of 1.38 MPa (200 psi). Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants and valves shall be carefully examined during the partially opened trench test. Joints showing visible leakage shall be

replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered following this pressure test shall be removed and replaced and retested until the test results are satisfactory.

2.5.3.5 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 1.38 MPa (200 psi). Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure to within 34.5kPa (5 psi) of the specified leakage test pressure after the pipe has been filled with water and all air expelled. Pipe installation will not be accepted if leakage exceeds the allowable leakage, as determined by the following formula:

$L = 0.0001351ND (P \text{ raised to } 0.5 \text{ power})$, 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

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.

2.5.3.6 Bacteriological Disinfection

2.5.3.6.1 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. During the flushing period, each blow off or flush valve on the line shall be opened and closed several times.

2.5.3.6.2 Sampling

For each building connected to the water system, personnel from the Contractor's commercial laboratory shall take at least 3 water samples from different points, approved by the Contracting Officer, in proper sterilized containers and perform a bacterial examination in accordance with approved methods. The commercial laboratory shall be verified to be qualified by the appropriate authority for examination of potable water.

2.5.3.6.3 Acceptance Requirements

The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

2.5.3.6.4 Time for making Tests

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

2.5.3.6.5 Concurrent Tests

The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be recorded for submission and approval. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government. 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.

2.5.3.7 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 meter (3'-4") square, for all valve boxes.

2.5.3.7.1 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.

2.5.3.7.2 Blow-Off Valves

The Contractor shall provide 40-50mm (1-5/8" – 2") blow-off valves at ends of dead end mains. Valves should be installed at low points in the mains where the flushing water can be readily discharged to natural or manmade drainage ditches, swales, dry wells, or other.

2.5.3.8 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.

2.5.4 Sanitary Sewer

2.5.4.1 General

There are no functional or salvageable sanitary sewer collection, treatment or disposal facilities at this **CSB** site. The Contractor shall obtain topographic information or other maps that show vegetation, drainage channels and other land surface features such as underground utilities and related structures that may influence the design and layout of the collection system. If maps are not available, or do not provide satisfactory information or sufficient detail of the site, field surveys shall be performed. Sanitary sewers less than 1.25 meters (4 feet) under road crossings shall have reinforced concrete cover at least 150 mm (6 inch) 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. All sewers shall be located outside of the roadways as much as practical, and minimize the number of roadway crossings. To the extent practical, a sewer from one building shall not be constructed under another building, or remain in service where a building is subsequently constructed over it. Construction required shall include appurtenant structures and building sewers to points of connection with building drains 1.5m (5 feet) outside the building to which the sewer collection system is to be connected.

The Contractor shall use the following criteria where possible to provide a layout which is practical, economical and meets hydraulic requirements:

- a. Follow slopes of natural topography for gravity sewers.
- b. 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.
- c. Avoid routing sewers through areas which require extensive restoration or underground demolition
- d. 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.
- e. 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.
- f. Sewer lines shall have a minimum of 800 mm of cover for frost protection.
- g. Locate manholes at change in direction, pipe size, or slope of gravity sewers.
- h. Sewer sections between manholes shall be straight. The use of a curved alignment shall not be permitted.
- i. If required by the design, locate manholes at intersections of streets where possible. This minimizes vehicular traffic disruptions if maintenance is required.
- j. Sewer lines less than 1.25 meters deep under road crossings shall have a reinforced concrete cover of at least 150mm 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) meter beyond the designated roadway.
- k. Verify that final routing selected is the most cost effective alternative that meets service requirements.

2.5.4.2 Protection of Water Supplies

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

- 2.5.4.2.1 a. Sanitary sewers shall be located no closer than 15m (50 feet) horizontally to water wells or earthen reservoirs to be used for potable water supply.
- 2.5.4.2.2 Sanitary sewers shall be no closer than 3 m (10 feet) horizontally to potable water lines; where the bottom of the water pipe will be at least 300mm (12 inches) above the top of the sanitary sewer, horizontal spacing shall be a minimum of 1.8m (6 feet).
- 2.5.4.2.3 Sanitary sewers crossing above potable water lines shall be constructed of suitable pressure pipe or fully encased in concrete for a distance of 2.7m (9 feet) on each side of the crossing. Pressure pipe will be as required for force mains in accordance with local standards and shall have no joint closer than 1m (3 ft) horizontally to the crossing, unless the joint is fully encased in concrete.
- 2.5.4.2.4 Depressed sewers crossing potable water lines must be installed below the water line with a minimum vertical clearance of 600mm (2 feet). Sewer joints will not be closer horizontally than 1 meter (3 feet) to the crossing, unless the joints are fully encased in concrete as required above.

2.5.4.3 Quantity of Wastewater

The Contractor shall verify the average daily flow considering both resident (full occupancy) and non-resident (8hr per day) population. The average daily flow will represent the total waste volume generated over a 24-hour period, and shall be based on 80% of total ADD. Design criteria guideline shall be based on average influent wastewater characteristics as BOD of 250mg/l, SS of 250mg/l, BOD load of 750ppd, and SS load of 750ppd.

2.5.4.4 Gravity Sewer

Sanitary sewers shall be designed to flow at a maximum in the following way: Trunk Sewers - 90 percent full; Laterals and Mains – 80 percent full, Building connections (service) – 70 percent full. Sanitary sewer velocities shall be designed to provide a minimum velocity of 0.6 meters per second (mps) or 2.0 feet per second (fps) at the average daily flow rate (80% of ADD), and a minimum velocity of 0.8 to 1.05 mps (2.5-3.5fps) at the peak diurnal flow rate. In no case shall the velocity drop below 0.3 mps, (1.0 fps) to prevent settlement of organic solids suspended in the wastewater. Pipe slopes shall be sufficient to provide the required minimum velocities and depths of cover on the pipe. Minimum slopes for various pipe sizes are given in Table 1. 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. Provide a minimum ground cover of 800 mm (2'-8") to protect sewer lines against freezing.

Table 1. Minimum Slopes for Sewers.

Sewer Size	Minimum Slope in Meters per 100 Meters
100 mm	1.00
150 mm	0.62
200 mm	0.40
250 mm	0.28
300 mm	0.22
350 mm	0.17
375 mm	0.15
400 mm	0.14
450 mm	0.12
525 mm	0.10
600 mm	0.08

2.5.4.5 Manholes

The Contractor shall provide standard depth manholes (MH), (depth may vary) an inside dimension of 1.2m (4 ft). 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 (30-inch) cast iron frame that provides a minimum clear opening of 600 mm (24 inches). In every case, the manholes, frames and covers shall be traffic rated, H-20 load rating. All manholes shall be provided with a concrete bench with a flow line trough, smoothly formed to guide waste flow to the outlet pipe from the inlet pipe(s). The top surface of the bench shall be above the crown of all pipes within the manhole. All surfaces of the bench shall be sloped smoothly toward the trough to guide flow, even under peak flow conditions.

2.5.4.5.1 Manhole Design Requirements

Manholes are required at junctions of gravity sewers and at each change in pipe direction, size or slope, except as noted hereinafter for building connections.

2.5.4.5.2 Spacing

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

2.5.4.5.3 Pipe Connections

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

2.5.4.5.4 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.

2.5.4.5.5 Steps for Manholes

Steps shall be cast iron, polyethylene coated, at least 15mm (5/8 in) thick, not less than 400mm (16 in) in width, spaced 300mm (12 in) on center.

2.5.4.6 Pipe

Pipe shall conform to the respective specifications and other requirements as follows: Provide Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 3034, Type PSM with a maximum SDR of 35, size 380 mm (15inch) or less in diameter. PVC shall be certified as meeting the requirements of ASTM D 1784, cell Class 12454 B.

2.5.4.6.1 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.

2.5.4.6.2 Joints

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

2.5.4.6.3 Branch Connections

Branch connections shall be made by use of regular fittings or solvent-cemented saddles as approved. Saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

2.5.4.6.4 The minimum depth of the cover over the pipe crown shall be be 0.8m (2 ft 8").

2.5.4.6.5 Building Connections and Service Lines

Building connections and service lines will be planned to eliminate as many bends as practical and provide convenience in rodding. Bends greater than 45 degrees made with one fitting should be avoided; combinations of elbows such as 45-45 or 30-60 degrees should be used with a cleanout provided. Connections to other sewers will be made directly to the pipe with standard fittings rather than through manholes. However, a manhole must be used if the connection is more than 31m from the building cleanout. Service connection lines will be a minimum of 150 mm (6 inch) diameter and laid at a minimum 1% grade, but up to 2% as design parameters dictate. Service laterals shall be 200 mm (8 inch) and sloped to maintain the minimum velocity as described in paragraph "Gravity Sewer."

2.5.4.6.6 Cleanouts

Cleanouts must be installed on all sewer-building connections to provide a means for inserting cleaning rods into the underground pipe. Install manufactured wye fittings. In lieu of a wye fitting, an inspection chamber may be installed. The inspection chamber shall be of the same construction as a manhole. Preferably the cleanout will be of the same diameter as the building sewer, and never be smaller than 150mm (6 in). Cleanouts shall be located within 1m from the building.

2.5.4.6.6.1 Grease Interceptors

Grease interceptors are used to remove grease from wastewater to prevent it from entering the sanitary

sewer and septic systems. All Dining Facilities (DFACs) shall incorporate preliminary treatment with use of a grease interceptor prior to the sanitary sewer system. The grease interceptor shall be of reinforced cast-in-place concrete, reinforced precast concrete or equivalent capacity commercially available steel, with removable three-section, 9.5 mm checker-plate cover, and shall be installed outside the building. Steel grease interceptors shall in be installed in a concrete pit and shall be epoxy-coated to resist corrosion as recommended by the manufacturer. Concrete shall have 21 MPa minimum compressive strength at 28 days. The grease interceptor shall connect to the sanitary sewer system.

2.5.4.6.7 Field Quality Control

2.5.4.6.7.1 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.

Low-pressure air tests: Perform tests as follows:

- (a) 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;
- (b) 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;
- (c) 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.

2.5.4.6.8 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.

2.5.5 Septic Systems

Permanent base waste water treatment plants shall be designed in accordance with Unified Facilities Guide Specifications UFGS 44 41 13, Prefabricated Biochemical Wastewater Treatment Plant, Oct 07.

Package waste water treatment plants shall be designed in accordance with Department of Defense Handbook, Wastewater treatment System Design Augmenting Handbook, Feb 97, with Notice 1, Jan 99, Section 6: Package Plants and Small flow treatment systems.

Septic systems shall be designed and installed in accordance with UFC 3-240-03, 16 January 2004 edition, and the following guidance:

2.5.5.1 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.

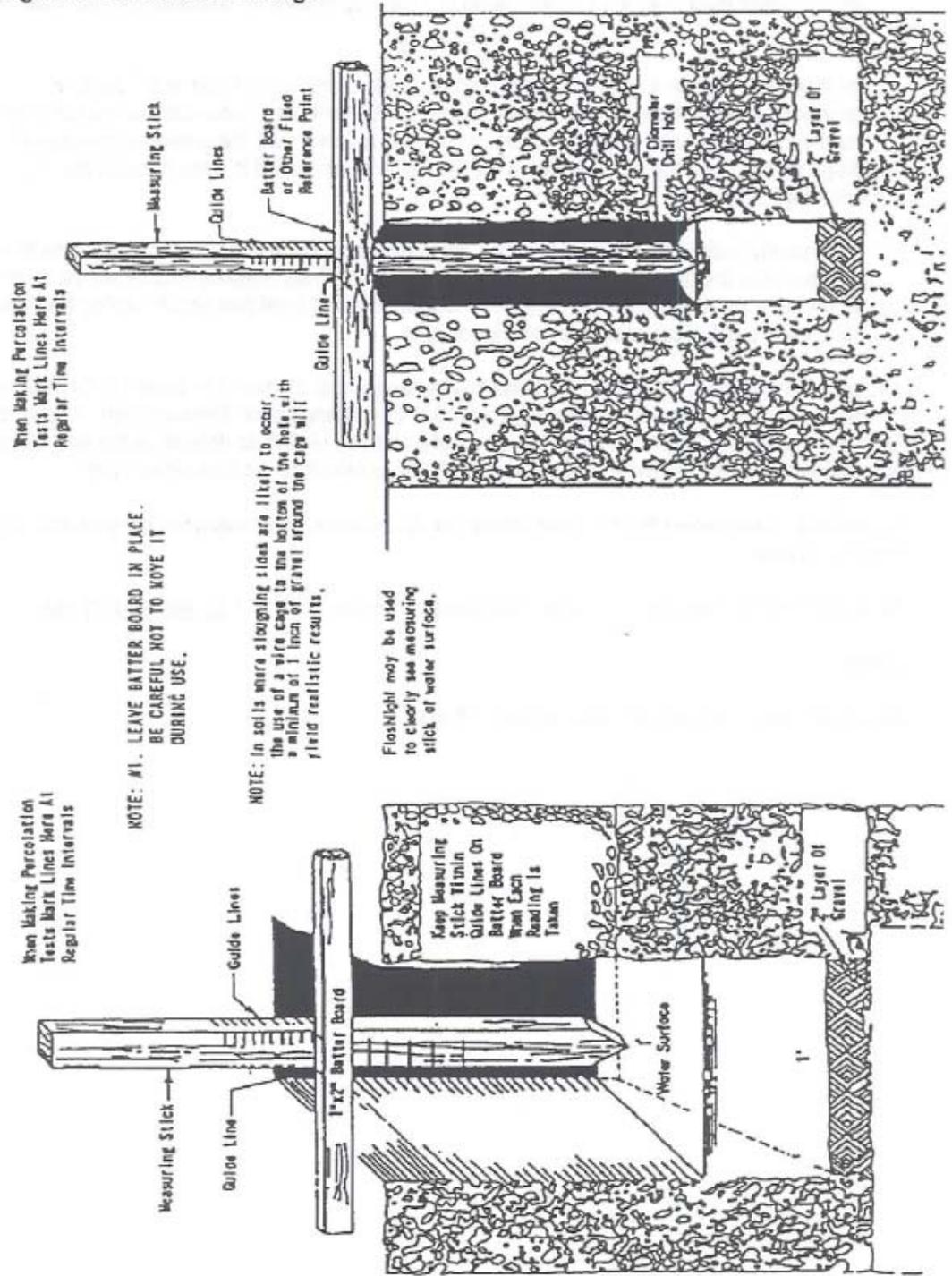
2.5.5.2 Percolation Testing

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).

- (a) 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.
- (b) 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.
- (c) 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.).
- (e) 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.
- (f) The percolation rate measurement is determine by one of the following methods:
 - i. 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.
 - ii. 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.

- iii. 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.
- (g) 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/m²/day). The sizing factors are used, in conjunction with average daily demand (ADD), to determine the size of the absorption field.
- (h) Example: Calculating the percolation rate:
- i. In 30 minutes, the measured drop in the water level is 15 mm.
 - ii. $\text{Minutes}/25\text{mm} = \text{Time} / (\text{drop}/25\text{mm}) = 30 \text{ minutes} / (15\text{mm}/25\text{mm}) = 50 \text{ Minutes}/25 \text{ mm}$, where $\text{Minutes}/25\text{mm} = \text{Minutes for water to drop } 25 \text{ mm}$.

Figure 1. Percolation Testing.



2.5.5.3 Septic System

Generally when determining an appropriate wastewater treatment package plant location, the Contractor shall provide protection for the plant 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.

2.5.6 Storm Sewer Systems

Oil/water separators shall be utilized for all drains from industrial sites. Separators shall be installed as close as possible from the drain location. Storm sewer system shall not be mixed with sanitary sewer system and shall be in accordance with UFC 3-240-03 latest edition.

3.0 ARCHITECTURAL REQUIREMENTS

3.1 GENERAL

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

3.2 DESIGN CRITERIA

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

IBC - International Building Code, 2006

NFPA 101 - Life Safety Code, 2006.

3.3 LIFE SAFETY/ FIRE PROTECTION/ HANDICAPPED ACCESSIBILITY

To the extent possible, all facilities will be designed in accordance with recognized industry standards for life safety and building egress. An adequate fire alarm system, fire extinguishers, and smoke alarms shall all be included as required. If a sprinkler system is required by building code, a waiver will have to be obtained before construction notice to proceed is issued. However, due to the lack of adequate water volume and pressure, sprinkler systems may not be feasible. The facility shall comply with all other safety requirements of NFPA 101. In keeping with the intended function of these facilities, handicapped accessibility will not be incorporated into this project. Due to the war contingency requirement, it is assumed that only able-bodied military and civilian personnel will use the facilities listed herein.

3.4 ANTITERRORISM/ FORCE PROTECTION

Force protection/anti-terrorism measures for this location shall be followed and incorporated into this

project in accordance with the referenced DoD Regulations. Information regarding force protection may be found herein and at the following link: www.tisp.org/files/pdf/dodstandards.pdf.

3.5 EXCAVATION

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

3.6 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, unless specifically stated elsewhere:

Assembly	Minimum Thermal Value
Exterior walls (above grade)	RSI 1.936 (R 13)
Ceilings/roof	RSI 3.345 (R 30)
Floor (over unheated space)	RSI 3.345 (R 19)
Exterior doors	RSI 0.25 (R 1.43)
Exterior windows/(glazing within doors)	RSI 0.308(R 1.75)
Skylights	RSI 0.18 (R 1.02)

RSI measured in m²-K/W, R measured in sqft-F-hr/BTU. The design analysis shall include exterior building assembly R-value calculations for each separate assembly. The calculations shall be in accordance with ASHRAE Fundamentals or EN ISO 6946. The calculations shall indicate the thermal conductivity, thickness, and R-value of each assembly component and the overall R-value for the assembly. The assembly R-value calculations shall investigate the effects of thermal bridging from the use of metal building material such as metal wall studs, roof Purlins, wire mesh wall ties or bolts, structural members, etc.

Window glazing surface area shall be determined based on the architectural design per each building and shall not be an assumed percentage of the wall area.

3.7 CONCRETE & MASONRY

3.7.1 Concrete

Place 150 mm (6") of capillary water barrier below areas to receive a concrete slab on properly compacted soil free of organic material. Concrete flooring in wet areas shall slope to the floor drain and not allow for water to puddle. Concrete slabs in all areas shall not be placed prior to inspection and approval of piping and sub-surface by the Contracting Officer. Foundation trenches shall be level and free of loose material. Trenches shall be inspected and approved by the Contracting Officer prior to placing of any concrete foundations. See paragraph 4 for structural characteristics of concrete and reinforcing steel for foundations and slabs.

3.7.2 Insulated Concrete Sandwich Wall System (3-D Building System)

As an option to standard masonry construction, the Contractor may construct walls of single story buildings using an insulated concrete sandwich wall system. The insulated concrete sandwich wall system shall be field fabricated and composed of a 76 mm (3 inch) expanded polystyrene core that spans

in a single piece from floor elevation to top of wall elevation. The polystyrene core shall have a welded wire fabric, 50 mm x 50 mm (2 inch x 2 inch) mesh, 2.52mm (12.5 gauge) wire, attached to both faces of the polystyrene core. The welded wire mesh shall be installed at 13mm from the face of the polystyrene core. The welded wire mesh on each face shall be attached to each other and the polystyrene core with diagonal truss wires. Apply sprayed concrete (shotcrete) to a minimum thickness of 45mm (1-3/4 inch) or as structural calculations require, whichever is greater. Method of placing the shotcrete shall be in conformance with ACI 506R-85. Concrete finishing shall be done by appropriate hand tools (darby, trowel, etc.) to provide the desired finish effect.

3.7.3 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. Concrete masonry units (CMU) for exterior walls shall be either 190 mm or 290 mm wide x 390 mm x 190 mm high as shown on drawings. All cells shall be fully grouted and reinforced. 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.

3.8 METAL

3.8.1 Building Systems

3.8.1.1 Arch Span

Insulated Arch-Span metal roofing systems shall be supported by reinforced concrete stem walls approximately 2.5 m in height. Stem walls shall be insulated and finished with gypsum board or plaster on the interior, and finished with stucco on the exterior. The floor slab shall be reinforced concrete with a minimum thickness of 150mm placed on a clean vapor barrier above a capillary water barrier of 150mm minimum thickness on properly compacted soil. Exterior walls shall be insulated with a minimum of R-13 insulation, and provide a minimum of R-30 insulation for the roof. The roof insulation system shall be spray applied and harden to a durable rigid surface, as per the arch span manufacturer's standards.

Ribbed steel roof panels shall be mechanically fabricated from prefinished steel coil and joined by machines and operators, all certified by the arch span building manufacturer. The contractor shall present certificates of manufacturer's training for machine operators, and certificates of authenticity for proprietary machines and equipment.

Only prefinished steel coil certified by the arch-span system manufacturer shall be used on this project. Fasteners for accessories shall be manufacturer's standard. All materials and Concealed fasteners for steel roof panels shall be zinc-coated steel, aluminum, corrosion resisting steel, or nylon capped steel. Fasteners for structural connections shall provide both tensile and shear strength of not less than 350 kg per fastener.

3.8.1.2 Pre-Engineered Metal Building Systems

Metal building systems shall comply with the requirements of the MBMA Low Rise Building Systems Manual-2002. Facilities designated as long-span, shall have no interior columns.

3.8.2 Trim

3.8.2.1 Metal Window Sills

Galvanized metal window sills, 1 mm (20-gage), shall be installed on the exterior of all windows. The

metal window sills shall have a turn down of 50 mm over the exterior masonry and stucco. Metal sills shall extend from side to side of the masonry opening in a single piece. Extend the metal 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 6mm to the exterior and not allow water to puddle.

3.8.2.2 Metal Fascia & Soffit

No wood fascias and/or soffits are allowed. Use metal fascias and soffits throughout. Extend roof decking out over fascia 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. Provide continuous soffit venting of all overhangs at both bottom and top of roof slope.

3.8.3 Dining Facilities

3.8.3.1 Steel Cook Top

Provide steel cook top in kitchen minimum thickness of 25 mm. Provide circular cut outs. Consult with the Contracting Officer for the diameter of circular cutouts. Provide steel infill plates for all cut out openings. Cook top can be made of several pieces for ease of handling. Adjacent plates shall be tight fitting to each other.

3.8.3.2 Pass-Through Counter Top

Provide 1.6 mm (16 gauge) stainless steel, or 40 mm marble, pass through counter tops at openings between the kitchen and dining area. Edges shall be turned down 30 mm and corners shall be welded and ground smooth. Provide anchor angles welded to the bottom of the counters to anchor tops to masonry walls below. Provide six (6) anchors on the Dish Return Counter, three (3) on each side of the wall. Provide eight (8) anchors on the Serving Counter, four (4) on each side of the wall. Anchor angles to wall with masonry expansion sleeves and stainless steel screws. Counter tops are to be 600 mm wide x length of opening shown.

3.8.3.3 Fire Counter Shutter (Dining Facilities)

Fire Counter Shutters shall be installed in conjunction with the Pass-Through Counter Tops described in the paragraph above. Fire counter shutters shall be used to separate the kitchens from the dining areas, and shall be U.L labeled for gypsum board, masonry and steel openings, and rated at 90 minutes in full compliance with NFPA-80 standards. Finish of shutter, guides and hoods shall be stainless steel. System shall be activated by 74 C (165 F) fusible links, and by electrical switches located near exit doors. Bottom bar sliding bolt locks shall be provided to secure the shutters in the down position; bolts shall be operated from the kitchen side of the shutter.

3.9 CARPENTRY

The use of wood framing as indicated below is acceptable only where allowed by IBC 2003 and NFPA 101.

3.9.1 Wood Purlins

If Contractor chooses to utilize wood purlins, provide and install roof purlins of natural wood, locally available material 1 meter on center securely wedged between steel H structural joists. Tightly fit 30 mm boards over roof structure and nail into wood purlins. New roofing shall extend a minimum of 300 mm past the exterior surface of the wall.

3.9.2 Wood Battens

If Contractor chooses to utilize wood ceiling batten strips, wood ceiling batten strips, 20 mm x 60 mm, shall be nailed to the bottom of the wood purlins. Battens shall be spaced at 400 mm on center (or per UBC requirements if sheetrock is substituted for plaster). This is for the support of a plaster ceiling.

3.10 ROOFING AND WEATHERPROOFING

3.10.1 Sloped Roofs

On metal sloping roofs provide and install minimum .70 mm (24 gauge) galvanized standing seam design. **Metal panels shall be continuous from ridge to eave of roof.** Standing Seam panel width shall be by manufacturer's recommendation to prevent canning, warping, and deformation. 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, sheathing deck with water barrier felt layer under the metal roof panels and as described in this section. Rigid board insulation may also be installed between the felt layer and metal panels. Roofing shall be galvanized mil finish. Provide continuous ridge vents on all gable roofs. **Minimum slope for metal roof shall be no less than 2:12. In area where winters receive snow loads, minimum slope of metal roof shall be no less than 3:12.**

3.10.2 Low Slope Roofs

Provide and install 3 ply built up roofing over concrete deck. Contractor may propose to the Contracting Officer an alternate roofing system with justification for consideration and alternate pricing. Concrete roof deck shall slope 21mm per m. **Metal Roofing Panels shall not be used on low slope roofs with less than 2:12 slope.**

3.10.2.1 Built-up Roofing System

A Insulated-Deck, Coal Tar, Glass-Fiber, Aggregate Roofing (ICGA-BUR): Provide built-up, aggregate-surfaced roof system with coal tar bitumen and glass-fiber ply felts (roof manufacturer's separation layers) for layup as indicated.

3.10.2.1.1 Primer: ASTM D 41 primer as recommended by roofing manufacturer.

3.10.2.1.2 Coal Tar Bitumen: ASTM D 450, Type III, as an option to asphalt.

3.10.2.1.3 Bitumen Membrane which meets the following:

- a. ASTM D312 or the equivalent EN 1849-1 for thickness and unit weight,
- b. ASTM D312 or the equivalent EN-1426 for penetration,
- c. ASTM D312 or the equivalent EN-1427 for softening point
- d. ASTM D312 or the equivalent TS 11758-1 for flash point or heat stability
- e. ASTM D4601 or the equivalent TS 11758-1 for width and area of roll
- f. ASTM D4601 (moisture percentage) or the equivalent EN 1928 (water tightness)
- g. ASTM D226 (pliability) or the equivalent EN 1109 (cold bending).

3.10.2.1.4 Glass Roofing Felt: ASTM D 2178, Type IV or VI, except felts for coal tar systems shall be impregnated with a bituminous resin coating which is compatible with coal tar bitumen.

3.10.2.1.5 Organic Felt Base: ASTM D 2626 for use with asphalt roofing system.

3.10.2.1.6 Organic Felt Base: ASTM D 226 for use with asphalt roofing system and ASTM D 227 for use with coal tar roofing system. Organic felts may be used for bitumen stops and edge envelopes.

3.10.2.1.7 Insulation: 5cm (2 inch) thick extruded polystyrene rigid thermal insulation boards, conforming

DIN, EN 13164 BS, EN 13164, $k=0.2$ @ 75 degrees F mean temperature, 2.82 kg/sq cm (40 lbs/sq in) compressive strength, hydrophobic, Type VI.

3.10.2.2 Roof Membrane Installation

- a. Prime surface of concrete deck with asphalt primer per manufacturers recommended application rate.
- b. Cant Strips/Tapered-Edge Strips: Wood, not less than 89 mm (3-1/2 inches) high, 45-degree insulation cant strips at juncture of membrane with vertical surface. Provide tapered-edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- c. Base Layer: Install one lapped course of base sheet. Attach first layer of roofing membrane material to substrates and elsewhere as indicated. Mop to non-nailable substrate with hot bitumen or apply with torch method per manufacturer's specifications
- c. Second Layer: Install second layer of roofing membrane material over the first course staggering joints and seams in both directions by at least 300 mm. Mop top layer of membrane to base layer, or attach via torch method per manufacturer's specifications.

3.10.2.3 Insulation Installation

Comply with insulation manufacturer's instructions and recommendations for handling, installing, and bonding or anchoring insulation to substrate. Insulation boards shall be installed loose, without glue, in staggered manner. Attention should be paid not to leave separation along edges. Where overall insulation thickness is 50 mm (2 inches) or greater, install required thickness in two layers with joints of second layer offset from joints of first layer a minimum of 300 mm (12 inches) each direction. Trim surface of insulation where necessary at roof drains so completed surface is flush with drain ring. Polyester felt or geotextile shall be installed over insulation layers as a filter layer to prevent the passage of fines in gravel layer to lower strata.

3.10.2.4 Composition Flashing And Stripping

- a. Install composition flashing at cant strips, at other sloping and vertical surfaces, at roof edges, and at penetrations through roof. Install composition flashing in accordance with membrane manufacturers specifications. Nail or provide other forms of mechanical anchorage of composition flashing to vertical surfaces as recommended by manufacturer of primary roofing materials.
- b. Install composition stripping where metal flanges are set on roofing. Provide not less than two plies of woven glass-fiber fabric, each set in a continuous coating of roofing cement and extended onto the deck 100 mm to 150 mm (4 inches and 6 inches), respectively. Except where concealed by aggregate surfacing or elastic flashing, apply a heavy coating of roofing cement over composition stripping.
- c. Roof Drains: Fill clamping ring base with a heavy coating of roofing cement. Set built up roofing membrane in to the clamping ring base and fix the drain top on it.
- d. Allow for expansion of running metal flashing and edge trim that adjoins roofing. Do not seal or bond built-up roof membrane or composition flashing and stripping to metal flanges that are over 914 mm (3 feet) in length.
- e. Counterflashings: Counterflashings, cap flashings, expansion joints and similar work to be coordinated with built-up roofing work, are specified in other sections of these specifications.
- f. Roof Accessories: Miscellaneous sheet metal accessory items, including insulation vents and other devices and major items of roof accessories to be coordinated with built-up roofing work.

3.10.2.5 Gravel Layer

A gravel layer of 16 to 32 mm diameter stone will be laid in at least 5cm thick on top of the filter layer in non-trafficable flat roofs. The gravel layer will be applied as soon as possible to prevent UV damage and/or wind damage to insulation and filter layers.

3.10.3 Flashing & Sheet Metal

3.10.3.1 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.

3.10.3.2 Steel Sheet, Zinc-Coated (Galvanized)

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

3.10.3.3 Aluminum wall capping and expansion joint profiles.

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

3.10.3.4 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.

Gutters shall have a slope between 1" : 33'-0" (1:400) and 1" : 16'-0" (1:200) for proper drainage.

3.10.3.5 Downspouts

Downspouts shall be designed and fabricated on site. Unless otherwise specified or indicated, exposed edges shall be folded back to form a 13 mm (1/2 inch) 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. Downspouts shall be rigidly attached to the building with supports a minimum of 1.5 M apart.

3.10.3.6 Wall, Floor, Ceiling Expansion Joints In Plaster & Stucco

Expansion joints shall be provided as specified in ASTM, DIN 18339, BS or EN Standards.

3.10.3.7 Connections and Jointing

3.10.3.7.1 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.

3.10.3.7.2 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.

3.10.3.7.3 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.

3.10.3.8 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.

3.10.3.8.1 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.

3.10.3.8.2 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.

3.10.3.8.3 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.

3.10.3.8.4 Wall Capping

Wall Capping shall be installed according to the manufacturer's recommendations.

3.10.4 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 can not 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. 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.

3.10.4.1 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.

3.10.4.2 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.

3.10.4.3 Floor Joint Sealant

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

3.10.4.4 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.

3.10.4.5 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.

3.10.4.6 Backing

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

3.10.4.7 Cleaning Solvents

Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

3.10.4.8 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 caulk or sealant prior to applying new sealant. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.10.4.9 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.

3.10.4.10 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.

3.10.4.11 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.

3.10.4.12 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

- a. **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 hour then remove by wire brushing or sanding.
- b. **Metal and Other Non-Porous Surfaces:** Remove excess sealant with a solvent-moistened cloth.

3.11 WINDOWS, DOORS & GLAZING

3.11.1 Windows

3.11.1.1 Materials

- (a) **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/mm² ultimate tensile strength and not less than 1.5 mm thick at any location for main frame and sash members.
- (b) **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.
 1. **Reinforcement:** Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard non-corrosive pressed-in splined grommet nuts.
 2. **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.
- (c) **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.
- (d) **Compression-Type Glazing Strips and Weatherstripping:** Unless otherwise indicated, and at the

manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets.

- (e) 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.
- (f) Wire Fabric Insect Screen shall be permanently fixed to the exterior, except for guard towers.

3.11.1.2 Hardware

A. General: Provide the manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

3.11.1.3 Fixed, Casement, Projected and Horizontal Sliding Windows

Provide window units meeting **UL 752, level 5, AK-47 resistance**. This standard shall apply to all window units within guard shack, guard house, guard tower, and guard rooms in Headquarters Building. Provide cam action sweep sash lock and keeper at meeting rails. All other glazing shall be minimum 6mm laminated with .75mm polyvinyl-butylal (PVB) interlayer per UFC 4-010-01.

3.11.1.4 Fabrication

Provide horizontally sliding aluminum windows with factory finish in all buildings to fit the masonry openings. Window openings shall be provided with insect screening permanently fixed to the exterior. Provide a locking device on the interior of each window. Provide anchors on each side of the frame into the adjoining masonry, 3 on each side. Provide weather stripping system for all exterior windows and doors.

3.11.1.5 Finishes

Apply baked enamel in compliance with paint manufacturer's specifications for cleaning, conversion coating, and painting.

- (a) Color: White meeting the requirements of DIN 50018

3.11.1.6 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.

3.11.1.7 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 weathertight construction. Refer to the Sealant sections for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.

3.11.1.8 Adjusting

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

3.11.1.9 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.

3.11.2 Doors

All exterior doors (entry and exist doors) shall be heavy duty metal doors with metal frames. Interior door shall be hollow metal doors with hollow metal frames. All glazed doors shall have 5 mm single glazing in the upper half of the door. Heavy gauge metal exterior doors are required for security of unmanned buildings, such as water treatment building, power station, warehouses, and other buildings requiring higher security. Commercial duty lock sets and hardware shall be used on all doors. Install required louvers, as called for in paragraph 6, in the lower portion of the door. Provide (3) hinges 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. All glazing in or adjacent to doors shall be tempered per IBC. Provide weather stripping system for all exterior doors.

3.11.2.1 Solid Plastic & Phenolic doors

Solid Plastic & Phenolic doors and frames are for interior wet room use only. Solid Plastic & Phenolic doors and frames be used for bathrooms, shower rooms, and toilets rooms.

3.11.2.2 Steel Doors

SDI A250.8, except as specified otherwise. Prepare doors to receive specified hardware. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. 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.

3.11.2.2.1 Accessories

3.11.2.2.1.1 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 0.9 mm thick steel and louver blades of a minimum 0.6 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.

3.11.2.2.1.2 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.

3.11.2.2.1.3 Astragals

Provide overlapping steel astragals on pairs of exterior steel doors which will not have aluminum astragals or removable mullions. For interior pairs of fire rated and smoke control doors, provide stainless steel astragals complying with NFPA 80 for fire rated assemblies and NFPA 105 for smoke control assemblies.

3.11.2.2.1.4 Moldings

Provide moldings around glass of interior and exterior doors. Provide non-removable moldings on outside of exterior doors and on corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to stationary moldings, or provide snap-on moldings. Moldings shall interlock at intersections and shall be fitted and welded to stationary moldings.

3.11.2.2.2 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.

3.11.2.2.2.1 Welded Frames

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

3.11.2.2.2.2 Mullions and Transom Bars

Mullions and transom bars shall be closed or tubular construction and shall member with heads and jambs butt-welded thereto or knock-down for field assembly. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

3.11.2.2.2.3 Stops and Beads

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

3.11.2.2.3 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.

3.11.2.2.3.1 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.

- a. Masonry: Provide anchors of corrugated or perforated steel straps or 5 mm diameter steel wire, adjustable or T-shaped;
- b. Completed openings: Secure frames to previously placed concrete or masonry with

expansion bolts

3.11.2.2.3.2 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.

3.11.2.2.4 Fire and Smoke Doors and Frames

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

3.11.2.2.5 Weather-stripping, Integral Gasket

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. Insert gasket in groove after frame is finish painted.

3.11.2.2.6 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.

3.11.2.2.7 Finishes

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

3.11.2.2.8 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 calking compound.

3.11.2.2.9 Installation of Doors & Frames

3.11.2.2.9.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. When an additive is provided in the

mortar, coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.11.2.2.9.2 Grouted Frames

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

3.11.2.2.9.3 Doors

Hang doors in accordance with clearances specified in SDI A250.8. After erection and glazing, clean and adjust hardware.

3.11.2.2.9.4 Fire and Smoke Doors and Frames

Install fire doors and frames, including hardware, in accordance with NFPA 80.

3.11.2.2.9.5 Protection and Cleaning

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

3.11.2.3.1 Accessories

3.10.2.5.1.1 Door Louvers

Fabricate from wood and of sizes indicated. Louvers shall be of the manufacturer's standard design and shall transmit a minimum of 35 percent free air. Louvers shall be the slat type.

3.11.2.3.1.1 Door Lite Openings

Provide glazed openings with the manufacturer's standard wood moldings except that moldings for doors to receive natural finish shall be of the same species and color as the face veneers. Moldings for flush doors shall be lip type.

3.11.2.3.1.2 Weather Stripping

Provide weather-stripping that is a standard cataloged product of a manufacturer regularly engaged in the manufacture of this specialized item. Weather stripping shall be looped neoprene or vinyl held in an extruded non-ferrous metal housing. Air leakage of weather stripped doors shall not exceed 0.003125 cubic meter per second of air per square meter of door area when tested in accordance with ASTM E 283.

3.11.2.3.2 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.

3.11.2.3.3 Finishes

Provide door finish colors as selected by the Contracting Officer from the color selection samples.

3.11.2.3.4 Water-Resistant Sealer

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

3.11.2.3.5 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.

3.11.2.4 Weather stripping

Install doors in strict accordance with the manufacturer's printed instructions and details. Provide weather stripping on 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.

3.11.2.5 Overhead Coiling Doors

Doors shall be fabricated from interlocking cold-rolled slats, designed to withstand building wind loading and be installed with wind locks. Slats shall be continuous for the width of the door. For doors not exceeding 4.27 m, slats shall be flat-profile design, with a depth of not less than 15.9 mm, a center to center width not more than 69.9 mm, and not less than a 1.21 mm uncoated thickness. Provide weather stripping for door-head and door jamb guides, and a bottom astragal. Weather stripping and astragal shall be natural rubber or neoprene rubber. Curtain jamb guides shall be fabricated from a combination of steel angles of sufficient size to retain curtain against the specified wind. Guides shall be fabricated from structural quality steel angles. Door shall have manufacturer's standard five pin tumbler locks; keyed. Doors shall be counterbalanced by an adjustable, steel, helical torsion spring mounted around a steel shaft in a spring barrel and connected to the door curtain with the required barrel rings. Hoods shall be fabricated from steel sheets with minimum yield strength of 227.5 MPa.

Counterbalance-barrel components shall be as follows:

- (a) Spring barrels shall be hot-formed structural-quality carbon steel, welded or seamless pipe. Pipe shall be of sufficient diameter and wall thickness to limit deflection to a maximum of 1/360 of the span.
- (b) Counterbalance springs shall be oil-tempered helical steel springs designed with a safety factor of 4. Springs shall be sized to counterbalance the weight of the curtain at any point of its travel, and shall be capable of being adjusted to counterbalance not less than 125% of the normal curtain load. Spring adjustment shall be arranged in such a way that the curtain need not be raised or lowered to secure the adjustment.
- (c) Counterbalance shafts shall be case-hardened steel of the proper size to hold the fixed ends of the spring and carry the torsion load of the spring.

- (d) Barrel plugs shall be fabricated from cast steel machined to fit the ends of the barrel. Plugs shall secure the ends of the spring to the barrel and the shaft.
- (e) Barrel rings shall be fabricated from malleable iron of the proper involute shape to coil the curtain in a uniformly increasing diameter.
- (f) Shaft bearings shall be factory sealed ball bearings of the proper size for load and shaft diameters.
- (g) Door operators shall consist of an endless steel hand chain, chain-pocket wheel and guard, and a geared reduction unit of at least a 3:1 ratio. Required pull for operation shall not exceed 16 kg. Chain hoists shall have a self-locking mechanism allowing the curtain to be stopped at any point in its upward/downward travel and to remain in that position until moved to the fully open or closed position. Hand chains shall be cadmium-plated alloy steel with a yield point of at least three times the required hand-chain pull. Pretreated zinc-coated steel sheets shall be given the manufacturer's standard prime coat and an enamel finish coat applied to the exterior face after forming.
- (h) After installation, doors, track, and operating equipment will be examined and tested for general operation and weather against the specified wind pressure, and weather resistance. Doors that fail the required tests shall be adjusted and retested. Doors that have been adjusted and fail subsequent tests shall be removed and replaced with new doors at no additional cost.

3.11.3 Glass & Glazing

Window glazing shall be at most 20% of an exterior wall's surface area.

Glazing shall conform to ASTM C 1036 or ASTM C 1172 or equal.

3.11.3.1 Tempered Glass

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.

3.11.3.2 Laminated Glass

For non-force protection glazing, laminated glass shall be constructed out of two, 3mm glass panes bonded together with a minimum .75mm polyvinyl-butylal (PVB) interlayer.

3.11.3.3 Insulated Glass

All exterior glazing shall be insulated, constructed of two panes of laminated glass separated by hermetically sealed 12mm airspace.

3.11.3.4 Glazing Accessories

3.11.3.4.1 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.

3.11.3.4.2 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.

3.11.3.4.3 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.

3.11.3.4.4 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.

3.11.3.4.5 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.

3.11.3.4.6 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.

3.11.3.4.7 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.

3.11.3.4.8 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.

3.11.3.4.9 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.

3.11.3.5 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.

3.12 FINISHES

All finishes, colors and materials in existing building and new buildings shall match. See Section 01335 for color submittals required. Provide color boards with all materials for COR approval prior to ordering materials.

3.12.3 Exterior Stucco Walls

The exterior of all buildings shall be stucco and/or plaster conforming to ASTM C926. 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 heavy duty metal lath up to 8'-0" (2400mm) above grade, and standard metal lath after that.** Install new stucco in 2 coats. The first coat shall be a scratch coat approximately 1 cm thick. Allow 7 days to cure. The second coat shall be finish stucco, smooth finish, approximately 1 cm thick. Allow 7 days to cure before painting. Stucco showing over sanding, cracks, blisters, pits, checks, discoloration or other defects is not acceptable. Defective plaster work shall be removed and replaced with new plaster at the expense of the Contractor. Patching of defective work will be permitted only when approved by the Contracting Officer. Patching shall match existing 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. Color to be selected by the Contracting Officer from the color board provided by the Contractor. When rigid board exterior installation is used on exterior walls, installation board shall be kept minimum 200mm above grade, and stucco shall wrap around the under-side of the installation board at that elevation above grade.

3.12.4 Interior 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 .06% lead by weight color to be selected by the Contracting Officer from the color board provided by the Contractor.

3.12.5 Interior Ceilings

Ceilings of Barracks, and Headquarters, shall be plaster applied in 2 coats over wire mesh, which is to be stapled to the 20 mm x 60 mm wood battens. Paint ceiling with 2 coats of flat white, with less than .06% lead by weight. Gypsum board may be used in lieu of plaster but framing supports for Gypsum board shall be as follows: For ½" thick gypsum board structural fastener supports shall be not further apart than 400 mm. If gypsum board is thicker follow guidelines in ASTM C 840 for supports and fastener frequency.

3.12.5.1 Ceilings of Dining Facility shall be exposed concrete painted with 2 coats of flat white, with less than .06% lead by weight.

3.12.6 Exposed Exterior Steel trim, Frames, Doors and Pipe Railings

Paint with one coat oil-based primer, with 2 coats of oil-based alkyd gloss enamel, color to be selected by the Contracting Officer from the color board provided by the Contractor.

3.12.7 Exposed Wood Trim, Frames and Doors

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

3.12.8 Tile Work

Tile work shall not be performed unless the substrate and ambient temperature is at least 10 degrees C and rising. Temperature shall be maintained above 10 degrees C while the work is being performed and for at least 7 days after completion of work. Upon completion, tile surfaces shall be thoroughly cleaned in accordance with manufacturer's approved cleaning instructions. Acid shall not be used for cleaning glazed tile. Floor tile with resinous grout or with factory mixed grout shall be cleaned in accordance with instructions of the grout manufacturer. After the grout has set, tile wall surfaces shall be given a protective coat of a non-corrosive soap or other approved method of protection.

3.12.8.1 Floors in wet areas shall be non-slip ceramic or 300 mm x 300 mm terrazzo tile with thin set mortar. Joints shall be 2-3 mm. Waterproof gray grout shall be applied the full depth of the tile. Floors shall slope, minimum 1/50, to floor drains. Slope shall be obtained with sloping mortar bed of minimum 20 mm thickness. Provide continuous waterproofing membrane beneath sloping mortar bed, turn up wall 300 mm behind wall base. Membrane shall be fully sealed at joints and shall shed water into body of floor drain. Color of tile shall be selected by the Contracting Officer from samples provided by the Contractor.

3.12.8.2 Floors in administration areas, living quarters, corridors, and all rooms unless otherwise stated shall be **300 mm x 300 mm terrazzo tile with thin set mortar** or sealed concrete with smooth finish. Joints shall be 2-3 mm. Waterproof gray grout shall be applied the full depth of the tile. Color of tile shall be selected by the Contracting Officer from samples provided by the Contractor.

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

3.12.8.4 The ablution drain areas shall be recessed below the floor level 200 mm and lined with ceramic tile. Ceramic tile shall extend up the wall past the water spigots to a height of 2 m above finished floor. Seats shall be formed concrete with terrazzo tile finish to match the floor, 300 mm x 300 mm x 300 mm high finished dimensions. Color of ceramic tile shall be selected by the Contracting Officer from samples provided by the Contractor. Spacing between tiles shall be similar to terrazzo tile.

3.12.8.5 Kitchen in Dining Facility shall be covered with terrazzo flooring or quarry tile. Walls in kitchen shall be ceramic tile up to 2 m above finished floor. Floor in Dining area shall be terrazzo tile.

3.12.9 All other floors are to be completely cleaned and sealed epoxy. Color to be selected by the Contracting Officer from samples provided by the Contractor.

3.13 SPECIALTIES

3.13.1 Mirrors

0.6 m x 0.9 m, 6 mm plate glass shall be mounted above all lavatories. Mount bottom of mirrors 1.1m above finished floor.

3.13.2 Toilet Paper Holders

Toilet paper holders, stainless steel, shall be installed approximately 600 mm above floor.

3.13.3 Shower Curtain Rods & Shower Curtain

Shower curtain rods, stainless steel, heavy duty, 18 gauge shall be mounted between the screen walls of each shower stall. Mount rod at 2.0 m above finished floor. Provide a shower curtain with support rings for each shower stall.

3.13.4 Grab-Bars

Stainless steel grab-bars, heavy duty, 18 gauge, two each 900 mm and 1050 mm long, 40 mm diameter shall be mounted behind and beside all eastern toilets, and bathtubs as they occur.

3.13.5 Paper Towel Dispensers

Paper towel dispensers, 0.683 mm Type 304 stainless steel, surface mounted. Furnish tumbler key lock locking mechanism.

3.13.6 Light Duty Metal Shelf

Provide a 600 mm long, light duty stainless steel shelf and brackets over each lavatory.

3.13.7 Robe Hooks

Robe hooks on all toilet and shower stalls required.

3.14 COLD STORAGE ROOMS

3.14.1 Contractor shall provide the Contracting Officer shop drawings for approval of appropriately sized walk-in refrigerators and freezer to include proposed manufacturer, construction details, manufacturer's instructions, evacuation and charging procedures, operation and maintenance date, start-up and initial operational tests.

3.14.2 Walk-in coolers shall be panel type modular construction. Doors shall be swing type. Refrigeration equipment shall be remote located on the exterior of the building. Provide a temperature/ alarm system. Provide interior lighting with exterior switch. Floors of cool rooms shall be insulated panelized construction from the manufacturer of the cool rooms. The concrete floor will not be depressed.

3.14.3 Refrigeration piping shall be annealed or hard drawn seamless copper tubing in conformance with ASTM B280. Refrigeration systems shall be remote type.

3.14.4 Electrical characteristics shall match local power 380v/3ph/50Hz and 220v/1ph/50Hz.

Preservation and packing shall be commercial grade.

Provide a recording thermometer.

Provide temperature alarm with connector to remote temperature alarm.

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

Refrigeration Equipment

Refrigeration equipment shall be designed for remote installation. Design units for 16 to 18 hour operation at the indicated interior temperature in -18 degree C ambient temperature. Capacities, air delivery, and dimensions shall be as indicated. Remote condensing units shall be factory fabricated and rated in accordance with UL303 and ARI 365. Provide with motor, air cooled condenser, receiver, compressors, mounted on a common base. Compressors shall be hermetic type. Evaporators shall be

factory fabricated and rated in accordance with UL 412 and ARI 420. Forced convection, unit cooler type, made to suspend from the ceiling panels, with forced air discharged parallel to the ceiling. Provide with air circulating motor, multi-fin tube type coil and grille assembled within a protective housing. Air circulation motors shall be lifetime sealed, and the entire unit-cooler assembly shall be accessible for cleaning. Provide a drip pan and drain connection. When the cold storage room is used for freezing, provide an automatic electric heat defrosting system. Provide a timer type defrost controllers.

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

3.14.11 Submit a copy of installation instructions to the Contracting Officer covering both assembly and installation of the refrigeration equipment prior to start of

3.14.12 work. Start up and initially operate the systems upon completion of the installation of the equipment and refrigerant piping. Adjust the safety and automatic controls to place them in operating sequence. Record manufacturer's recommended readings hourly. Operational test shall cover a period of not less than 24 hours. Upon completion of Operational test the systems shall be performance tested. Test duration shall not be less than 8 hours. Test shall include the following information to be in the report with conclusions regarding the adequacy of the systems:

Time, dates and duration of tests:

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

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

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

3.14.15 Upon completion of the work and at a time designated by the Contracting Officer, provide instruction to designated personnel in the operation and maintenance of each refrigeration system. The period of instruction shall not be less than one 8-hour day.

4.0 STRUCTURAL

4.1 GENERAL

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

4.2 DESIGN

Design shall be performed and design documents signed by a registered professional architect and/or engineer. Calculations shall be in SI (metric) units of measurements. All components of the building shall be designed and constructed to support safely all loads without exceeding the allowable stress for the materials of construction in the structural members and connections. All building exterior walls shall be constructed with reinforced CMU, shotcrete 3-D panels, or reinforced concrete unless otherwise stated in sections 1010 or 1015.

4.3 STANDARDS

The Contractor should use the following American standards to provide sound structural design if local standards are not available, relevant, or applicable. The Contractor shall follow American Concrete Institute Standards for design and installation of all concrete structures.

Concrete strength	280.0 kg./sq.cm (f'c) (4000psi) a minimum specified compressive @ 28 days (ASTM-. C 39 and ACI 318) with a maximum water-cement ratio of 0.45.
Plaster strength	140.0 kg./sq.cm (f'c) (2000psi) conforming to ASTM C 926.
Steel Reinforcement	4218.0 kg./sq.cm(Fy= 60.0 ksi),yield strength.
Welded Wire Fabric	ASTM A185
Anchor Bolts	ASTM A307 using A36 steel.
Concrete Masonry Units	ASTM C90, Type I (normal wt, moisture Cntrl).
Mortar	ASTM C270, Type S (Ultimate compressive strength of 130.0 kg/sq. cm.)
Proportion	1 part cement, 0-1/2 part lime and 4-1/2 parts aggregate
Grout	ASTM C476 (Slump between 200 mm to 250 and Compressive Strength 14 MPa (2000 psi) at 28 days.
Joint Reinforcement	Standard 9 gauge minimum, Ladder Type
Structural Steel	ASTM A36: 2530.0 kg./sq.cm (Fy = 36,000psi)
Welding	AWS (American Welding Society) D1.1-2002.

4.4 DEAD AND LIVE LOADS

Dead loads consist of the weight of all materials of construction incorporated in the buildings. Live loads used for design shall be in accordance with the Structural Load Data, UFC-3-310-01, and edition as referenced herein.

4.5 WIND LOADS

Wind loads shall be calculated using a "3-second gust" wind speed of 135 km/hr.

4.6 SEISMIC

The building and all parts thereof shall be designed for the seismic requirements as defined by the International Building Code referenced herein. Spectral ordinates shall be $S_s = 1.28g$ and $S_1 = 0.51g$.

4.7 STRUCTURAL CONCRETE

Concrete structural elements shall be designed and constructed in accordance with the provisions of the American Concrete Institute, Building Code Requirements for Structural Concrete, ACI 318, latest edition. A minimum cylinder 28 day compressive strength of 21 MPa (3000 psi) shall be used for design and construction of all concrete, except that 24 MPa (3500 psi) shall be used for Shotcrete applications. Reinforcing steel shall be deformed bars conforming to American Society for Testing and Materials (ASTM) publication ASTM a 615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement. Concrete at or below grade shall have maximum water-cement ration of 0.45. No concrete shall be placed when the ambient air temperature exceeds 32 degrees C (90 degrees F) unless an appropriate chemical retardant is used. In all cases when concrete is placed at 32 degrees C (90 degrees F) or hotter it shall be covered and kept continuously wet for a minimum of 48 hours. Concrete members at or below grade shall have a minimum concrete cover over reinforcement of 75 mm (3 inch).

4.8 MASONRY

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

4.9 STRUCTURAL STEEL

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

4.10.1 Steel Roof Joists

Steel roof joists shall be placed according to the roof design and roof manufacturer specifications. Steel purlins shall be installed perpendicular to the steel beams. Use continuous metal roof sheets from ridge to eave to avoid constructing roof seams. In lieu of the continuous metal roof sheets, the Contractor can submit a plan for roofing seams; however, the plan must show a detail of how leaks will be avoided, and the Contracting Officer before application must approve the plan. Steel "hat channels" shall be installed on the bottom side of steel beams for the installation of gypsum board with screws. Provide all necessary metal framing for roof fascia and soffits. See structural paragraph for structural characteristics of steel joists.

4.10 METAL DECK

Deck units shall conform to SDI Publication Number 29. Panels of maximum possible lengths shall be used to minimize end laps. Deck units shall be fabricated in lengths to span three or more supports with flush, telescoped or nested 50 mm (2 inch) laps at ends, and interlocking, or nested side laps. Metal deck units shall be fabricated of steel thickness required by the design and shall be galvanized.

4.11 OPEN WEB STEEL JOIST

Open web steel joists shall conform to SJI Specifications and Tables. Joists shall be designed to support the loads given in the standard load tables of SJI Specifications and Tables.

4.12 FOUNDATIONS

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

4.13 EARTHWORK AND FOUNDATION PREPARATION

4.13.1 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 37.5mm and no more than 2 percent by weight passing the 4.75mm No. 4 size sieve and conforming to the soil quality requirements specified in the paragraph entitled "Satisfactory Materials."

4.13.2 Satisfactory Materials

Any materials classified by ASTM D 2487 as GW, GW-GM, GW-GC, SW, SW-SM, or SW-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.

4.13.3 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 75mm. The Contracting Officer shall be notified of any unsatisfactory materials.

4.13.4 Clearing and Grubbing

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

4.13.5 Stripping

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

4.13.6 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 percent 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 (3/4") 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 percent 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.

4.13.7 Structures with Spread Footings

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement. Fill over excavations with concrete during foundation placement.

5.0 GEOTECHNICAL

5.1 SOIL INVESTIGATION

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

5.2 GEOTECHNICAL QUALIFICATIONS

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

6.0 MECHANICAL

6.1 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.

6.2 SPECIALIST SUB-CONTRACTORS QUALIFICATIONS

The heating, ventilation, and air-conditioning works shall be executed by an air-conditioning specialist sub-contractor experienced in the design and construction HVAC equipment to include conventional compression 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. HVAC equipment will normally consist of split pack heat pump units with supplemental electric heating

elements, ducted packaged heat pump units with supplemental duct mounted electric resistance heaters, industrial quality unit heaters, air ventilation systems and specialized industrial ventilation systems. The HVAC heating and cooling load calculations shall be prepared using recognized HVAC load analysis programs such as Trane "Trace" or Carrier "HAP". The heating and cooling load calculations shall take into account the site elevation and ambient design temperatures when determining required HVAC equipment capacities and airflows. The HVAC specialist shall submit the complete HVAC analysis at the 65% design submittal. The HVAC analysis shall clearly state the type of systems to be used and how the system will satisfy the specified indoor design conditions. Provide related psychrometric charts showing the air wet bulb and dry bulb temperatures at each section of the heat/cool unit during both design heating and cooling operation.

Provide complete, edited specifications using the UFGS specs for selected HVAC system. The edited specifications shall be submitted along with the 65% design submittal. The specifications shall be coordinated with the manufacturer of the equipment.

6.3 CODES, STANDARDS AND REGULATIONS

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

6.4 DESIGN CONDITIONS

Outside Design Conditions (**Contractor shall verify the ambient conditions with available and reliable local weather data**).

Jalalabad area:

Latitude – (approx.) 34 deg. North

Longitude – (approx.) 70 deg. East

Elevation – (approx.) 580 M (1903 ft.)

Summer – 39.6 deg C (103 deg F) Dry Bulb (DB) [& 25.6 deg C (78 deg F)] Wet Bulb (WB)]

Winter – (4.6 deg C/40 deg F)

Daily Range – data unknown)

6.4.1 Indoor Design Condition

Enlisted Barracks	No cooling	Heating 20 C (68 F)
Senior Barracks	Cooling 25.6 C (78 F)	Heating 20 C (68 F)
Administrative buildings/Offices	Cooling 25.6 C (78 F)	Heating 20 C (68 F)
DFAC (Dining Area)	Cooling 25.6 C (78 F)	Heating 20 C (68 F)
Toilet/Shower/Laundry bldgs	No cooling	Heating 20 C (68 F)
Maintenance facilities	No cooling	Heating 12.7 C (55 F)
Communication building	Cooling 25.6 C (78 F)	Heating 20 C (68 F)
Storage buildings	No cooling	No heating
Arms Storage	No cooling	Heating 12.7 C (55 F)
Gymnasiums	Cooling 25.6 C (78 F)	Heating 20 C (68 F)
Guard towers/sheds	Cooling 25.6 C (78 F)	Heating 20 C (68 F)

Warehouses do not normally require any temperature control unless materials requiring special temperature control are stored. In general, warehouses, laundry, and storage buildings and vehicle maintenance bays shall be provided with ventilation to maintain the indoor conditions to 10 F above the summer ambient DB temperature. If the warehouse is to be occupied (people working), provide infrared heaters to spot heat the space where the people normally work. Vehicle maintenance bays shall be

provided with infrared heaters or unit heaters.

6.4.2 Noise Level

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

6.4.3 Internal Loads

- a. Occupancy: Use ASHRAE standards to calculate sensible and latent heat from people. In general, light/moderate office work is 73watts sensible and 45watts latent.
- b. Lighting: 21.5 W/m² (2 W/Ft²) 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).
- c. Outdoor Air: Outdoor ventilation air shall be provided per ASHRAE Standard 62.1 with the exception of guard towers, guard shacks, and storage facilities. In general this requires 2.5 L/s/Person (5 CFM/Person) and 0.3 L/s per square meter of floor space (0.06 CFM/sqft); outdoor air requirements can be satisfied by opening windows and doors for facilities without a ducted system. Latrine/Bathroom Exhaust– 85 CMH (50 CFM) per toilet, urinal, and shower head.
- d. Building Pressurization: 1.3 mm W.G. (0.05 in W.G.); Maintain negative pressure in latrine areas. This is only applicable for buildings provided with central ducted forced air systems

6.5 NEW AIR CONDITIONING & 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 ensures the equipment's performance meets the design heating and cooling sizing requirements.

Facility Type	Cooling	Heating	Type of HVAC System	Remarks
Enlisted Barracks	None	20C 68 F	Unit Heaters	Provide ceiling fans
Officers Barracks	25.6C 78 F	20C 68 F	Split pack heat pump units	
Battalion HQs	25.6C 78 F	20C 68 F	Ducted packaged heat pump	
Toilet/Shower/Laundry	None	20C 68 F	Unit Heaters	Provide adequate ventilation
Storage	None	7.2 C 45 F	Unit heaters	Provide adequate ventilation
DFAC (Dining Area)	25.6C 78 F	20C 68 F	Ducted packaged heat pump	
Comm/Maint	25.6C 78 F	20C 68 F	Ducted packaged heat pump	
Gymnasium	25.6C 78 F	20C 68 F	Ducted packaged heat pump	
POL Storage	None	7.2 C	Unit heater	Provide

		45 F		adequate ventilation
Arms Storage	None	7.2 C 45 F	Unit heater	Provide adequate ventilation
Vehicle Maintenance	None	12.7 C 55 F	Unit heaters or infrared heaters	Provide adequate ventilation
Enclosed Power Plant (Office space to be provided with split pack heat pump unit)	None	12.8C 55 F	Unit heaters	Provide adequate ventilation.
Guard House	25.6C 78 F	20C 68 F	Split pack heat pump	
Guard Tower	25.6C 78 F	20C 68 F	Split pack heat pump	

6.5.2 Unitary Ducted Heat Pump Units

Ducted, packaged heat pump units shall be provided for all large occupied buildings such as DFACs, Administrative, barracks and operational facilities. 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 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 DX coil, blower, supplemental electric heater elements, washable filter, and condenser 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 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. Heat pump units shall be limited to 10 tons each. Facilities requiring more than 10 tons of cooling shall be provided with multiple heat pump units.

6.5.3 Unitary (ductless split) Heat Pump Units

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

6.6 DUCTWORK

Air shall be distributed from central Air Handling Units (AHUs) to achieve proper airflow throughout the facility by means of air distribution ductwork. Air distribution system shall be comprised of supply and return ductwork, fittings, grilles, registers, and/or diffusers. Ductwork shall be constructed of galvanized steel or aluminum sheets and installed as per SMACNA "HVAC Duct Construction Standards (Metal and Flexible)." Flexible non-metallic duct may be used for final unit/diffuser connection in ceiling plenums.

These flexible duct run-outs shall be limited to 3 meters in length.

6.6.1 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.

6.6.2 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.

6.6.3 Branch Take-offs

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

6.6.4 Wall Penetrations

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

6.6.5 Air Filtration

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

6.6.6 Control Wiring and Protection Devices

Control wiring and protection of the air conditioning units being offered must be the manufacturer's standard, pre-wired, installed in the unit at the factory or as recommended. Thermostats shall be located near the unit return, and shall include lockable housing that allows viewing of settings without permitting access. For units serving more than one area, the thermostat shall be located near the return of the space with the highest heat generation.

6.7 COLD STORAGE ROOMS & CONEX BUILDINGS

6.7.1 Shop Drawings

Contractor shall provide the Contracting Officer shop drawings for approval of appropriately sized walk-in refrigerator and freezer to include proposed manufacturer, construction details, manufacturer's instructions, evacuation and charging procedures, operation and maintenance date, start-up and initial operational tests.

6.7.2 Modular Construction

Walk-in coolers shall be panel type modular construction. Doors shall be swing type. Refrigeration equipment shall be remote located on the exterior of the building. Provide a temperature/ alarm system. Provide interior lighting with exterior switch. Floors of cool rooms shall be insulated panelized construction from the manufacturer of the cool rooms. The concrete floor will not be depressed.

Walk-in freezer shall be able to maintain the product temperature between -10 to 0 deg F.

Walls, ceiling and flooring of the coolers and freezer shall not contain any wood or wooden material. Walls and ceiling shall be made of sandwiched panels filled with polystyrene or urethane insulation material. Panels shall be aluminum or stainless steel.

Ramps shall be provided at the door of the cooler and freezers.

6.7.3 Piping

Refrigeration piping shall be annealed or hard drawn seamless copper tubing in conformance with ASTM B280. Refrigeration systems shall be remote type.

6.7.4 Electrical

Electrical characteristics shall match local power 380v/3ph/50Hz and 220v/1ph/50Hz.

6.7.5 Packing Material

Preservation and packing shall be commercial grade.

6.7.6 Temperature Record & Control

Provide a recording thermometer. Provide temperature alarm with connector to remote temperature alarm.

6.7.8 Outdoor Condensing Unit

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

6.7.9 Refrigeration Equipment

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

6.7.9 Drain Lines

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

6.7.11 Installation Instructions

Submit a copy of installation instructions to the Contracting Officer covering both assembly and installation of the refrigeration equipment prior to start of work

6.7.12 Testing

Start up and initially operate the systems upon completion of the installation of the equipment and refrigerant piping. Adjust the safety and automatic controls to place them in operating sequence. Record manufacturer's recommended readings hourly. Operational test shall cover a period of not less than 24 hours. Upon completion of Operational test the systems shall be performance tested. Test duration shall not be less than 8 hours. Test shall include the following information to be in the report with conclusions regarding the adequacy of the systems:

Time, dates and duration of tests:

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

6.7.13 Operations & Maintenance

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

Upon completion of the work and at a time designated by the Contracting Officer, provide instruction to designated personnel in the operation and maintenance of each refrigeration system. The period of instruction shall not be less than one 8-hour day.

6.7.14 Clean-up

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

6.8 VENTILATION AND EXHAUST SYSTEMS

All fans shall be used for building ventilation and pressurization with capacities to be selected for minimum noise level generated. Unit mounted fans either used for supply or exhaust shall be centrifugal

forward curved, backward inclined, or airfoil fans with non-overloading characteristics of high efficiency and quiet running design. The fans shall be of the heavy-duty type with durable construction and proved performance in a desert environment. Each exhaust fan shall be provided with motorized or gravity dampers which close automatically when the fan is not running. Also, each fan shall be complete with vibration isolator, external lubricators, and all accessories and sound attenuators as necessary.

Consideration shall be given to the use of gravity type or turbine ventilators for warehouse and storage buildings. Gravity type and turbine ventilators require no electrical power to operate. Application of gravity or turbine ventilators shall be incorporated as much as practically possible.

Supply intake openings shall be provided with motorized dampers which are interlocked with the exhaust fan. The dampers open or close when the exhaust fan is on or off respectively.

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

Supply intake openings for gravity type or turbine ventilators shall be a louvered opening. Intake openings shall be adequately sized to induce convection flow through the gravity or turbine ventilators.

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

6.8.1 Kitchen Hood Exhaust and Make-up Air

As required and as per Kitchen design specialist and equipment supplier requirements. Exhaust flow rate shall be a minimum of 400 cfm per linear foot of hood length. The air velocity in the exhaust duct shall be limited to 1500 feet per minute. The designer shall take special note that multiple large propane stoves will be installed in the kitchen. The steam generated by the local style of cooking with large pots is immense in comparison to western standards, and the additional need for ventilation must be accounted for in the design. Also, the cooks are accustomed to standing on top of the stoves in order to stir the large cauldrons of food. This common cooking practice should be taken into consideration when designing the exhaust hood. The height of the hood above the stovetop should be such that a man of average stature could stand upright without risk of hitting his head on the hood. Design per NFPA 92A, 96, 204, and 211. Make up air intake shall be integral with the hood system or be located as close to the exhaust intake to prevent cold drafts. Non-integral makeup air shall be tempered within ten degrees of ambient air temperature.

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

6.8.2 Battery Room Exhaust

Battery room exhaust shall comply with Part 6 of UFC 4-229-01N dated 16 January 2004. The UFC is available at <http://www.wbdg.org/>. The exhaust fan for the lead acid shop shall be sized to provide a minimum of 3 ACH. The exhaust fan shall be sized larger when required for mechanical ventilation cooling. The fan shall have a non-sparking wheel and the motor shall be located out of the airstream. The ventilation system for the shop shall be designed to provide a negative static pressure by exhausting 10% more air than is supplied. Supply air for the shop shall be 100% outside air.

6.8.3 Submittals

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

6.9 ELECTRIC HEATERS

6.9.1 Unit Heater

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, very durable and securely fastened to the ceiling, wall or structure. Provide a self-contained electric heating unit, suspended from ceiling or structure, with fan and heating elements. Provide control-circuit terminals and single source of power supply with disconnect. Heating wire element shall be nickel chromium. Include limit controls for overheat protection of heaters. Provide tamper resistant integral thermostat.

6.9.2 Cabinet Heater

Use of cabinet heaters shall be limited to spaces requiring heating and is not subject to misuse or abuse. Use of cabinet heaters is allowed only as directed by the User. Provide a self-contained electric heating unit, recessed mounted in wall or structure, with fan and heating elements. Provide control-circuit terminals and single source of power supply with disconnect. Heating wire element shall be nickel chromium. Include limit controls for overheat protection of heaters. Provide tamper resistant integral thermostat.

6.9.3 Infrared Heaters

Infrared heaters shall be provided for spot heating of a large area such as maintenance bays and warehouses. Infrared heaters shall use electricity. Contractor shall position the infrared heaters to direct the radiant heat to only those areas where people normally work. Coordinate with User. Provide control-circuit terminals and single source of power supply with disconnect.

6.9.4 Submittals

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

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

6.10 TEST ON COMPLETION

6.10.1 After completion of the work, the Contractor shall demonstrate to the Contracting Officer that the installation is adjusted and regulated correctly to fulfill the function for which it has been designed. The Contractor shall test, adjust, balance and regulate the section or sections of concern as necessary until the required conditions are obtained. Operational test shall be conducted once during the winter and once during the summer. Coordinate with the Contracting Officer on when the test shall be scheduled. Include tests for all interlocks, safety cutouts and other protective device to ensure correct functioning. All such tests shall be carried out and full records of the values obtained shall be prepared along with the final settings and submitted to the Contracting Officer in writing.

6.10.2 The following tests and readings shall be made by the Contractor in the presence of the Contracting Officer and all results shall be recorded and submitted in a tabulated form.

- a. Ambient DB and WB temperatures
- b. Room Inside Conditions:
 1. Inside room DB & WB temperatures
 2. Air flow supply, return and/or exhaust
 3. Plot all temperatures on psychrometric chart
- c. Air Handling Equipment: Air quantities shall be obtained by anemometer readings and all necessary adjustments shall be made to obtain the specified quantities of air indicated at each inlet and outlet. Following readings shall be made:
 1. Supply, return and outside air CMH (CFM) supplied by each air conditioning system.
 2. Total CMH (CFM) exhausted by each exhaust fan
 3. Motor speed, fan speed and input ampere reading for each fan
 4. Supply, return and outside air temperature for each air-conditioning system.
- d. Electric Motors:

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

6.11 ELECTRICAL REQUIREMENTS FOR HVAC EQUIPMENT

- (a) Note that electrical requirements for all HVAC systems shall be designed and installed to operate on the secondary power standard required herein. The existing power distribution system may require modifications or upgrades to support the additional power required by the HVAC unit. The Contractor is responsible to field verify all the conditions and provide complete shop drawings showing any incidental power upgrades. All electrical work shall comply with the National Electric Code.
- (b) All thermostats shall be wall mounted near the return grilles in the room with the highest heat load generation and mounted 1.5 meters (5 feet) above the floor. In lieu of a thermostat, a temperature sensor may be located in the same location or in the return duct and connected to a thermostat located near the unit return. Thermostat shall be mounted 1.5 meters (5 feet) above the finished floor and be easily accessible. Thermostats for the latrine facilities shall be located near the unit return and mounted 1.5 meters (5 feet) above the finished floor. Operation of the control system shall be at the manufacturer's standard voltage for the unit.
- (c) The following are the minimum requirements for motors regarding enclosure, insulation and protection:
 1. Compressor Hermetic: Provide inherent (internal) overload protection.
 2. Condenser: Provide internal thermal overload protection.
 3. Evaporator (Open Class "A") fan motor type provides internal thermal overload protection.

6.12 CEILING FANS

6.12.1 Ceiling Fan

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

The electrical supply shall be 230volts, single phase, and 50 hertz. Install per manufacturers' instructions.

6.12.2 Submittals.

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

6.12.3 Submittals.

The Contractor shall submit the following for the equipment to be provided under this section of the specification: manufacturer's data including performance characteristics at design conditions; catalog cuts showing dimensions, performance data; drawings indicating location and installation details.

6.13 PROPANE COOKING STOVE

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

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

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

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

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

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

6.13.1 Propane Fuel Storage/Distribution

Propane Storage and Distribution shall be provided to support operation of the propane stoves for cooking and boiling tea. The bulk storage of fuels shall consist of above-ground horizontal steel tanks sized to store a 15-day supply of fuel. This single tank shall be complete with fill fittings, tank gauge, vent, and other fittings and appurtenances required for full and safe operation. Tanks shall be provided with support saddles, platform/stair and concrete pad. Bulk storage capacity shall be based on minimum four-week full load operation of the kitchen. Metal fuel tank saddles should not be placed directly on fuel

containment area slabs. They should be elevated on piers to avoid moisture corrosion. Propane storage tanks shall be provided and installed in accordance with NFPA 58. The propane storage tanks shall be installed on a concrete pad, and provided within an enclosure to protect the tanks from the elements. The Contractor shall coordinate with the User and the Contracting officer in determining the capacity of propane fuel required. The propane fuel capacity shall be based on frequency of cooking, consumption of fuel every cooking cycle, frequency and availability of replacement fuel tanks and spare capacity. This project will require that the Contractor provide the agreed to amount of fuel tanks filled with propane fuel at time of completion.

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

6.14 WOOD COOKING STOVE (NOT USED)

6.15 OPERATIONS AND MAINTENANCE (O&M) FOR MECHANICAL

- (a) 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.
- (b) The O&M manuals must be provided prior to any training activities. Manuals shall be "tri-lingual" in Dari, Pashto and English.
- (c) All control panels shall have tri-lingual name plates in Dari, Pashto and English.
- (d) 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.

7.0 PLUMBING

7.1 SCOPE OF WORK.

7.1.1 General

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

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

7.1.2 Sub-Contractors Qualifications

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

7.1.3 Standard Products

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

7.2 CODES, STANDARDS AND REGULATIONS

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

IPC – International Plumbing Code

NFPA - National Fire Protection Association

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

ASME – American Society of Mechanical Engineers

ASTM – American Society for Testing and Materials

AWS – American Welding Society

UFC 4-229-01N dated 16 January 2004

7.3 PLUMBING SYSTEMS REQUIREMENTS

7.3.1 Water

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

7.3.2 Piping Materials

Domestic water shall be distributed by means of standard weight (schedule 40) galvanized steel pipe, Polyethylene (PE) plastic pipe (schedule 40 or 80). Waste and vent piping can be made of either galvanized steel pipe (schedule 40), or Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 2665. Corrosion protection shall be provided if galvanized piping comes in contact with earth or masonry floors, walls or ceilings.

7.3.3 Plumbing Fixtures

The following typical plumbing fixtures shall be provided:

- a. Eastern Water Closet with flush tank assembly. Provide acid resisting fired porcelain enameled cast iron water closet complete with rotating No-Hub 'P' trap and No-Hub coupling to meet piping requirements. Eastern Style water closet shall be furnished with integral non-skid foot pads and bowl wash down non-splashing flushing rim. The water closet shall be completely self supporting requiring no external mounting hardware and shall be flush with floor. The Eastern Style water closet shall incorporate waterproofing membrane flashing flange. Provide a cold water spigot 300mm above finished floor on the right (from a perspective of standing inside of the cubicle and looking out) sidewall of the cubicle. Spigot shall have a flexible hose and spray nozzle such that the occupant can wash over the water closet. Toilets shall be oriented north and south. Toilets shall not face east or west.
Western style toilets shall be provided as requested by the User.
- b. Lavatories. All sinks shall be trough type constructed of block and concrete with ceramic tile exterior and lining capable of withstanding abuse. Provide maintenance access to waste piping and P-traps from under the sink. Lavatories inside the prison cells shall be tamper-proof with integral spout, soap depression, and outlet connection to slip 40mm OD tubing.
- c. Sink Faucets. LN faucets shall be vandal proof, heavy duty cast brass with chrome plating with separate hot and cold water valves for manual mixing. Faucet handles shall be cast brass alloy with chrome plating. **No goose neck faucet fixtures shall be used.**
- d. Janitor's Sink. Floor mount janitor, enameled cast iron with copper alloy rim guard. Provide hot and cold water valves with manual mixing. Faucet handles shall be cast brass alloy with chrome plating. Include a stainless steel shelf and three mop holders.
- e. Shower. Showerhead and faucet handles shall be vandal proof, heavy duty cast brass with chrome plating for the LN facilities and regular cast brass chrome plated for coalition facilities. 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 AFF with hot and cold-water controls, mixing valve and a diverter type valve so water can be directed to either the shower or to the lower faucet. Shower shall be provided with low flow shower head. The shower head shall be heavy duty type and securely fastened to the wall.
- f. Emergency Shower and Eye Wash Assembly. Provide emergency shower and or eye wash assembly in Power Plant and in other facilities where appropriate. Provide a floor drain in the area, if appropriate (where emergency water flowing on the floor may lead to additional safety or operational complications).
- g. Service Sink. Standard trap type, enameled cast iron. Service sinks provided in maintenance areas shall be concrete. Service sinks in battery rooms shall be acid resistant.
- h. Kitchen Sink. Single bowl shall be corrosion resisting formed stainless steel. Faucet bodies and spout shall be cast brass or wrought copper alloy. Handles, drain assembly, and stopper shall be corrosion resisting steel or copper alloy.
- i. Ablution Trench. See building floor plans for size and construction of trench and number of stations. Provide trench drain with brass grating and strainer. Provide each station with hot and cold water valves with manual mixing. Faucet assembly shall be vandal proof, heavy duty cast brass with chrome plating with separate hot and cold water valves for manual mixing. Faucet handles shall be cast brass alloy with chrome plating.
- j. Grease Interceptor (Exterior only). Shall be steel construction manual cleaning type with removable checker-plate cover complete with flow control valve. Tested and rated in accordance with PDI G-101. Concrete shall have a minimum compressive strength of 21 MPa (3045 psi) in 28 days (kitchen use only).

- k. Floor Sink (P-13). Provide floor sink, circular or square, with 300mm overall width or diameter and 250mm nominal overall depth. They shall have acid resistant enamel interior with cast iron body, aluminum sediment bucket and perforated grate of cast iron. Outlet size as indicated on plans.
- l. Floor or Shower Drain: Cast iron construction with galvanized body, integral seepage pan, and adjustable perforated or slotted chromium plated bronze, nickel-bronze, or nickel brass strainer consisting of a grate and threaded collar. Toilet room floor drains are similar except are provided with built-in, solid, hinged grate.
- m. Trench Drains: Floor trench shall be concrete construction with a cast iron grate. The cast iron grate shall be sectionalized and hinged so that it can easily be opened to clean out the trench. Iron grates shall be fabricated in sections in length not greater than 1500 mm. The floor trench shall be provided with perforated aluminum pan inserts which can be removed to clean out large food particles. The floor trench drain shall be adjustable perforated or slotted chromium plated bronze, nickel-bronze, or nickel brass strainer consisting of a grate and threaded collar. This style of floor trench shall be installed in the kitchen area of the DFACs in response to kitchen cleaning practices of the local national staff.
- n. Room hose bibs and floor drains shall be provided as required. Afghan dining facility kitchen area clean-up hose bib to be supplied with connecting hose on reel including approximately 12 meters of hose. Provide clean-up spray nozzle with hose assembly.
- o. Provide P-Traps per International Plumbing Code IPC for all fixture drains, floor and trench drains, and shower drains. P-traps shall have minimum of 50 mm water seal.
- p. Large Pot sink, provide clean-up spray nozzle with hose assembly.

7.3.4 Hot Water

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

7.3.5 Hot Water Heaters

The hot water shall be generated by electric water heaters with the exception of Latrine/Shower and large DFAC buildings (DFACs with seating for more than 250 personnel). The unit(s) shall be typically located inside a mechanical room, storage room, toilet/janitor room or similar type space. The unit(s) shall be of the commercially available tank type having low or medium watt density electric heating elements.

In cases where the pressure of the water coming into the tank will violate manufacturer recommendations, a pressure reducer shall be installed in the line before the water heater. Also, all water heaters shall be equipped with a blow-off valve that will empty into a nearby floor drain or to the exterior of the building.

7.4 WASTE, DRAIN AND VENT SYSTEM

Floor drains shall be provided in each room that contains a water source. Floor drains shall be provided in the mechanical equipment and toilet rooms as required. Floor drains shall be provided next to the electric water heaters. In mechanical rooms, floor drains shall be provided to avoid running drain piping long distances above or over the floor. A trench drain shall be provided for the DFAC Kitchen. All waste and vent piping shall be provided in accordance with the latest edition of IPC. Drain outlet shall use p-trap

system to trap sewer gases. P-trap drain should be a one-piece system without removable parts. Every trap and trapped fixture shall be vented in accordance with the IPC.

7.5 PLUMBING FOR BATTERY ROOMS

Water, drain and associated plumbing features for the battery room shall comply with requirements in Part 6 of UFC 4-229-01N.

7.6 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.

7.6.1 Compressed Air Systems

Compressed air system shall be in accordance with UFC 4-229-01N. Compressed air shall be provided using a packaged air-cooled electric motor driven compressor and ASME rated receiver with air cooler and moisture separator to remove moisture and oil. Compressed air system shall be capable of operation up to 200 psig maximum for 125 psig normal units. High-pressure system (above 200 psig) shall be provided to supply compressed air to equipment where required. Provide an engine driven air compressor where generator electrical power is unreliable. 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. Noise level of air compressor should not exceed acceptable db limits.

7.6.2 Waste/Hazardous Drainage

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

7.6.3 Drainage from Maintenance Areas

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

7.6.4 Generator Fuel Storage/Distribution

Fuel Oil Storage and Distribution shall be provided to support operation of diesel engine generators at the Power Plant, emergency generators and other locations. The bulk storage of fuels shall consist of above-ground horizontal steel tanks sized to store a 28-day supply of fuel, with containment dikes. These tanks shall be complete with fill tube and cap, suction tube, tank gauge, vent, and other fittings and appurtenances required for full and safe operation. Tanks shall be provided with support saddles, platform/stair and concrete pad. Fuel shall be transferred from the bulk storage tanks by duplex transfer

pumps into individual day tanks. Fuel piping shall be fiberglass for underground and steel for piping located above grade. Bulk storage capacity shall be based on minimum four-week full load operation of the plant. Metal fuel tank saddles should not be placed directly on fuel containment area slabs. They should be elevated on piers to avoid moisture corrosion. Fuel containment area should have a sump or manually controlled water release valves for water removal.

7.5.4.1 Filling System

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

7.6.5 Motor Pool Fuel Point (Storage/Dispensing)

Fuel storage and distribution shall be provided to support the vehicles used at various locations on base. The fuels shall be stored in one or more above-ground or underground horizontal steel tank as per capacity schedule given below.

Motor Pool 38,000 liters of Diesel and 10,000 liters of MOGAS.(for standard Battalion size compound) unless otherwise stated in the 1010 Scope of Work.

These tanks shall be complete with fill tube and cap, suction tube, tank gauge, vent, and other fittings and appurtenances required for full and safe operation. Tanks shall have overfill protection devices and remote overfill alarm. Tanks shall be provided with support saddles, platform/stair, concrete pad and leak spillage containment provisions. Fuels shall be transferred from the storage tanks by transfer pumps located within the fuel dispensing units. Fuel piping shall be fiberglass for underground and steel for piping located above grade. Provide separate dispensing units for diesel and MOGAS. Each dispensing unit shall be equipped with dual nozzles and key control. Fuel dispensing unit shall be installed on an island such that two vehicles can simultaneously fuel on either sides of the dispensing unit. Coordinate site design and route all contaminated drainage water from the fuel dispensing pad through an oil/water separator. Provide containment per applicable criteria.

Fuel point and ammo storage protection consists of reinforced concrete barriers that can be prefabricated or constructed at the site. The protection and should be placed over at least two sides and have a concrete top.

7.7 TESTING AND COMMISSIONING

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

8.0 FIRE PROTECTION

8.1 GENERAL

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

8.2 BUILDING CONSTRUCTION

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

8.3 LIFE SAFETY

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

8.4 FIRE PROTECTION EQUIPMENT

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

8.5 FIRE DETECTION AND ALARM SYSTEM

Smoke detection – see electrical section for more fire alarm and detection details. Smoke detectors are required for each building. Smoke detectors shall have back up battery power and be installed according to all applicable fire protection codes. Fire detection and alarm systems shall be provided as required by NFPA 101 and UFC 3-600-01 and listed herein. Required fire detection and alarm systems shall be designed and installed in accordance with NFPA 72.

8.6 WATER SUPPLY FOR FIRE PROTECTION

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

8.7 PORTABLE FIRE EXTINGUISHERS

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

9.0 ELECTRICAL

9.1 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. The new phase or addition shall interface with the existing installation electrical system. Attached sheets ANA-E-01, ANA-E-02, and 1100-E-07 show the present existing conditions. The contractor shall coordinate with the present contractor on site for the final configuration and conditions.

9.2 DESIGN CRITERIA

9.2.1 Applicable Standards

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

9.3 MATERIAL

9.3.1 General

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

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

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

9.3.2 Standard Product

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

9.3.3 Design Conditions

All equipment shall be rated and designed for 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.

9.3.4 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.

9.4 DESIGN REQUIREMENTS

9.4.1 Power Plant

The existing on-site Prime Power Generating Plant consists of a separate generator area, high voltage switchgear room, office area and a storage room. There are three empty generator bays, provided with necessary conduit stub-up etc. for future equipment, room for switchgear expansion, and room for two future step-up transformers. Electrical equipment for the addition to the generating plant shall include, but not be limited to, diesel engine generators, expansion of the medium voltage switchgear, step-up transformers, compressors, pneumatic tanks, day tanks, relaying equipment and all other auxiliary equipment that is necessary for operating the addition to the prime power plant. All equipment items should have brief instructions posted on them in English and Afghan languages. Final generating capacity of the power plant design only shall be for the ultimate site demand load based on the master (site) plan plus 25% spare capacity for any future load growth. Secondary wiring within the building shall be per paragraph 'Secondary Power Distribution System' below. All cabling within the Power Plant associated with Power Generation (Generator to Transformer to Switchgear) shall be installing underground.

9.4.1.1 Generators

Generators shall be skid mounted standard industry size, 1500 RPM, diesel-engine Prime Power rated units. Number of units shall be based on the N+2 principle. Where 'N' would represent number of units required to meet the ultimate demand load plus 25% spare capacity and '+2' would represent spare generators available at all times. Contractor shall consider building sq footage of existing and any known future buildings planned for calculating ultimate electrical demand loads. Generating voltage shall be 3 phase, 380 volts, and 50 hertz, stepped up to 20kV, via transformers, for base wide Primary Power Distribution through the generator switchgear described below. Generator starting may be either pneumatic or electric, at the Contractor's option. Each generator shall be provided with a day tank with a minimum fuel capacity of 8 hours operating at 100% generated rated (kW) load. The generators shall be 1000KW (1250 KVA) to match existing. Contractor shall select generators with 380 V generating voltage and step-up to 20kV via 1000 kVA transformers for distribution. The Contractor shall schedule transformer and other long lead-time power submittals in time for approvals, procurement, delivery and installation to establish permanent power as soon as possible.

9.4.1.2 Medium Voltage (20 kV) Switchgear

The existing switchgear is dead-front type (i.e. no live parts shall be exposed) switchgear that consists of a Generator Bus and a Distribution Bus. Both buses are connected via a bus-tie circuit breaker. The distribution Bus is provided with three (3) 20 kV feeder circuit breakers. The new circuit breakers in the switchgear shall be 1600 A vacuum or SF-6 gas filled type. Concrete encased high voltage feeder cable duct-bank shall be providing from each breaker cubicles to outside manhole(s). Spare conduit shall be providing in each duct-bank. Conduits shall be PVC, minimum 100 mm (4 inch) in diameter.

9.4.1.3 Generator Synchronizing Equipment

Generator synchronizing/paralleling equipment shall be providing, in order for the generator(s) to synchronize with an operating generator, prior to coming on-line. The new synchronizer shall function with the existing system. Minimum of one (1) prime power generator shall be on line at all times. The new generators and synchronizers shall operate with the existing Automatic Synchronizing Transfer Switch for automatic transfer of power when switching from one generator to another when the electrical demand load is below 90% of a single generator, and shall automatically start and synchronize the second generator when the first is operating above 90% capacity so as to allow both generators to equally share the demand load. When only one generator is required, transfer between generators is fully automated with a programmable time clock. The other generator(s) shall run through a complete cool down cycle and then stop. Similarly, with the decrees in the demand load, the generator(s) shall drop-off line, one at a time, keeping a minimum of one generator operating on-line. All generator(s) shall go through a cool down cycle prior to coming to stop. All relaying shall be automatically reset for automatic restart and stopping of generators, as the load demands increases or decreases. Load sharing by the stand-by generator(s) shall be adjustable between 50% to 90% load on the operating generator(s). Synchronizing/paralleling of generators shall be automatic and manual.

9.4.1.4 Load Bank

A 1000kW 380V, 4 pole load bank is already provided as part of the existing system.

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

9.4.1.6 Miscellaneous

Contractor shall be responsible for providing all relaying, metering and grounding equipment necessary for safe and efficient operation of the new generators added to the power plant. Relaying shall include, but not be limited to, differential, locking-out, over current, directional, reverse power,

9.4.1.7 Operating Instructions

Contractor shall provide, mounted in a frame, an updated complete electrical one-line diagram of the power plant with detail operating instruction. Instruction shall be mounting on a wall inside the switchgear room.

Similarly, complete fuel and cooling system schematic diagrams shall also be providing in the switchgear room. Brief operating instructions shall be post on major components in the power plant. These instructions shall be written in English and Afghanistan language.

9.4.2 Site Primary & Secondary Power Distribution System

Primary (20kV 'Delta') and secondary power distribution (380/220V 'Wye') shall be underground. Design and installation of primary and secondary power distribution systems shall be complete and in compliance with the requirements of the National Electrical Safety Code (ANSI/IEEE C2), UFC 3-550-03FA (also called Army TM 5-811-1), National Electrical Code (NFPA 70), and other electrical references listed in this RFP. Site-wide primary power distribution system is designed (laid-out) to be serviced by three (3) high voltage feeders. All feeders are provided with feeder-to-feeder tie capabilities to transfer loads between feeders. Feeder tie points are located in the field and away from the Power Plant. The contractor shall extend the existing primary distribution system and relocate the feeder tie point to the far end of the system, allowing the feeders to be tied together in the same manner as the existing system. Primary power distribution shall be complete, to include but not be limited to, fused cut-outs, arresters, terminals, cable guards, circuit breakers, transformers, and related items. All primary feeder taps shall be protected with fused cutouts. Long feeder runs shall be provided with sectionalizing devices, such as, in-line fuses, sectionalizer or recloser, as necessary. Minimum of 3 fuses, with appropriate rating, shall be provided as spares at each fused cut-out location. The Contractor shall complete a power system analysis for the entire site and provide site power load calculation to determine the total site power requirements, and the power production requirement for the power plant. The Contractor shall perform load calculations to determine the number of required transformers to feed all facilities in this project, to include future facilities. All power system analysis and load calculations shall be submitted as part of the 35% Design Analysis, and revised/updated for each design submittal. Primary Distribution shall be installed in accordance with the NESC, UFC 3-550-03FA, and other applicable standards listed in this RFP.

9.4.3 Raceways

Exterior raceways (conduits) shall be installed at a slope towards a manhole or hand-hole to avoid collection of water in the raceway. Conduit shall be PVC, thin-wall for concrete encasement and hardwall (Schedule 40) for direct burial. Direct buried conduit shall only be installed for street lighting circuits. Direct buried conduits shall be encased in concrete, when under paved areas or under road crossings. Primary and secondary cables shall be installing in conduit no less than 100mm (4 inch) in diameter. Secondary cable shall be installed in conduit no less than 50mm (2 inch). Direct buried conduit shall be installing 610mm (24 inch) below grade. All underground conduits shall use long-sweeping elbows. All communications conduits shall use long-sweeping elbows.

9.4.4. Existing Services / Building Loads

Contractor shall connect all existing active electric services to facilities in the Base, to the new power distribution system provided under this contract. Connection of existing services to the new system shall be via appropriately sized pad-mount transformer(s) and coordinated with the Contracting Officer.

9.4.5 Transformer Substations: Transformer substations shall be strategically located close to the loads. Dedicated transformer substations shall be provided for large loads. Transformers shall be Primary 'Delta' and Secondary 'Wye' connected. Primary side load-break disconnecting means shall be provided with all transformers. All transformers shall be 800kVA to match existing. Transformer substations shall be dead front, loop-feed, pad-mounted, compartmental, self-cooled type. Transformers shall come complete from manufacturer; use of third party transformer housings or add-on transformer housings shall not be permitted. Transformers shall

have no exposed live components. Transformer selection, design, and installation shall be governed by NEC, NESC, ETL 1110-3-412, TM 5-684, UFC 4-510-01, UFC 3-550-03FA, UFC 3-550-03N, IEEE C57.12.28, ANSI/IEEE C57.12.22, IEEE C57.12.34, and C57.12.80.

Size of transformers, generators, and power feeds shall be governed by UFC 4-510-01, NFPA 99, and the NEC. In case of conflict between transformer design criteria between the above named standards, UFC 4-510-01 shall govern; in cases where UFC 4-510-01 can not resolve the conflict, it shall be brought to the attention of the Contracting Officer for resolution.

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

9.4.7 Secondary Power Distribution System

Secondary Power shall be 380/220 volts, 3 Phase, 4 Wires, 50 Hz. Building secondary power distribution system shall include main distribution, lighting and power panels as required. All panel boards shall be circuit breaker 'bolt-on' type panels. In large buildings separate lighting and power panels shall be provided. The minimum size circuit breaker shall be rated at 20 amperes. Circuit breakers shall be connected to bus bar(s) within the panel boards. Daisy chain (breaker-to-breaker) connection(s) shall not be acceptable. Indoor distribution panels and load centers shall be flush mounted in finished areas. All circuit breakers shall be labeled with an identification number corresponding to the panel schedule. A 3-pole circuit breaker shall be a single unit and not made up of 3 single pole circuit breakers connected with a wire or bridged to make a 3-pole breaker. All wiring shall be copper, minimum # 12 AWG (4mm sq), recessed in finished areas and surface mounted in metal conduits in unfinished areas. Conductors shall be size in accordance with NFPA 70. The use of 75 or 90 degree C (minimum) terminal and insulated conductors is required. Use of 75 degree C conductors on circuits with protective terminals rated for 60 degree C is inappropriate. All panels shall be providing with a minimum of 25% spare capacity for future load growth. Power receptacles (outlets) shall be duplex, 20A/240 volts, 50 HZ, German (DIN) Standard. All splicing and terminations of wires shall be performed in a junction or device boxes. Proper wire nuts/connectors shall be used for splicing wire. No twist-wire connections with electrical tape wrapped around it shall be acceptable. All electrical installation shall be in accordance with the requirements of NFPA 70 (National Electric Code). Main Distribution Panel shall be provided with an ammeter, voltmeter and kilowatt-hour meter. Selector switch shall be provided for reading all 3 phases. All service entrance cables and equipment, such as main distribution panels etc., to the facilities shall be sized for the ultimate facility loads, to include any heating loads (infrared heating), initial and future provided by others.

9.4.8 Receptacles

General purpose receptacles shall be duplex, grounding (earthed) type, "flush" or "semi-flush" wall mounted type, color ivory and installed 450 mm above finished floor (AFF). In office or similar areas receptacles shall be provided at every 3.66 M intervals. In maintenance buildings 3-duplex receptacles shall be provided at each vehicle maintenance bay. In storage buildings, receptacles shall be providing in 10 m intervals. In communications rooms, receptacles shall be provided at 1 m intervals or closer. CEE Type receptacles with plugs 2P+E (240v) or 3P+E (380v) and with appropriate rating, shall be provided for, but not be limited to, washers, dryers, kitchen equipment and any other type of large pluggable equipment. Receptacle shall be complete to include box, cover plate and necessary screws/connectors

and of the type most commonly used in Afghanistan. Receptacles near sinks or lavatories shall be switch operated and Ground Fault Circuit Interrupter (GFCI), or Residual Current Disconnect (RCD) type, with the trip setting of 10 milliampere or less. Sinks will have a receptacle above, with one dual receptacle serving two sinks that are side-by-side. Receptacles in wet/damp areas or within 1 meter (~3 feet) of sinks, lavatories, or wash-down areas shall be ground fault circuit interrupter (GFCI) type or Residual Current Disconnect (RCD) type, with the trip setting of 10 milliamperes or less. Total number of duplex receptacles shall be limited to six (6) per 16- or 20-ampere circuit breaker.

9.4.9 Lighting

Light Fixtures: Lighting fixtures shall be a standard manufacturer's product. Fluorescent light fixtures shall be power factor corrected and equipped with standard electronic ballast(s). All light fixtures shall be capable of receiving standard lamps used locally. Light fixtures shall be mounted at 2.5M (8 ft), minimum, AFF. Fixtures may be pendant or ceiling mounted, depending on the ceiling height. All fixtures shall be fully factory wired. Lighting levels shall be as follows:

General Office Space / Computer Rooms 50 FC (540 Lux)
Conference Rooms 30 FC (320 Lux)
Dinning Rooms 30 FC (320 Lux)
Laundry Rooms 30 FC (320 Lux)
Bed Rooms 30 FC (320 Lux)
Kitchen 70 FC (750 Lux)
Lobbies 15 FC (160 Lux)
Lounges 15 FC (160 Lux)
Mechanical, Electrical Equipment Rooms 15 FC (160 Lux)
Stairways 20 FC (215 Lux)
Toilets 20 FC (215 Lux)
Storage Rooms 15 FC (160 Lux)
Corridors 10 FC (110 Lux)
Parking Lots 0.5 FC (5 Lux)

9.4.9.1 High Ceilings

Contractor may provide high bay High Pressure Sodium (HPS) vapor light fixtures in facilities with high ceilings, provided that the replacement lamps for the fixtures are available locally. Indoor lighting for all areas shall consist of fluorescent surface mounted light fixtures. Exterior lighting will be installing as referenced. Moisture resistant/waterproof fluorescent light fixtures shall be provided in high humidity and wet areas such as latrines and showers. Battery powered 'emergency' and 'exit' lights shall be provided within each building, as applicable, for safe egress during a power outage. All light fixtures shall be factory finished, complete and operational, to include but not be limited to, lens, globe, lamp, ballast etc. Industrial type fluorescent light fixtures shall not be use, except in unfinished mechanical or electrical service rooms. HID Metal Halide light fixtures may be providing in the generator / high bay area(s). Fluorescent light fixtures shall be providing in the remaining areas. Emergency lighting, emergency egress 'exit' lights and exterior building lighting shall be provide as necessary.

9.4.9.2 Emergency "EXIT" Light Fixtures

Emergency "EXIT" light fixture shall be provided in accordance with NFPA requirements. Fixtures shall be single sided and for wall and/or 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/reset and lamp failure indication buttons. Primary operating voltage shall be appropriate for the available secondary voltage. Lettering "EXIT" shall be color red and not less than 6 inches (150 mm) in height and on matte white background. Illumination shall be via LEDs.

9.4.9.3 Above Mirror Lights

Above mirror lights shall be provided in toilet rooms.

9.4.9.4 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/reset and lamp failure indication buttons. Primary operating voltage shall be 220 volts.

9.4.9.5 Light Switch

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

9.4.10 CONDUCTORS

All cable and wire conductors shall be copper. Conductor jacket or insulation shall be color coded to satisfy local utility requirements. Conductors shall be sized in accordance with this RFP and the listed codes and standards. For interior wiring, the use of 75 or 90 degree C (minimum) terminals and insulated conductors is required. Use of 75 degree C conductors on circuits with protective device terminals rated for 60 degree C is inappropriate. Wire size shall be a minimum of 4mm² (#12 AWG).

9.4.11 GROUNDING AND BONDING

In general, grounding and bonding shall comply with the requirements of NFPA 70 and NFPA 780, and UFC 3-550-03FA. Generating equipment shall also comply with the requirements of UFC 3-540-04N. Underground connections shall be exothermal welded. All exposed non-current carrying metallic parts of electrical equipment in the electrical system shall be grounded. Insulated grounding conductor (separate from the electrical system neutral conductor) shall be installed in all feeder and branch circuit raceways. Grounding conductor shall be green-colored, unless the local authority requires a different color-coded conductor. Ground rods shall be copper-clad steel. Ground resistance shall not exceed 25 ohms when measured more than 48 hours after rainfall using the fall of potential method outlined in IEEE 81. Communications Building: Grounding and Bonding shall meet the requirements of ANSI/TIA/EIA-942, IEEE 81.2 and IEEE 1100, as well as the NEC. Ground resistance shall not exceed 5 ohms when measured more than 48 hours after rainfall using the fall of potential method outlined in IEEE 81. A ground ring shall be installed around the communications building. Power plant: Grounding and Bonding shall meet the requirements of ANSI/TIA/EIA-942, IEEE 81.2 and IEEE 1100, as well as the NEC. Ground resistance shall not exceed 5 ohms when measured more than 48 hours after rainfall using the fall of potential method outlined in IEEE 81. A ground ring shall be installed around the Power Plant.

9.4.12 LIGHTNING PROTECTION

Vehicle Refueling Point, Refueling Vehicle Maintenance Facility, POL Storage Building, Arms Storage Clinic, and Medical Clinic shall have a lightning protection system installed per the NEC and NFPA 780, as well as other applicable standards listed in this document. Medical clinic lightning protection requirements shall also meet the requirements in UFC 4-510-01. Ammo Supply Point and all fueling areas shall also implement static electricity controls in accordance with standards listed in this document.

9.4.13 ENCLOSURES

Enclosures for exterior applications shall be NEMA Type 4X (IEC Classification IP56) or better and for dry interior locations NEMA Type 1 (IEC Classification IP10) or better. For wet indoor locations, NEMA type 3S (IEC Classification IP54) or better shall be used.

9.4.14 FIRE DETECTION & ALARM SYSTEM (NOT USED)

Per directions from the Host Nation, no Fire Detection and Alarm System shall be provided in the facilities to be used by the Host Nation's personnel. However, Fire Alarm System shall be provided, as described below, in the facilities to be used by the U.S. Personnel. Fire Detection and Alarm System shall consist of hard-wired, multi-station smoke detectors, with building wide annunciation. No Fire Alarm System shall be provided in the Dining/MWR Facility.

Fire alarm cable shall be installed in recessed hard wall PVC conduit and plastered over it. In addition to building wide fire alarm annunciation, the system shall also be capable of automatically transmitting the alarm signal via telephone lines to the local Base Fire Department / Fire Station. System design shall be in accordance with the requirements of NFPA 72. Fire alarm system shall be complete and a standard product of one manufacturer. Contractor shall provide hard-wired carbon monoxide (CO₂) detectors, with local in-room annunciation, in all rooms where wood burning or oil-fired heaters will be provided.

9.4.15 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.

9.4.16 CONDUIT RACEWAY SYSTEM

Metal conduit system shall be complete, to include but not limited to, necessary junction and pull boxes. 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 NFPA 70 requirements. Exterior conductors below grade shall be installed in concrete encased PVC conduit at a depth of 1220 millimeters.

9.4.17 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 NFPA 70 requirements.

9.4.18 TELEPHONE/COMPUTER NETWORK SYSTEM

Each Corps Brigade, and Battalion HQ building office, room shall have telephone and computer data outlets. Telephone/data System shall include cross-connect boxes, duplex RJ-45 telephone outlets with a minimum of 4 pair Category 5 Enhanced (CAT 5e) cable terminating at each outlet (jack). The Contracting Officer shall determine outlet locations for individual rooms. Telephone wiring shall be recessed in finished areas and surface mounted in metal conduits in unfinished areas. Two 4 inches conduits shall be providing from the cross connect box to the outside communication hand-hole. See paragraphs 10 thru 10.16 below for additional requirements for communications systems.

9.4.19 TELEVISION SYSTEM

Television System shall consist of television outlets and an empty metal conduit raceway system, to include necessary junction boxes and pull wire. The Contracting Officer shall determine outlet locations. Television monitors, coaxial cable any amplification devices shall be provided by others. One 2 inches conduit shall be providing from the television junction box to the outside communication hand-hole.

9.4.20 IDENTIFICATION NAMEPLATES

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

9.4.21 SCHEDULES

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

9.4.22 SINGLE LINE DIAGRAM

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

9.5 OPERATIONS AND MAINTENANCE (O&M) FOR ELECTRICAL

- (a) 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.
- (b) The O&M manuals must be provided prior to any training activities. Manuals shall be "tri-lingual" in Dari, Pashto and English.
- (c) All control panels shall have tri-lingual name plates in Dari, Pashto and English.
- (d) 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.

10. COMMUNICATIONS SYSTEM

10.1 General

10.1.1. Applicable Specifications

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
RUS Bulletin 1753F-201 (1997) Acceptance Test and Measurements
Of Telecommunications Plant
RUS Bulletin 1753F-208 (1993) Specifications for Filled
Telephone Cables with Expanded
Insulation (PE-89)
RUS Bulletin 1753F-401 (1995) Standards for Splicing Copper
And Fiber Optic Cable (PC-2)
RUS Bulletin 1753F-601 (1994) Specifications for Filled
Fiber Optic Cables (PE-90)

RUS Bulletin 1753E-001 (1996) RUS General Specification for Digital, Stored Program Controlled, Central Office Equipment, RUS Form 522.
RUS Publication IP 344-2 (2006) List of Materials Acceptable For Use on Telecommunications Systems of RUS Borrowers.
RUS Bulletin 345-65 (1978) Shield Bonding Connectors (PE-33)
RUS Bulletin 345-83 (1982) REA Specification for Gas Tube Surge Arrestors (PE-80)
RUS Bulletin 1753E-001 (1996) RUS General Specification for Digital Stored Program Controlled Central Office Equipment, (Form 522)
American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association
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

10.1.2 Communication Systems Design

The communications system for Jalalabad is to be designed, supplied and constructed by the Contractor. The design and construction of the systems shall be in accordance with the references and the requirements contained herein.

10.2 Exterior Communication Manhole System

The contractor shall extend the existing manhole/handhole and duct system. The manholes and hand-holes shall be constructed in accordance with the contract drawings. The maximum distance between manholes and/or hand-holes shall be 140 m (450 ft). The ducts shall be direct buried with a minimum of 1000 mm of properly tamped dirt/backfill on the top. Hand-holes shall be installed in laterals in between manholes and buildings and only where the distance between the main duct system and the building is 100 meters or more. The maximum number of ducts in a hand-hole wall shall be two, with one having four (4) inner ducts installed unless there are two buildings close by and can be fed from one hand hole. In this case, four (two with inner ducts) conduits can be installed in the walls.

10.3 Exterior Conduit

The underground conduit for the manhole and duct system shall be direct buried (1 meter below surface), 100 mm DB type PVC or schedule 40, PVC. Inner ducts shall be four (4) 25mm PVC or PE inner ducts field installed in the outer-duct. The inner ducts shall be installed in the duct face and secured with properly sized duct plugs which expand to seal the duct. The ducts will be reinforced concrete encased where a road or taxi way is crossed. The ducts (inner and outer) shall be listed on the RUS list of materials acceptable for use on RUS projects. Cable racking diagrams (manhole/hand-hole butterflies) shall be provided for the manholes and hand-holes. The minimum duct configuration in the main duct system shall be a six way duct, being three conduits wide by two conduits deep (3 X 2) with two of the conduits having inner-ducts installed. Laterals off of the main duct system manhole to manhole shall be a minimum of a 4 way (2x2) with one duct having inner ducts. The duct system from the manhole/hand hole to a building with cable installed shall be a 1x 2, 100 mm PVC duct bank with one duct having inner ducts. The duct system from a manhole/hand hole to a building with allocations only shall be two (2), four inch (100mm) DB type PVC conduits stubbed out 3 meters from the manhole/hand hole. All conduits shall be terminated in ABS plastic terminators cast into the walls of the concrete structures. In manholes, all conduit windows shall be recessed.

10.4 Exterior Telephone Cable

The Contractor shall install copper and fiber optic cable in accordance with the references and the cable requirements listed below. The copper cable shall be 24 AWG, RUS PE89 type, foam skin polyolefin, with

an outer layer of solid colored polyolefin and a copolymer coated 8 mil aluminum tape shield. The fiber optic cable shall be a single mode, RUS PE90 type, with a 6 mil, copolymer coated steel shield. The fiber shall not have any internal splices and have a maximum loss of .4dB/Km at 1310nm and .3dB/Km at 1550nm. The copper and fiber optic cable shall be installed, grounded/bonded, spliced and tested in accordance with RUS standards.

10.5 Splices

10.5.1 Copper Splices

25 pair modules shall be used on copper splices 25 pairs or greater and discrete connectors shall be used on lesser count cable splices. The copper splice closures shall be flash tested with nitrogen in accordance with the manufacturer's recommendations before encapsulation. The encapsulant shall fill all of the splice interstices. The copper splicing connectors, bonding hardware, splice closures and encapsulant shall be on the RUS list of material acceptable for use on RUS projects, IP 344-2. Bonding and grounding shall be in accordance with the RUS standards. The copper splice closure shall be installed by the copper splicer only. The copper cable splicer (s) shall have 7 years documented unsupervised experience in the installation of the splice closure being used and 7 years experience splicing RUS type cable.

10.5.2 Fiber Optic Splices

The fiber optic splice closure shall be equipped with splice trays that properly hold the fusion splice protectors (stainless steel rod with heat shrink tube). The splice loss shall be .02dB or less as measured by the fusion splicing machine and .2dB as measured by an OTDR. The fiber optic splice closure shall be flash tested with nitrogen in accordance with the manufacturer's recommendations and also be listed in RUS IP 344-2. All bonding hardware shall also be listed in RUS IP 344-2. Bonding and grounding shall be in accordance with the RUS standards. The fiber optic splice closure shall be installed by the fiber optic splicer only. The fiber optic cable splicer (s) shall have 7 years documented unsupervised experience in the installation of the splice closure being used and with RUS cable. The fiber optic splice shall also have a minimum of 7 years documented unsupervised experience with fusion splicing machines and a minimum of three years with the particular make and model of the machine that will be used.

10.6 Main Distribution Frame

The contractor shall route all communications to the Main Distribution Frame in the existing communications building.

10.6.1 Protected Entrance Terminals

Building Protected Entrance Terminal, 25, 50 or 100 Pair

The PETs shall consist of an input splice chamber with punch down blocks for the copper cable pairs, a protector field for 5 pin connectors and a factory installed output punch down block terminal for each outside plant cable pair. The PET shall be listed in RUS 344-2. The station cables shall be terminated on a field installed category 5e, 110 type punch down block and jumpers shall be installed between the PET block and the field installed block to connect dial tone to the outlet.

10.6.2 Protected Entrance terminal, 6 or 12 pair. The PETS shall consist of blocks with two well type heavy duty gas tube protector units. The six pair shall consist of three units where as the 12 pair will consist of 6 units. Every building with terminated cable shall be equipped with gas tube protectors. The station cables will be terminated on a category 5e 110 "station" block and jumpers shall be installed between the PET and the "station" block to connect dial tone to the outlet.

10.7 Patch Panels

10.7.1 Fiber Optic Patch panels, all buildings with data outlets.

The fiber optic terminations shall consist of the outside plant cable being fusion spliced to single mode pigtails with factory installed SC connectors. The fusion splice shall have a splice loss of .02 dB or better as measured by the splicing machine and .2dB as measured by an OTDR. The pigtails shall have a singlemode insertion loss of less than .35dB with the typical being 15 dB and a singlemode return loss better than -55dB. The fusion splices shall be protected by a stainless steel sleeve and heat shrink tube and placed in a splice tray. The terminations shall be contained in a wall mounted hinged door enclosure. The enclosure shall be equipped with hardware to properly store 1 meter of fiber slack. The enclosure shall be designed to handle adapter panels with three duplex SC connectors per adapter panel. The SC connectors shall have zirconia ceramic sleeves. The enclosure shall be capable of mounting four (4) adapter panels. Blank adapter plates shall be used wherever there are no fiber optic adapter panels. One duplex single mode fiber optic patch cord shall be provided for each duplex fiber optic port. The fiber patch cords shall have a mated pair insertion loss of less than .35dB with a typical loss of .15dB and a typical mated return loss of less than -55dB.

10.7.3 Copper Patch Panels, Category 5e - All Buildings with Data Outlets

Provide one patch panel port per data outlet plus 20% spare. The largest patch panel allowed shall be 48 port and the smallest 12 port. Where the 12 port is used, it shall be a category 5e, 12 port patch panel mounted on an 89 type block frame for the station cables. The 24 or 48 port patch panel shall be mounted on a swing down bracket mounted on the backboard. Cable guides and wire management bars shall be provided. Provide one category 5e patch cord, (RJ45-RJ45) per patch panel port. The Patch cords shall meet the minimum performance requirements specified in EIA/TIA-568B.1, EIA/TIA-568B.2 and EIA/TIA-568B.3.

10.8 Outside Plant Cable

The outside plant cable (cable size and cable counts) shall be engineered and installed in accordance with the referenced standards. The OSP cable engineering shall be approved at TAC before any cable is ordered. Under no circumstances will home runs from each building to the communications building be allowed; normal telephone cable distribution engineering standards will be used, meaning that large cables will be installed from the vault splices and the cables will get smaller as the buildings are provided service.

10.8.1 Spare Cable Pairs and Fiber Optic Strands

There shall be spare cable pairs and fiber strands in the manholes/hand holes as required ensuring that standard sized cables are used. Dead Cable pairs shall be spliced through and cleared and capped in proper connectors. The 25 pair binder grouping of the cable shall be maintained. When the smaller (6 pair or 12 pair) counts are used, the first 6 pair count or first two 6 pair counts are used, the 13th pair of the count is cleared and capped, and then the second pair counts 14th through 25 pair count will be used. Under no circumstances will a split binder count be used. The 6 strand grouping of the fiber optic cable plant shall also be maintained.

10.9 The Contractor shall provide cable (copper and fiber optic cable) count provisions, either installed in the building or allocated in cable stubs in manholes/handholes for all buildings on the site plan, (contracted buildings and future). Conduit stub outs in manholes/handholes shall be provided for all buildings on the site plan. The following buildings will either have the cables installed and terminated in the building OR have the cables allocated in the cable counts and left in the manhole/handhole cable stub out closures.

10.9.1 Battalion /Company HQ building.

50 pairs copper, 12 strands single mode fiber optic cable. Copper and fiber shall be installed in the building, terminated and tested. All outlets except wall outlets in the building shall be dual RJ 45, category

5e, one white labeled voice and one blue labeled data. An additional 50 pair copper and 12 strand fiber optic cable shall be installed in the command center constructed on the buildings. The cables shall be part of the consolidated 100 pair copper, 24 strand fiber optic "Command Center" cables installed from the respective MDFs to the command centers in the buildings. The command centers shall have dual category 5e, RJ 45 outlets installed on the walls at 1.5 meter intervals.

10.9.2 MWR GYM/ Recreation Center,

12 pairs copper and 6 strands fiber optic cable, installed, terminated and tested in the building. All outlets except wall outlets in the building shall be dual RJ 45, category 5e, one white labeled voice and one blue labeled data.

10.9.3 Barracks

12 pairs copper and 6 strands fiber optic cable installed, terminated and tested in the building. All outlets except wall outlets in the building shall be dual RJ 45, category 5e, one whitelabeled voice and one blue labeled data.

10.9.4 DFAC

12 pairs copper and 6 strands fiber optic cable installed, terminated and tested in the building. All outlets except wall outlets in the building shall be dual RJ 45, category 5e, one white labeled voice and one blue labeled data.

10.9.5 POL Storage

12 pairs copper and 6 strands fiber optic cable allocated in the cable plant and accessible in the closest manhole/handhole to the building.

~~10.9.6 Refueler Vehicle Maintenance Facility, 6 pairs copper, installed, terminated and fully tested in the building. No fiber.~~

10.9.7 Communication and Armament Maintenance Facility.

25 pairs copper, 12 strands single mode fiber optic cable. Copper and fiber shall be installed in the building,

10.9.8 Fuel Point

12 pairs copper and 6 strands fiber optic cable allocated in the cable plant and accessible in the closest manhole/handhole to the building.

10.9.9 General Warehouse Storage

12 pairs copper and 6 strands fiber optic cable allocated in the cable plant and accessible in the closest manhole/handhole to the building.

10.9.10 All Wheeled Vehicle Maintenance Facilities

6 pairs copper, installed, terminated and fully tested in the building. No fiber.

10.9.11 Toilet Shower Ablution Laundry Facility.

12 pairs copper installed and terminated in the building. No fiber. Copper to be fully tested.

10.9.13 All buildings not included above but included in the master plan (future), shall be considered to have requirements of 12 copper cable pairs and 6 fiber strands for planning purposes.

-END OF SECTION-

SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS

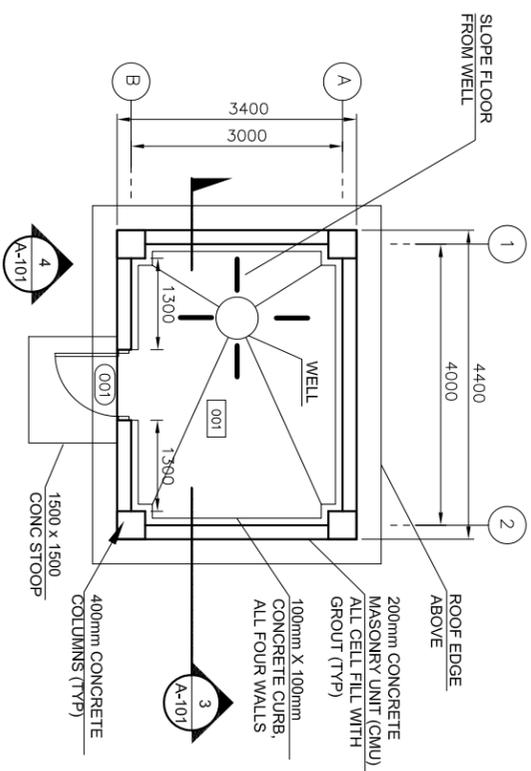
The following have been modified:

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

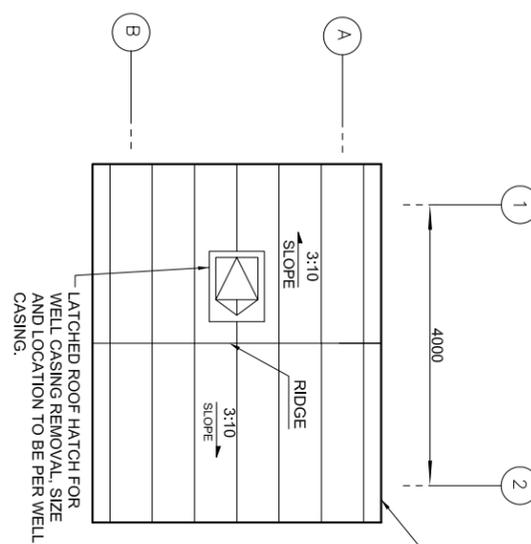
The Contractor shall be required to (a) commence work under this contract within seven (7) calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 300 calendar days. The time stated for completion shall include final cleanup of the premises.

(End of clause)

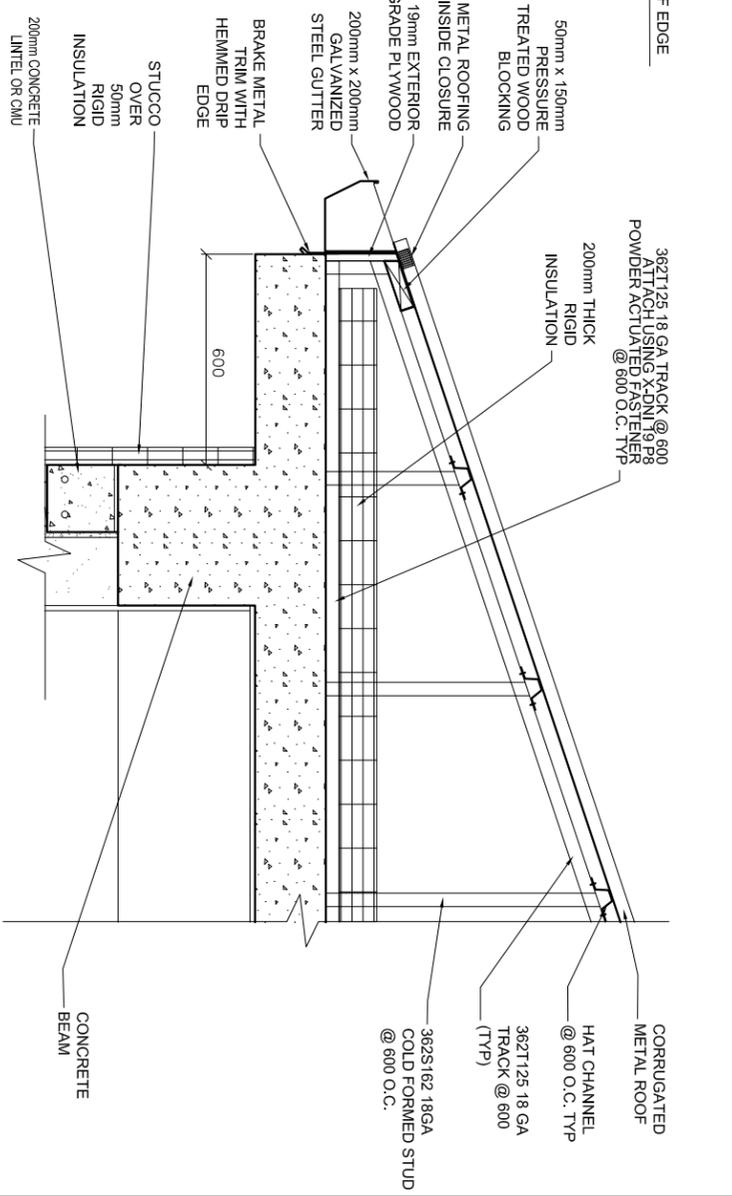
(End of Summary of Changes)



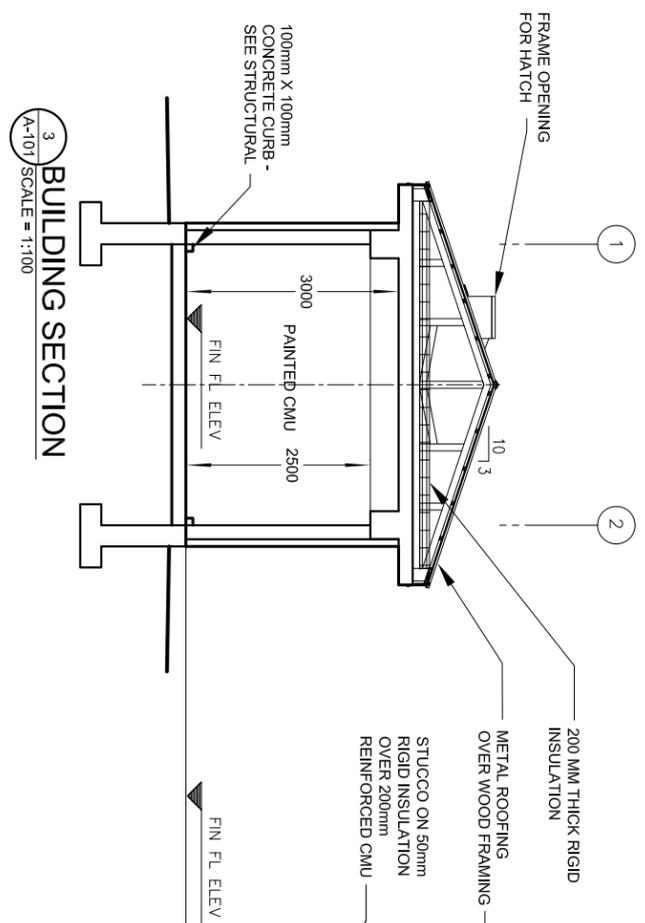
1 FLOOR PLAN
A-101 SCALE = 1:50



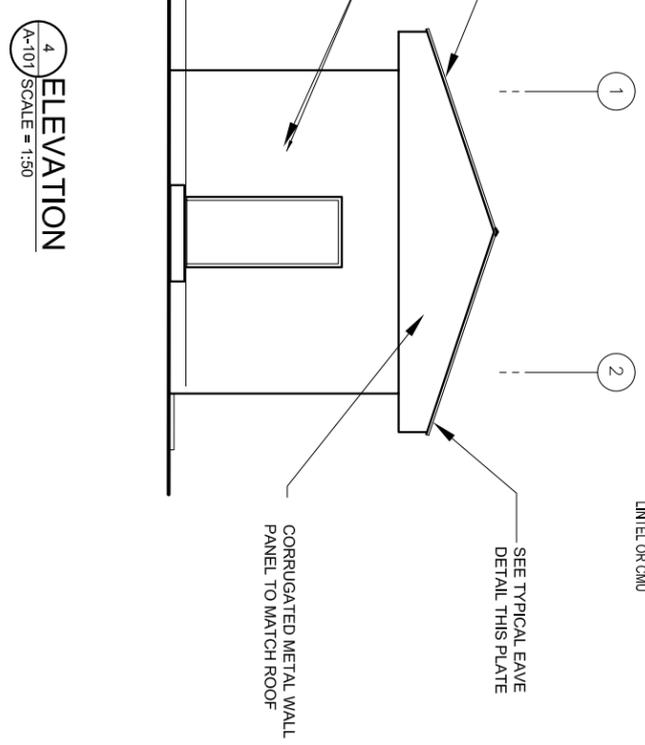
2 ROOF PLAN
A-101 SCALE = 1:50



5 EAVE DETAIL
A-101 SCALE = N.T.S.



3 BUILDING SECTION
A-101 SCALE = 1:100



4 ELEVATION
A-101 SCALE = 1:50

ROOM FINISH SCHEDULE LEGEND

FLOOR TYPE	F1 SEALED CONCRETE
FLOOR COLOR	1 SEALED CONCRETE - NATURAL FINISH
WALL TYPE	W1 PAINTED CMU
WALL COLOR	20 PAINTED CMU - HEMPEL, 1005-Y50R-25400
CEILING TYPE	C1 PAINTED EXPOSED STRUCTURE
CEILING COLOR	30 PAINTED EXPOSED STRUCTURE - HEMPEL, 0602-Y-15420, OFF WHITE

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR		BASE		WALLS		CEILING		REMARKS	
		MATL.	COLOR	MATL.	COLOR	MATL.	COLOR	MATL.	COLOR		
001	WELL HOUSE ROOM	F1	1	-	-	W1	20	C1	30	3400	

DOOR SCHEDULE

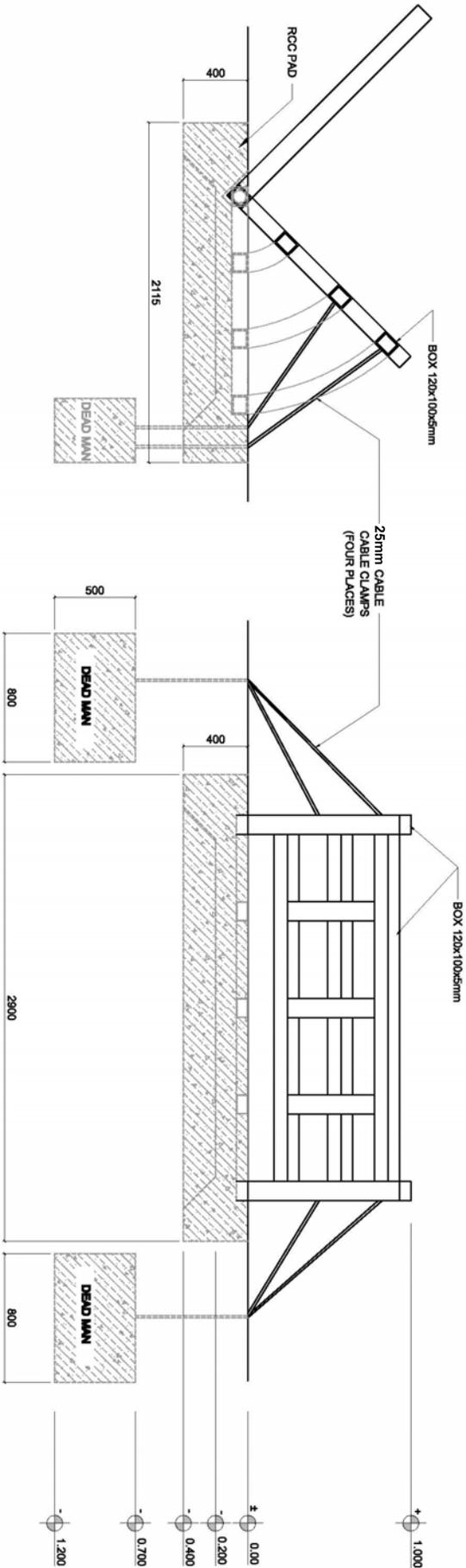
NO.	LOCATION	TYPE	DOOR		FRAME				FIRE LABEL	HDW SET	REMARKS		
			MATL	WIDTH	MATL	HEAD	JAMB	SILL				MATL	
001	WELL HOUSE ROOM	F	HM	900	2150	45	H-1/S&2	J-1/S&2	S-1/S&2	HM	-	6	

ROOM FINISH SCHEDULE NOTES

- ALL WALL PENETRATIONS SHALL BE SEALED TO PROVIDE A NEAT APPEARANCE. PENETRATIONS OF EXTERIOR WALLS SHALL BE SEALED TO WATER TIGHT.
- SEALANTS SHALL MATCH THE COLOR OF ADJACENT SURFACES.

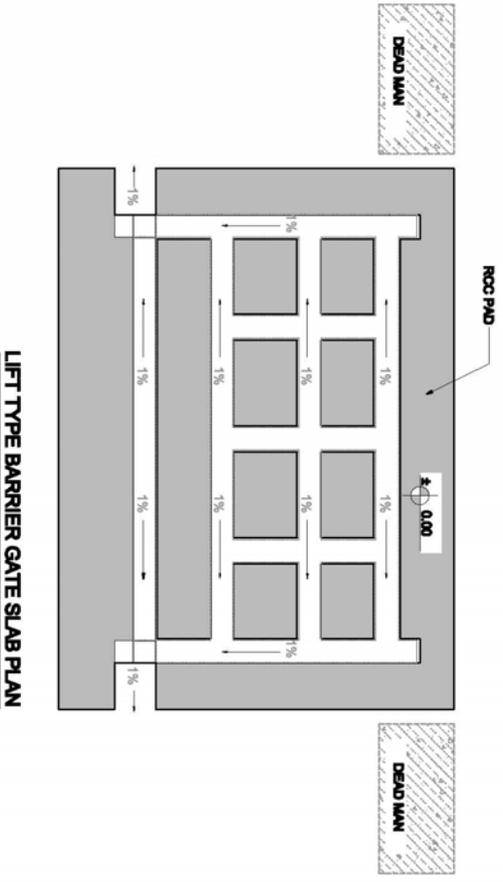


APPENDIX A_4.5



LIFT TYPE BARRIER GATE SIDE ELEVATION

LIFT TYPE BARRIER GATE FRONT ELEVATION



LIFT TYPE BARRIER GATE SLAB PLAN

NOTE
 ALL METAL CHANNEL WALLS SHALL BE 8mm OR THICKER.
 CONCRETE SHALL BE REINFORCED WITH A DOUBLE MAT OF 12mm REBAR
 WIDTH OF EACH PULL-UP BARRIER SHALL BE ADJUSTED TO COVER THE ENTIRE
 TRAVEL LANE PLUS AN ADDITIONAL 500mm IN EACH SIDE
 PIVOT BAR SHALL RUN THE ENTIRE LENGTH OF THE BARRIER
 EACH BARRIER CABLE SHALL BE FIRMLY CLAMPED INTO EACH DEAD MAN IN

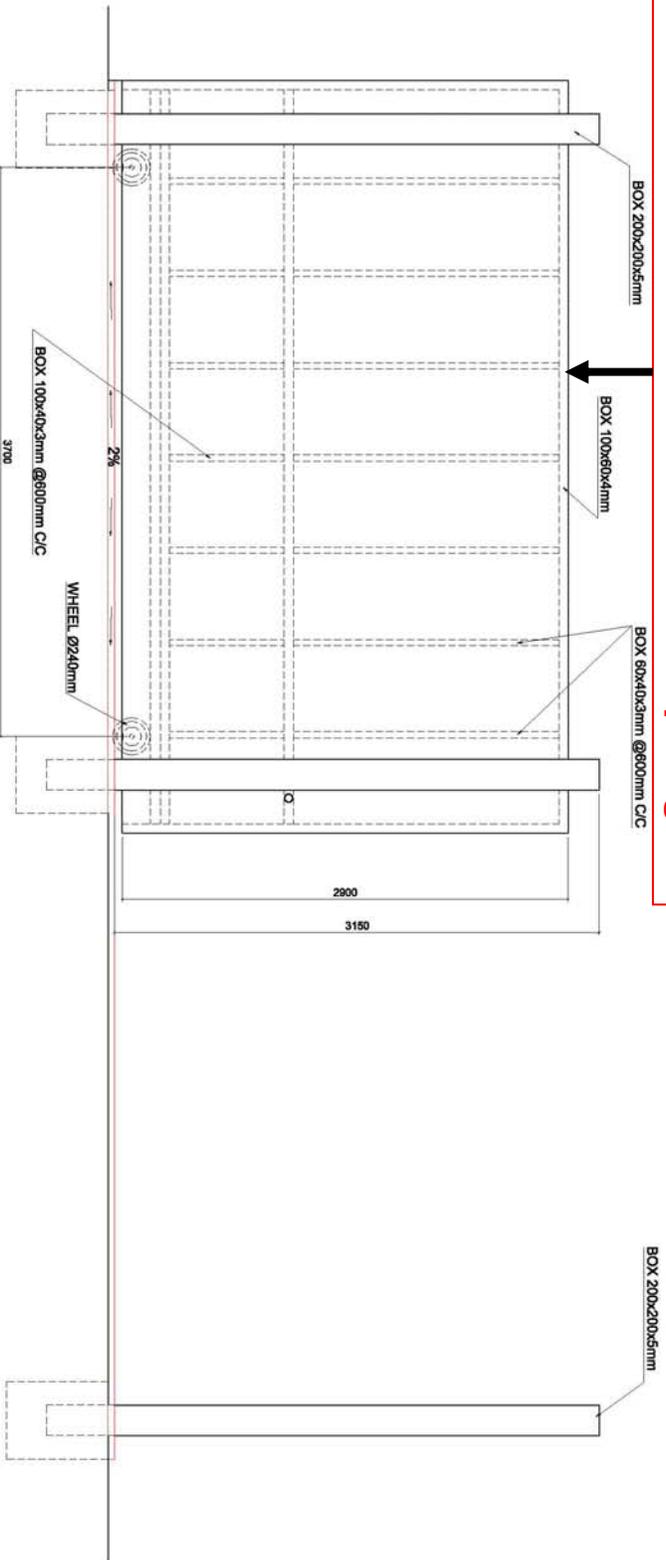
ALL DIMENSIONS AND/OR DIMENSIONS SHOWN IN
 CALLOUTS/NOTES IN ARE IN MILLIMETERS UNLESS
 OTHERWISE NOTED.
 0 0.125 0.25 0.5 0.75 1 1.25
 1:25 GRAPHIC SCALE (METERS)

Appendix – Cable Lift Gate

APPENDIX A_4.12

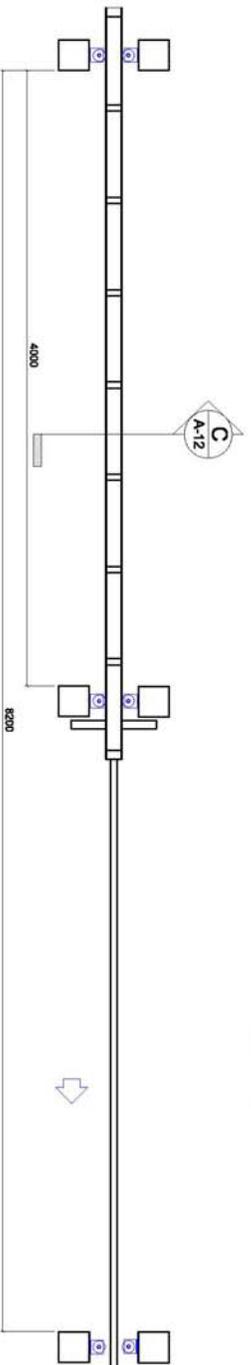
4.12

Install 5 strands of barb wire on top of gate



NOTE: FOR FOUNDATION AND DETAILS SEE STRUCTURAL DRAWINGS.

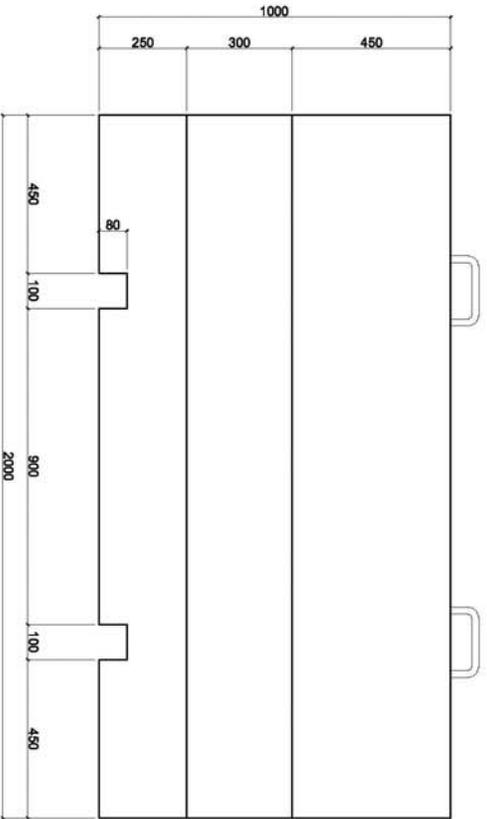
SLIDING ENTRY GATE ELEVATION



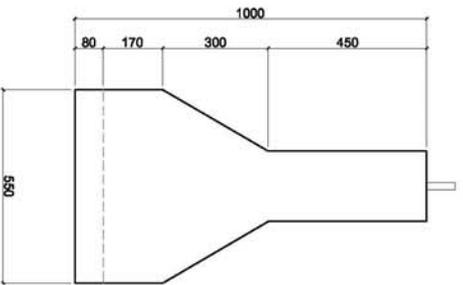
SLIDING ENTRY GATE PLAN

Appendix – K4 Sliding Gate

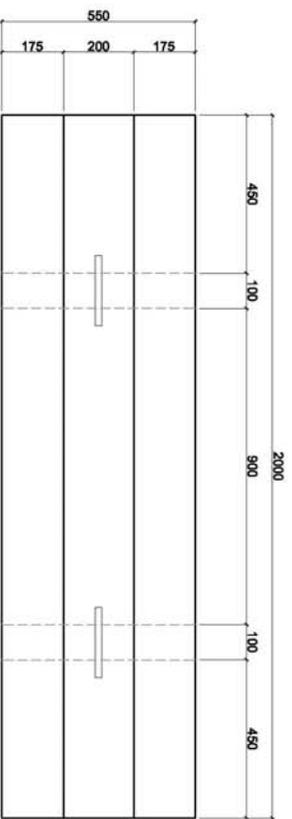
APPENDIX A_4.12



BARRIER FRONT ELEVATION



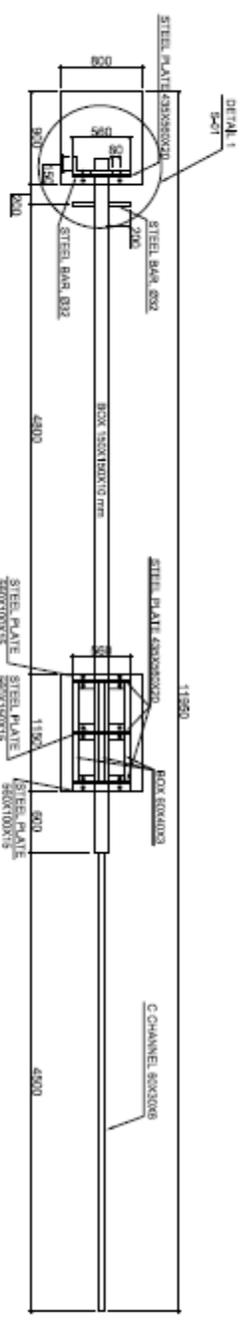
BARRIER SIDE ELEVATION



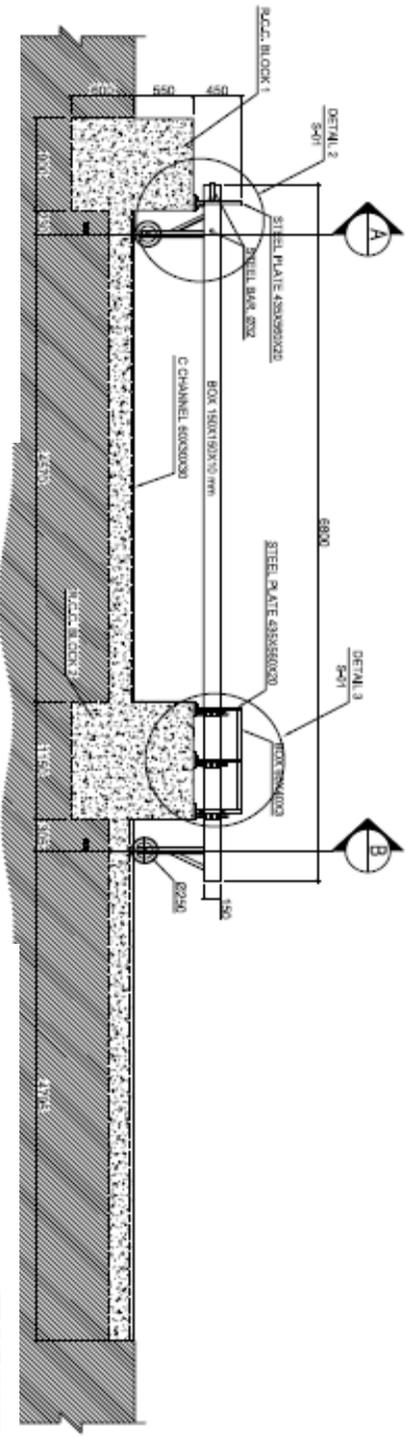
BARRIER PLAN

Appendix – “T” Barrier (size varies as needed)

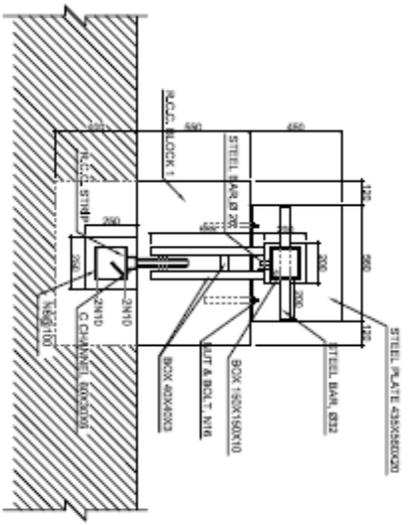
APPENDIX A_4.12



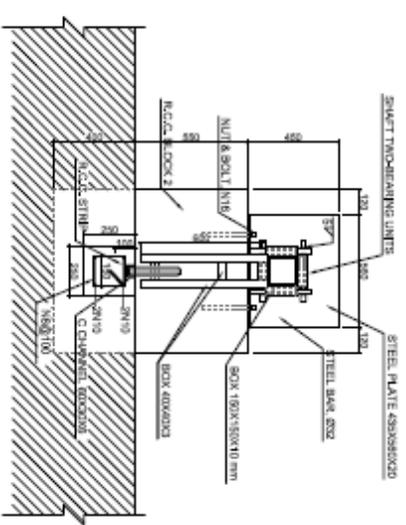
ANTI-RAM BARRIER PLAN VIEW
SCALE: 1:10



ANTI-RAM BARRIER ELEVATION VIEW
SCALE: 1:10



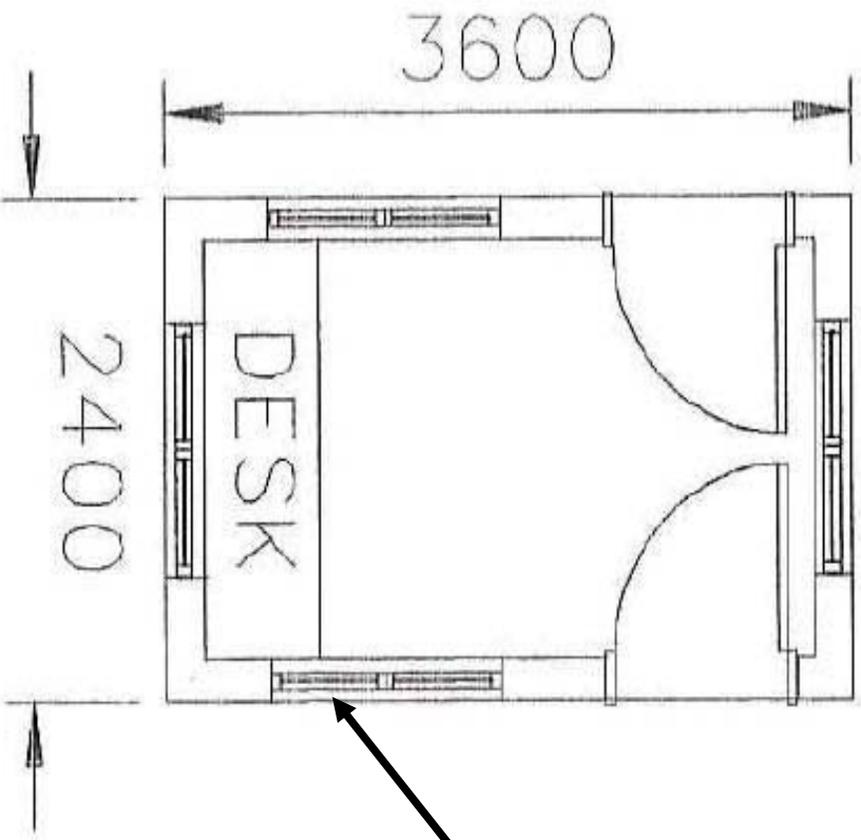
SECTION A-A



SECTION B-B

Appendix – Rolling Beam Barrier

APPENDIX A_4.12



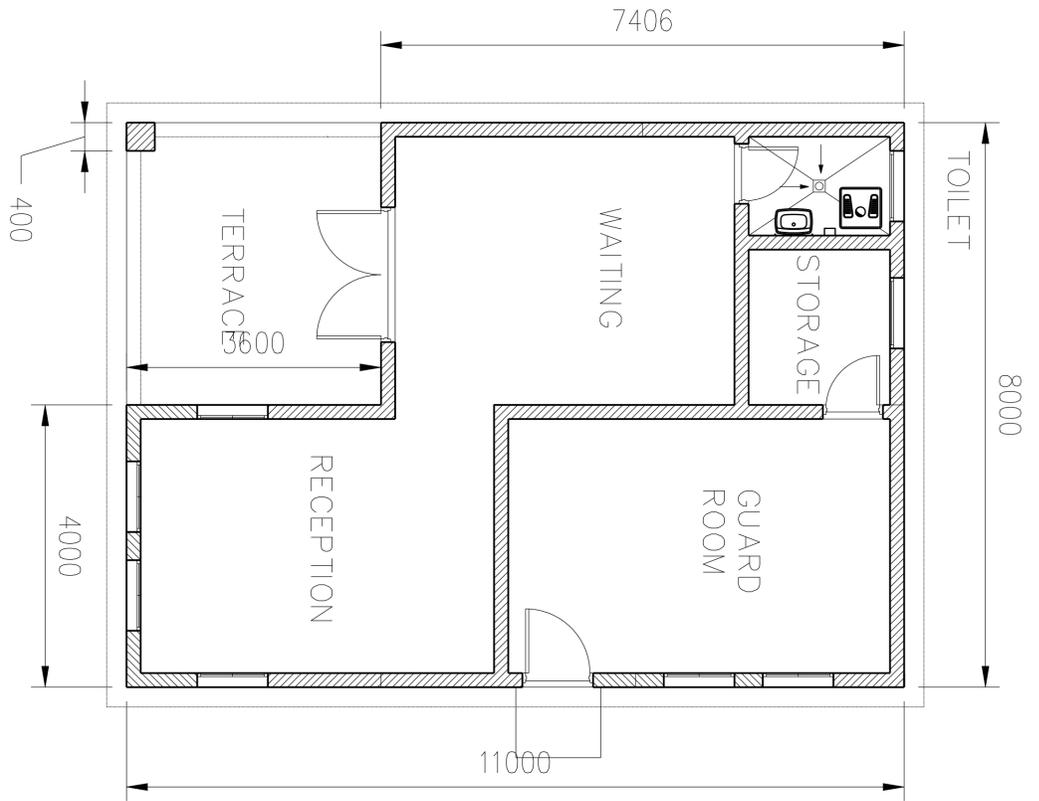
Gate House Plan

Appendix – Gate House

APPENDIX A_4.12

A B C D E F G H

1 2 3 4 5 6



A1 Size 594mm x 841mm

APPENDIX A_4.12

4.12

SHEET
REFERENCE
NUMBER:
SHEET -- OF --

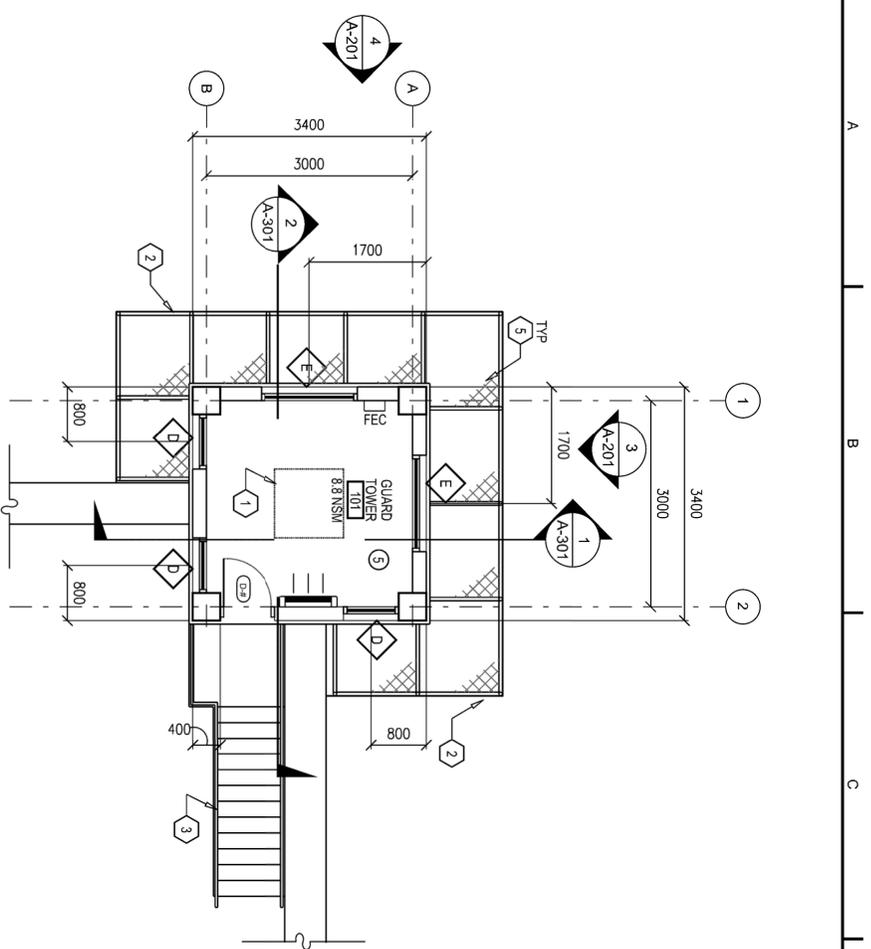
RECEPTION BLDG

U.S. ARMY ENGINEER DISTRICT, AFGHANISTAN
CORPS OF ENGINEERS
APO AE 96338
ENGINEERING AND
CONSTRUCTION DIVISION

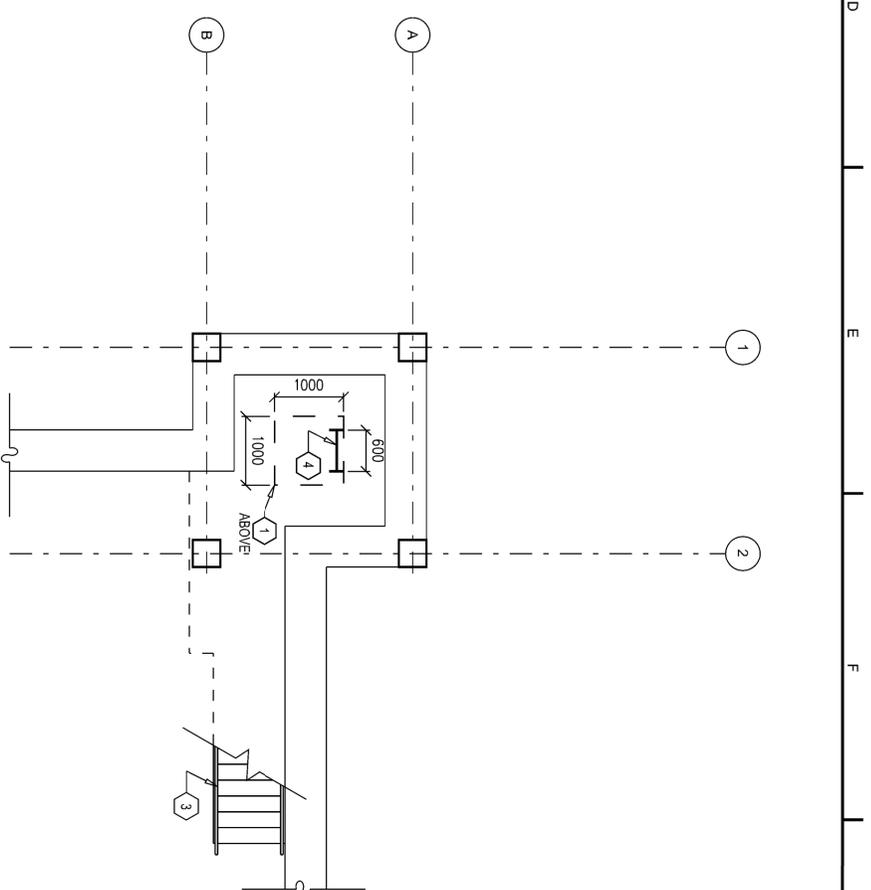
DESIGNED BY:	DATE:	REV.
DWN BY:	CKD BY:	DESIGN FILE NO.
REVIEWED BY:	DRAWING CODE:	
SUBMITTED BY:	FILE NAME:	
	PLOT SCALE: NTS	
	PLOT DATE: xx-xx-xx	

SYMBOL	DESCRIPTION	DATE	APPR.	SYMBOL	DESCRIPTION	DATE	APPR.

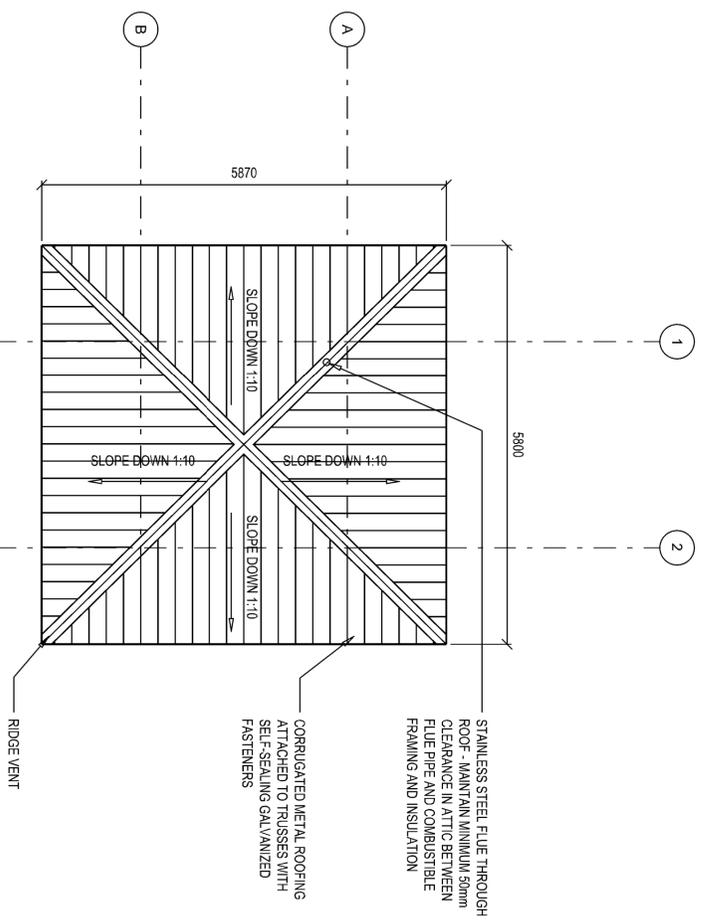




1 GUARD TOWER FLOOR PLAN
A-101/ NTS
SCALE = 1:50



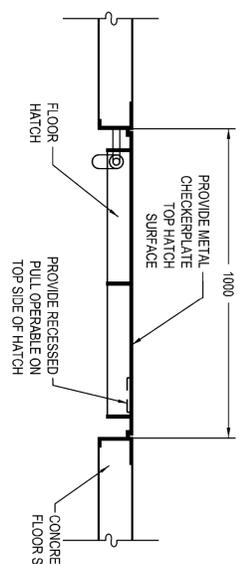
2 GUARD TOWER LOWER FLOOR PLAN
A-101/ NTS
SCALE = 1:50



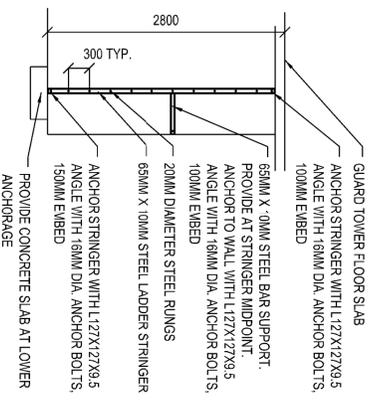
3 GUARD TOWER ROOF PLAN
A-101/ NTS
SCALE = 1:50

STAINLESS STEEL FLUE THROUGH ROOF - MAINTAIN MINIMUM 50mm CLEARANCE IN ATTIC BETWEEN FLUE PIPE AND COMBUSTIBLE FRAMING AND INSULATION

CORRUGATED METAL ROOFING ATTACHED TO TRUSSES WITH SELF-SEALING GALVANIZED FASTENERS



4 FLOOR HATCH DETAIL
A-101/ NTS



5 LADDER DETAIL
A-101/ NTS

ROOM NO.		ROOM NAME		ROOM FINISH SCHEDULE		REMARKS	
FLOOR FINISH	BASE FINISH	WALLS FINISH	COLOR	CEILING FINISH	COLOR		
SC	PP	PP	P1	PP	PP	1, 2, 3, 4	

FINISH SCHEDULE NOTES:

1. FINISH ABBREVIATIONS IN SCHEDULE ARE AS FOLLOWS: SC=SEALED CONCRETE, PP=PAINTED PLASTER OFF-WHITE PAINT.
2. PAINTED PLASTER WALLS AND CEILINGS SHALL HAVE ONE COAT OF PRIMER AND TWO COATS OF SEMI-GLOSS OFF-WHITE PAINT.

- LEGEND:**
- DOOR TYPE: SEE SHEET A-301
 - WINDOW TYPE: SEE SHEET S-A8
 - KEY NOTE
 - FIRE EXTINGUISHER CABINET
 - SPLIT PACK HVAC UNIT

KEY NOTES:

1. FLOOR HATCH - RE: DETAIL A-101
2. RFG STANDOFF SCREEN
3. EXTERIOR STAIR
4. LADDER - RE: DETAIL A-101
5. RETURN FENCE HORIZONTALLY TO FACE OF WALL

FLOOR PLAN NOTES:

1. ALL INTERIOR PARTITIONS SHALL BE TYPE 1 UNLESS NOTED OTHERWISE
2. OPENINGS FOR DOORS SHALL BE LOCATED 200 MM FROM THE ADJACENT WALL UNLESS NOTED OTHERWISE
3. SURFACES TO BE PAINTED SHALL BE CLEAN AND FREE OF FOREIGN MATTER BEFORE APPLICATION OF PAINT. CLEANING SHALL BE SCHEDULED SO THAT DUST AND OTHER CONTAMINANTS WILL NOT FALL ON NEWLY PAINTED SURFACES.
4. CONCRETE AND INTERIOR MASONRY SURFACES GROUTED SOLID SHALL BE ALLOWED TO DRY AT LEAST 30 DAYS BEFORE PAINTING EXCEPT CONCRETE SLAB ON GRADE WHICH SHALL BE ALLOWED TO CURE 90 DAYS BEFORE PAINTING.
5. PAINTS CONTAINING LEAD IN EXCESS OF 0.08 PERCENT BY WEIGHT OF THE TOTAL NONVOLATILE CONTENT SHALL NOT BE USED.
6. MERCURIAL FUNGICIDES SHALL NOT BE USED IN OIL-BASE PAINT.
7. REMOVE LOOSE DIRT AND CLEAN SURFACES BEFORE PAINTING. APPLY PAINT TO INTERIOR STRUCTURAL RIGID FRAMINGS AND CEILINGS AND TEST FOR ADHESION. PRIMER COAT FOR MASONRY: INITIAL FIRST COAT WITH AN ACRYLIC LATEX PAINT FOR EXTERIOR SURFACES AND A SECOND COAT WITH A WATER REPELLENT ACRYLIC LATEX PAINT.
8. INTERIOR METAL DOORS AND FRAMES SHALL RECEIVE A PRIMER COAT PLUS TWO COATS OF PAINT.
9. DIMENSIONS ARE TO CENTERLINE OF WINDOW OPENINGS, AND TO HINGE SIDE OF DOOR OPENINGS.

GRAPHIC SCALE



APPENDIX A_4.12



SYMBOL	DESCRIPTION	DATE	APP

DESIGNED BY: AED	DATE: 23-03-23	REV:
DWN BY: AED	DESIGN FILE NO.	
REVIEWED BY:	DRAWING CODE:	
SUBMITTED BY:	FILE NAME:	
	PLOT SCALE: AS SHOWN	
	CONTRACT NO. xx-xx-xx	

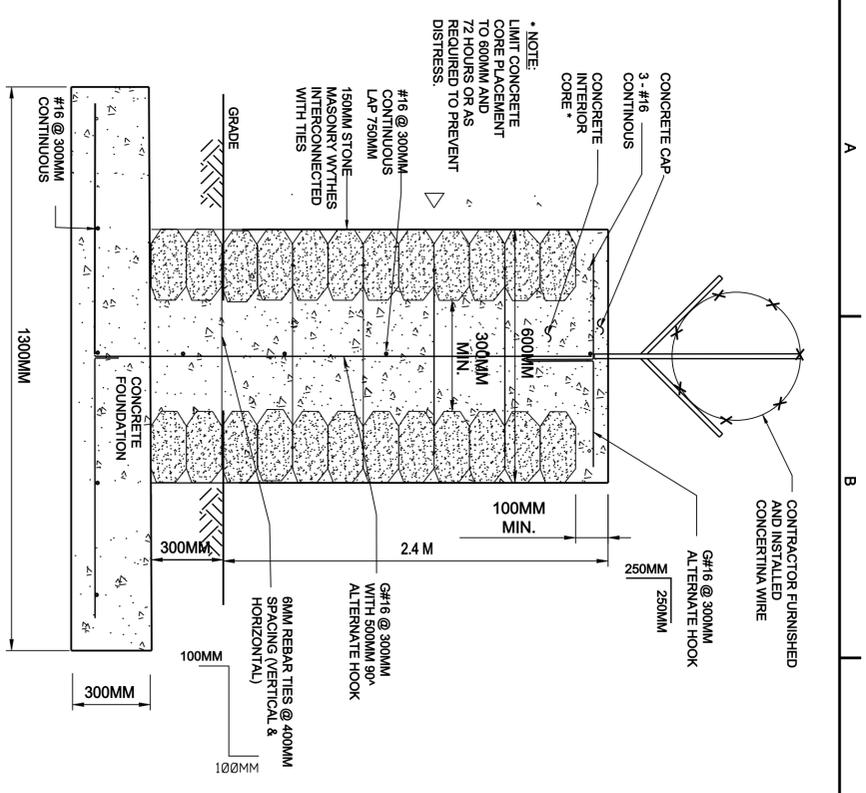
U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN ENGINEER DISTRICT
APO AE 09356

ENGINEERING AND
CONSTRUCTION DIVISION

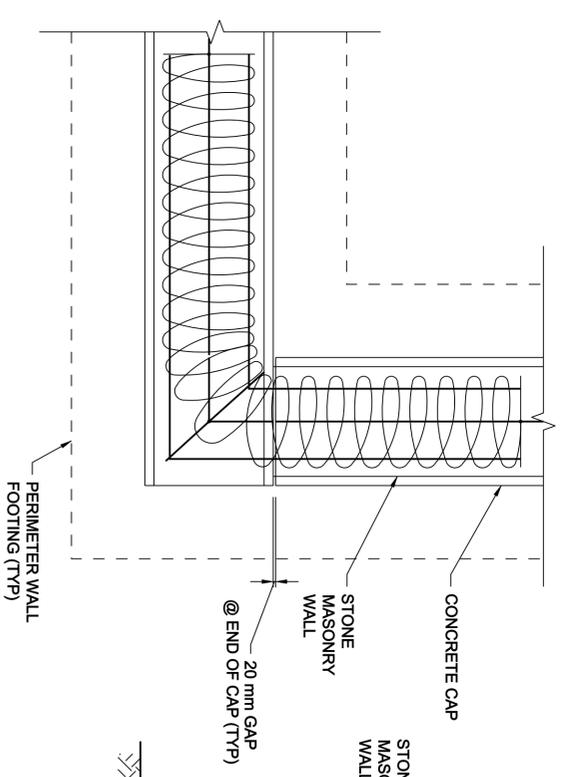
CNPA HEADQUARTERS COMPOUND
KABUL, AFGHANISTAN

GUARD TOWER
FLOOR PLAN

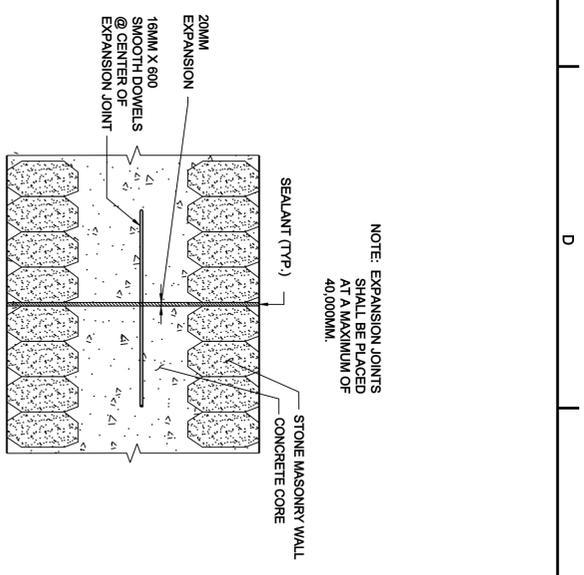
SHEET
REFERENCE
NUMBER:
A-101
SHEET 9 OF 14



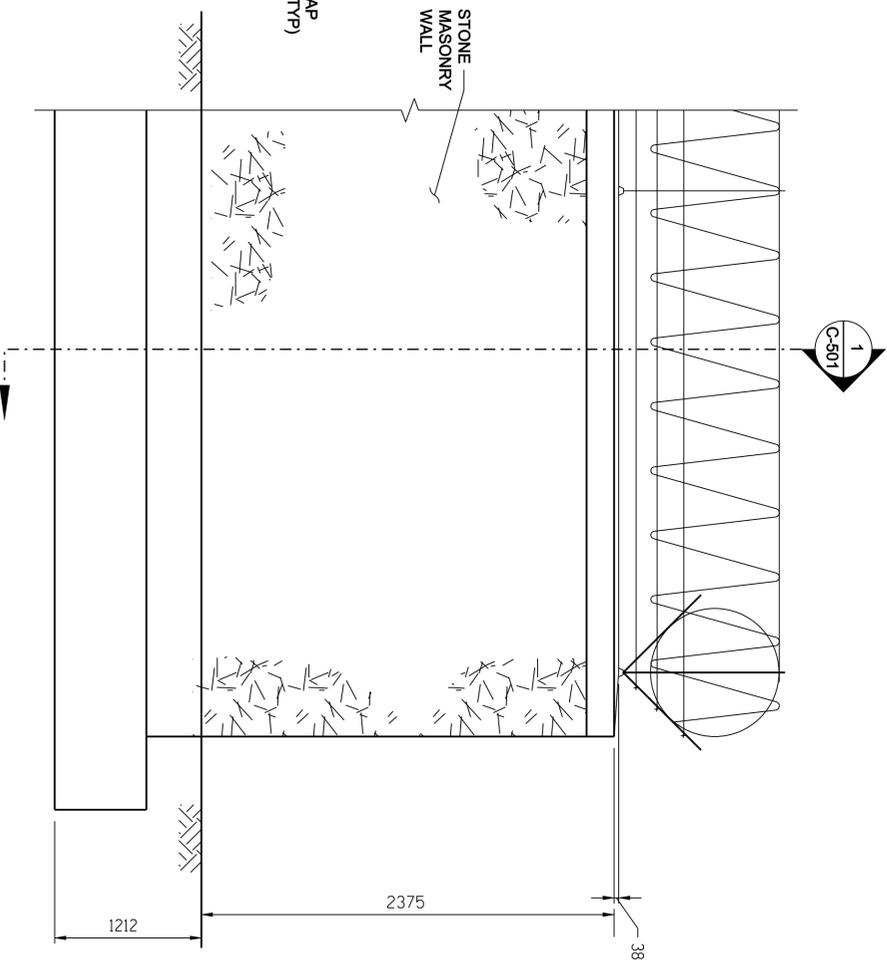
1 SECTION
C-501/NTS



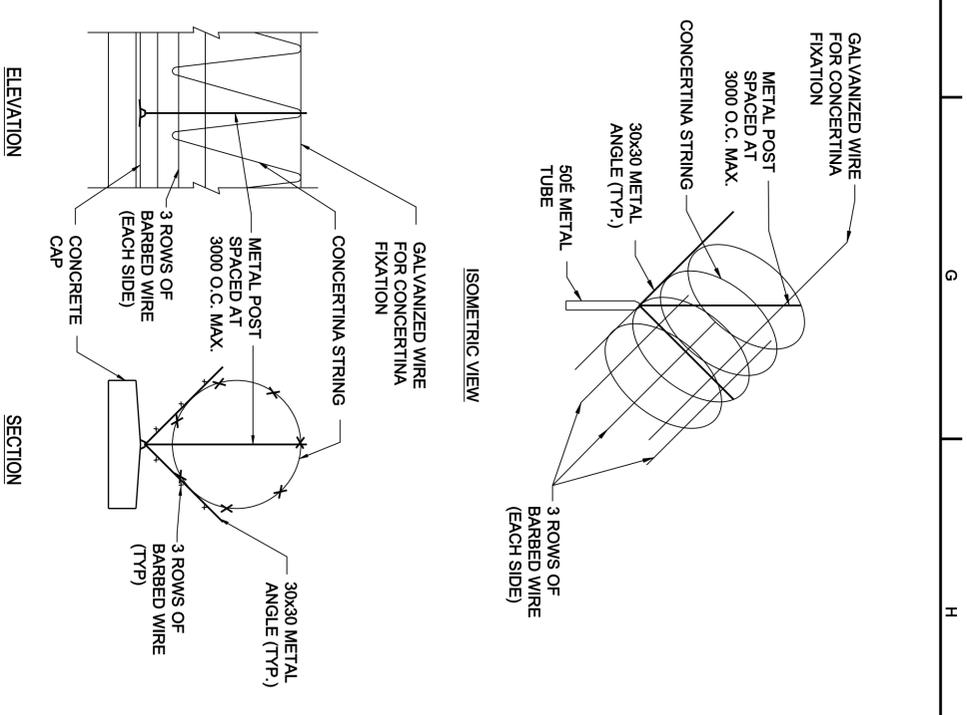
1 PERIMETER - STONE WALL CORNER - PLAN
C-501/NTS (END CONDITION SIMILAR)



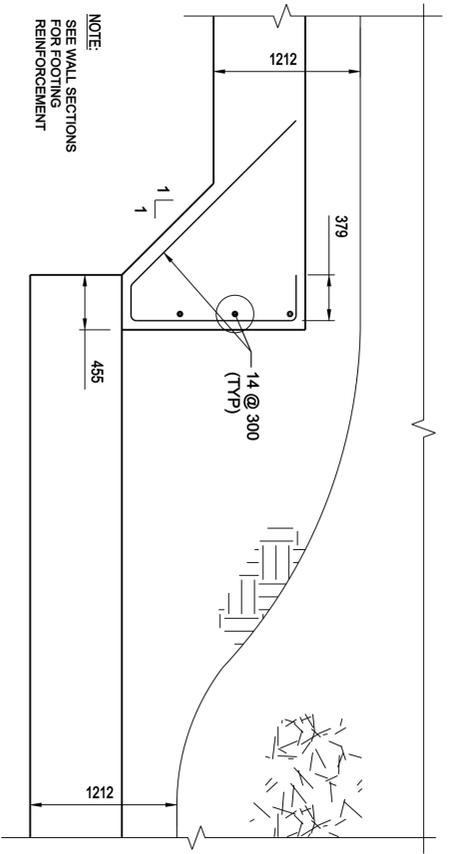
1 STONE WALL EXPANSION JOINT DETAIL
C-501/NTS



1 ELEVATION B
C-501/NTS



1 CONCERTINA STRING AND BARBED WIRE DETAILS
C-501/NTS



1 STEPPED FOOTING DETAIL FOR GRADE CHANGE GREATER THAN 15 DEGREES
C-501/NTS

APPENDIX A_4.13

4.13



SYMBOL	DESCRIPTION	DATE	APR

DESIGNED BY: AED	DATE: xx-xx-xx	REV.
DWN BY: AED	DESIGN FILE NO. 	
REVIEWED BY: 	DRAWING CODE: 	
SUBMITTED BY: 	FILE NAME: 	
	PLOT SCALE: AS SHOWN	
	CONTRACT NO. xx-xx-xx	

U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN ENGINEER DISTRICT
APO AE 09356

ENGINEERING AND
CONSTRUCTION DIVISION

ANA KANDAK
QALA-E-NAW
AFGHANISTAN

CIVIL
STONE WALL PLAN
SECTIONS & DETAILS

SHEET
REFERENCE
NUMBER:
C-503
SHEET -- OF --

FINISHING SCHEDULE

ROOM NUMBER	USAGE	NSM	FLOOR	WALL COVER	CEILING
04-100	TRASH POINT	4.40 M ²	FI	WI	-

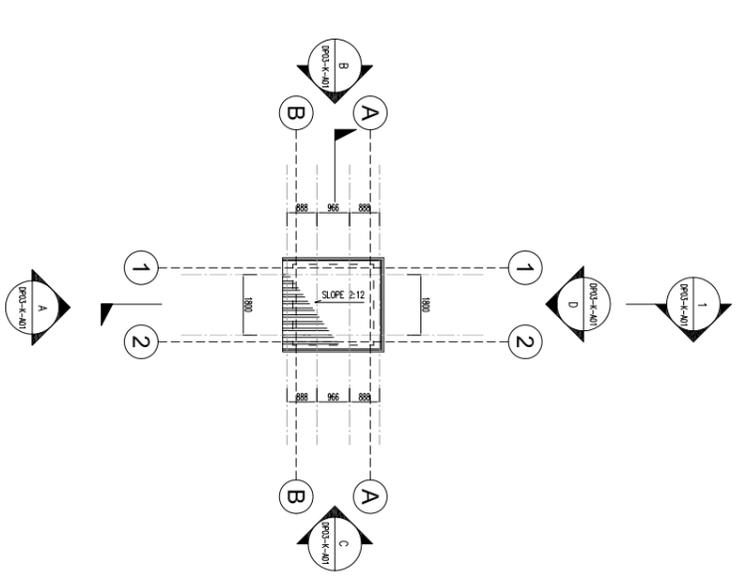
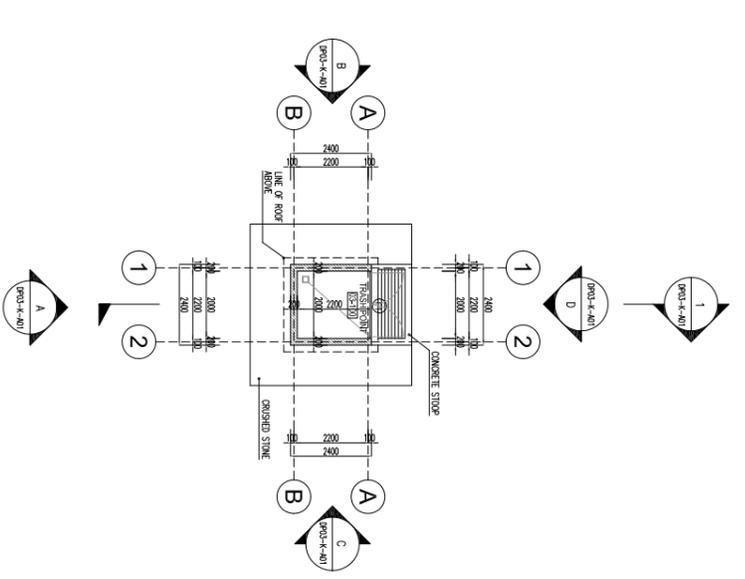
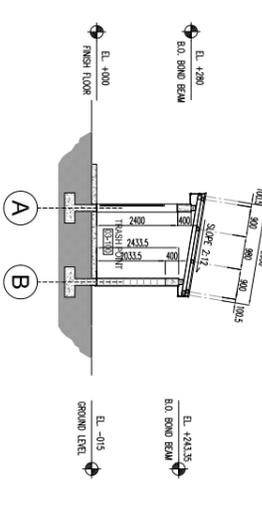
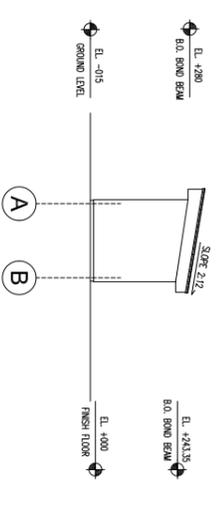
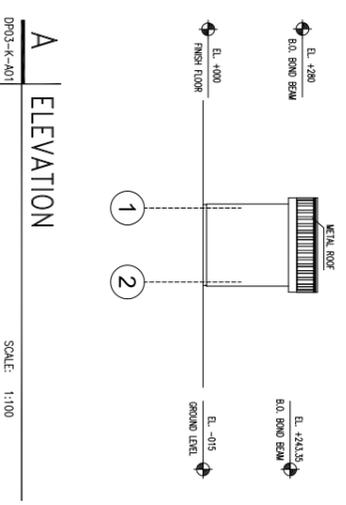
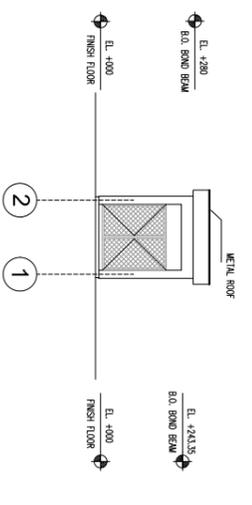
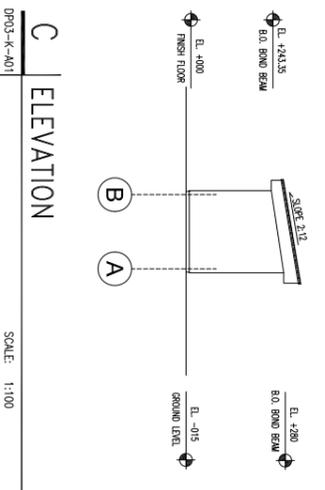
FINISHING SCHEDULE LEGEND

FLOOR	DESCRIPTION	STATUS
F1	SEALED CONCRETE	NOT USED
F2	TERRAZZO 30X30 CM	NOT USED
F3	SMOOTH TERRAZZO 30X30 CM	NOT USED
F4	CERAMIC 33X33 CM (DIAGONAL)	NOT USED
F5	RAISED FLOOR	NOT USED
WALL COVER		
W1	SEMI-GLOSS WHITE PAINT	NOT USED
W2	CERAMIC H=200 CM	NOT USED
W3	CERAMIC H=180 CM	NOT USED
W4	CERAMIC H=120 CM	NOT USED
CEILING		
C1	DRY WALL+SEMI GLOSS WHITE PAINT	NOT USED
C2	WATERPROOF DRY WALL+SEMI GLOSS WHITE PAINT	NOT USED

WALL SYMBOLS

	CMU WALL
	DRY WALL

- NOTES:**
- 1-EXTERIOR WALLS AND SECURITY ZONE WALLS 20X40X20 CM CMU WALL.
 - 2-INTERIOR PARTITION WALLS ONE LAYER 15 MM DRY WALL (TOTAL:105 MM) UNLESS OTHERWISE NOTED.
 - 3-ALL DIMENSIONS ARE TO FACE OF CMU AND DRY WALLS UNLESS NOTED OTHERWISE.
 - 4-ROOF IS SLOPE 2:12 METAL ROOF.
 - 5-SEE CIVIL DRAWINGS FOR BUILDING COORDINATES AND FINISH FLOOR ELEVATION.
 - 6-SEE STRUCTURAL DRAWINGS FOR SEISMIC JOINTS & CONSTRUCTION JOINTS.
 - 7-FURNITURE IS OUT OF SCOPE.



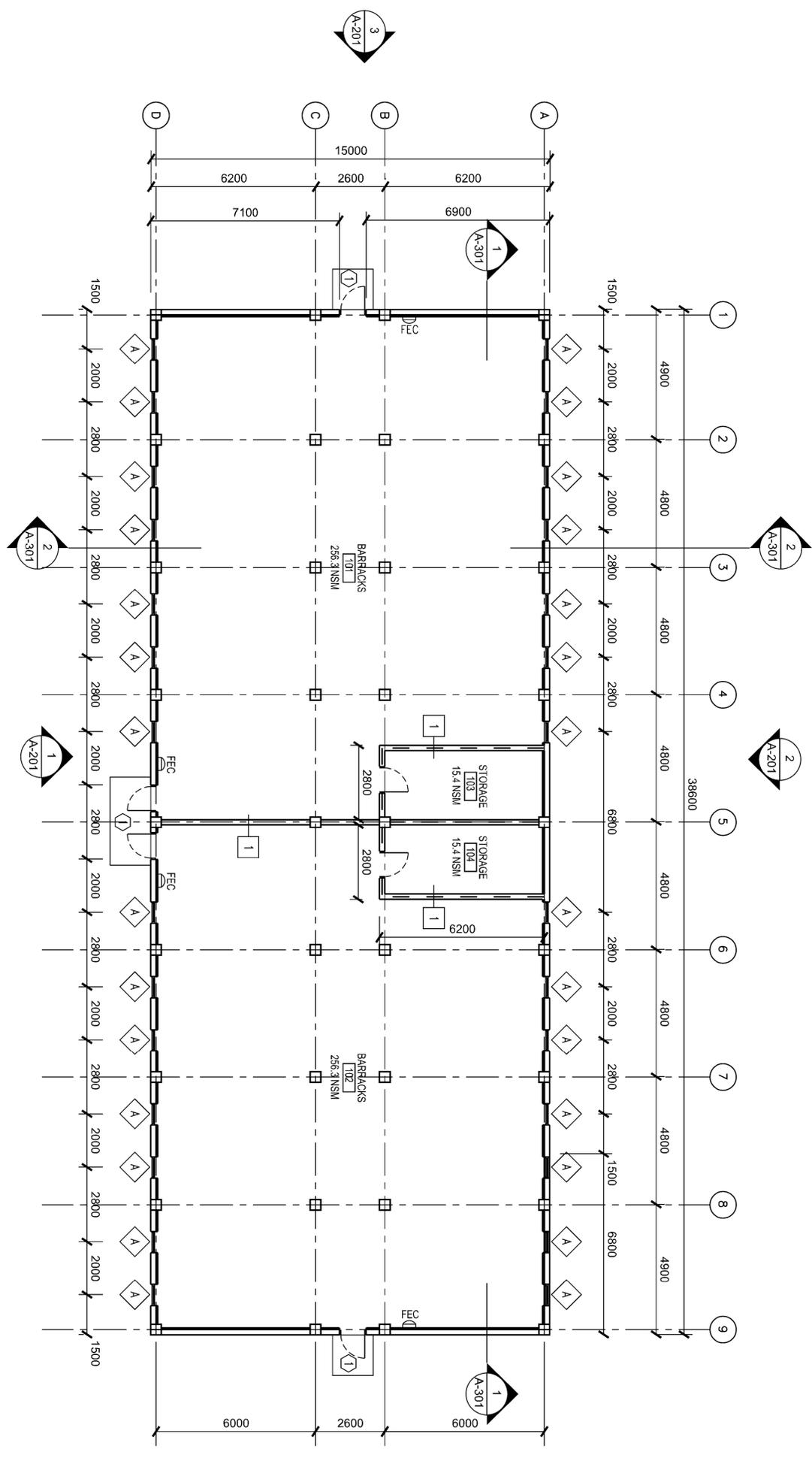
APPENDIX A_4.15

TOTAL AREA OF BUILDING :5.76 M2

Sheet Reference Number: DP03-K-A01	ANA POL-E KHOMRI FOB POL-E KHOMRI, AFGHANISTAN		DEPARTMENT OF THE ARMY U.S. ARMY CORPS OF ENGINEERS AFGHANISTAN ENGINEERS DISTRICT POL-E KHOMRI, AFGHANISTAN		Designed By: G.IRMAK	Drawn By: B.SERTSÖZ B.YILDIRIM	Contract Date: CONTRACTDATE
	TRASH POINT FLOOR PLAN,SECTION AND ELEVATIONS		YMTYZ JV Contractor: IRMAK		Reviewed by: G.IRMAK	Draw Code: DP03-K-A01	FILE NAME: TRASH POINT
		Designer In Association with IRMAK,KONKAN, TFMKA,DELTA OM&BERKMEH		Submitted by: IRMAK	Plot Date: 26-OCT-08	Plot Scale: 1:100	DATE 28-OCT-08 28-AUG-08
				Contract No: W917PM-07-D-0017	TO 0005		Description 99%DESIGNSUBMITTAL 35%DESIGNSUBMITTAL



A B C D E F G H



FLOOR PLAN
A-101 SCALE = 1:100

LEGEND:

- ⬢ DOOR TYPE SEE SHEET A-502
- ⬢ WINDOW TYPE SEE SHEET A-502
- ⊗ KEY NOTE
- FEC FIRE EXTINGUISHER CABINET
- ▬ 1 HR. RATED FIRE WALL

KEY NOTES:

- 1. CONCRETE STOOP - RE. DETAIL 1/S-A13.

FLOOR PLAN NOTES:

1. ALL INTERIOR PARTITIONS SHALL BE TYPE 1 UNLESS NOTED OTHERWISE
2. OPENINGS FOR DOORS SHALL BE LOCATED 200 MM FROM THE ADJACENT WALL UNLESS NOTED OTHERWISE
3. SURFACES TO BE PAINTED SHALL BE CLEAN AND FREE OF FOREIGN MATTER BEFORE APPLICATION OF PAINT. CLEANING SHALL BE SCHEDULED SO THAT DUST AND OTHER CONTAMINANTS WILL NOT FALL ON WET, NEWLY PAINTED SURFACES.
4. CONCRETE AND INTERIOR MASONRY SURFACES GROUTED SOLID SHALL BE ALLOWED TO DRY AT LEAST 30 DAYS BEFORE PAINTING EXCEPT CONCRETE SLAB ON GRADE WHICH SHALL BE ALLOWED TO CURE 90 DAYS BEFORE PAINTING.
5. PAINTS CONTAINING LEAD IN EXCESS OF 0.06 PERCENT BY WEIGHT OF THE TOTAL NONVOLATILE CONTENT SHALL NOT BE USED.
6. MERCURIAL FUNGICIDES SHALL NOT BE USED IN OIL-BASE PAINT.
7. REMOVE LOOSE DIRT AND CLEAN SURFACES BEFORE PAINTING. APPLY PAINT TO INTERIOR STRUCTURAL RIGID FRAMINGS AND CEILINGS AND TEST FOR ADHESION. PRIMER COAT FOR MASONRY, INITIAL FIRST COAT WITH AN ACRYLIC LATEX PAINT FOR EXTERIOR SURFACES AND A SECOND COAT WITH A WATER REPELLENT ACRYLIC LATEX PAINT.
8. INTERIOR METAL DOORS AND FRAMES SHALL RECEIVE A PRIMER COAT PLUS TWO COATS OF PAINT.
9. DIMENSIONS ARE TO CENTERLINE OF WINDOW OPENINGS, AND TO HINGE SIDE OF DOOR OPENINGS.
10. SEE ELECTRICAL FOR STOVE SLEEVE LOCATIONS.

GRAPHIC SCALE



APPENDIX A_4.16



SYMBOL	DESCRIPTION	DATE	APPR.	SYMBOL	DESCRIPTION	DATE	APPR.

DESIGNED BY: _____	DATE: _____	REV. _____
DWN BY: _____	CKD BY: _____	DESIGN FILE NO. _____
REVIEWED BY: _____	DRAWING CODE: _____	FILE NAME: _____
SUBMITTED BY: _____	PLOT SCALE: _____	PLOT DATE: _____

U.S. ARMY ENGINEER DISTRICT, AFGHANISTAN
CORPS OF ENGINEERS
APO AE 96338

ENGINEERING AND
CONSTRUCTION DIVISION

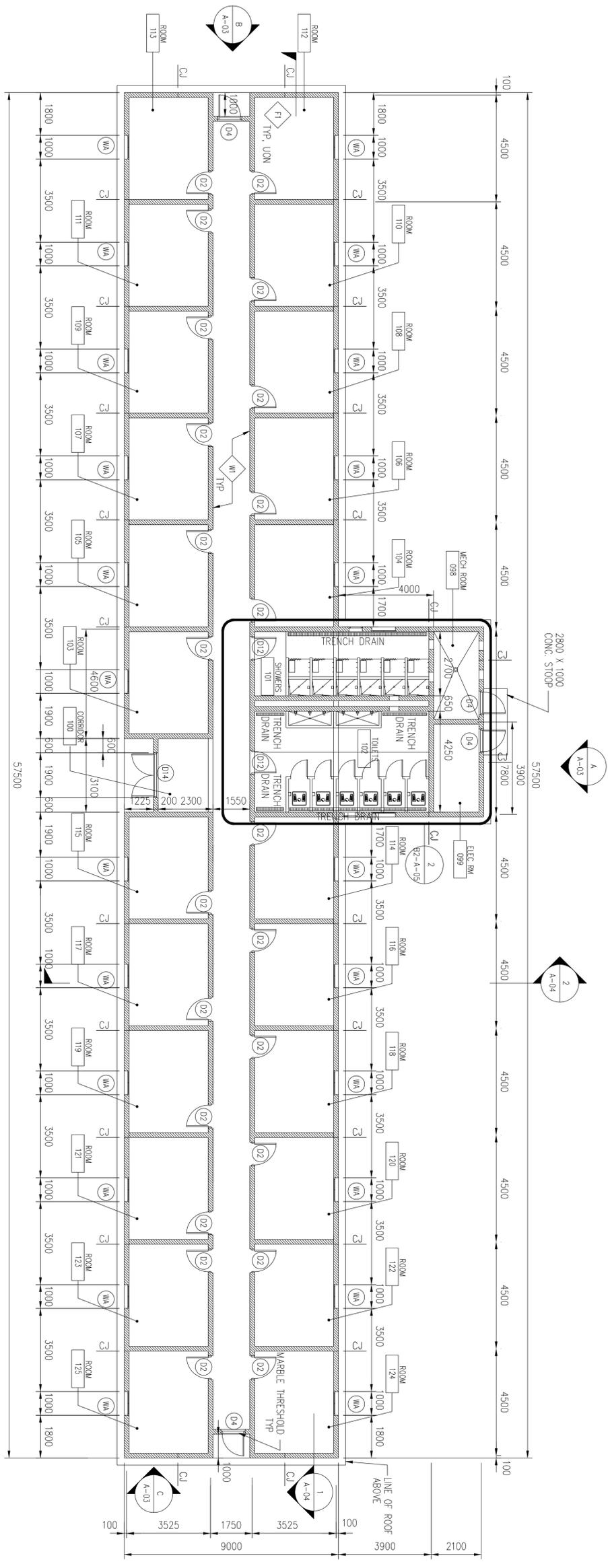
GAMBERI CSB
GAMBERI, AFGHANISTAN
50 MAN OPEN BAY BARRACKS

FLOOR PLAN

SHEET
REFERENCE
NUMBER:
A-101
SHEET 1 OF

A1 Size 594mm x 841mm

A B C D E F G H



APPENDIX A_4.16

4.16

A1 Size 594mm x 841mm



U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN
ENGINEER DISTRICT

SYMBOL	DESCRIPTION	DATE	APPR.	SYMBOL	DESCRIPTION	DATE	APPR.

DESIGNED BY:	DATE:	REV.
DWN BY:	xx-xx-xx	
REVIEWED BY:	DESIGN FILE NO.	
SUBMITTED BY:	DRAWING CODE:	
	FILE NAME:	
	PLOT SCALE: NTS	
	PLOT DATE: xx-xx-xx	

U.S. ARMY ENGINEER DISTRICT, AFGHANISTAN
CORPS OF ENGINEERS
APO AE 96338

ENGINEERING AND
CONSTRUCTION DIVISION

OFFICER/NCO
BUILDING

SHEET REFERENCE NUMBER:
SHEET -- OF --

F.F.L. = 1000.

01 FIRST FLOOR PLAN

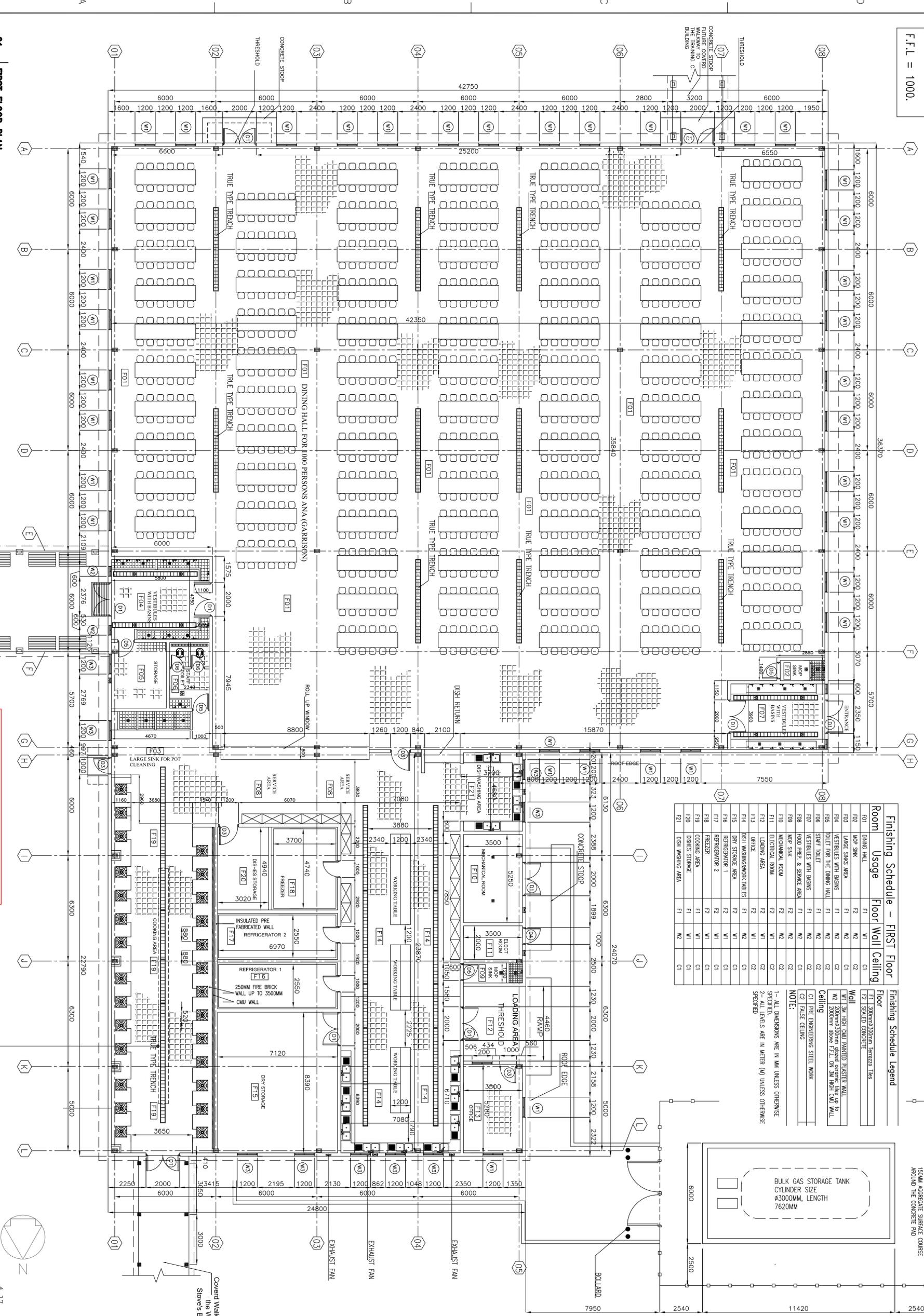
SCALE: 1:100

(20X30XMM) CONCRETE STEEL COVERED WALK WAY

APPENDIX A_4.17

EXHAUST DUCT FOR MORE DETAIL SEE MECHANICAL DRAWING

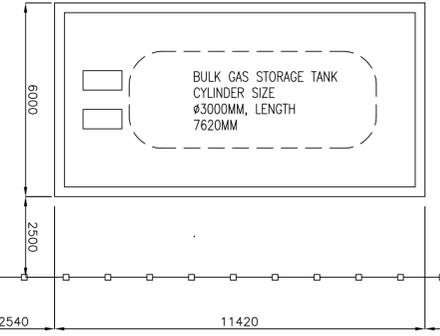
1:100



Room	Usage	Floor	Wall	Ceiling
F01	DINING HALL	F1	W1	C1
F02	MOP SINK	F2	W2	C2
F03	LARGE SINKS AREA	F1	W1	C1
F04	VEGETABLES WITH BENS	F1	W1	C1
F05	TOILET FOR THE DINING HALL	F1	W1	C1
F06	SINK TOILET	F1	W1	C1
F07	VEGETABLES WITH BENS	F1	W1	C1
F08	FOOD PREP & SERVICE AREA	F2	W2	C2
F09	MOP SINK	F2	W2	C2
F10	MECHANICAL ROOM	F2	W2	C2
F11	ELECTRICAL ROOM	F2	W2	C2
F12	LOADING AREA	F2	W2	C2
F13	OFFICE	F2	W2	C2
F14	DISH WASHING/TABLES	F1	W1	C1
F15	DISH STORAGE AREA	F2	W2	C2
F16	REFRIGERATOR 1	F2	W2	C2
F17	REFRIGERATOR 2	F2	W2	C2
F18	FREEZER	F2	W2	C2
F19	COOKING AREA	F1	W1	C1
F20	DISHES STORAGE	F1	W1	C1
F21	DISH WASHING AREA	F1	W1	C1

Floor	Finishing Schedule Legend
F1	30mmx30mm Lenzex Tiles
F2	SCALED CONCRETE
W1	3M HIGH CHALK PAINTED REINFORCED WALL
W2	200mmx30mm spaced concrete lines up to 2000mm above F.F.L. ON 3M HIGH OLD WALL
C1	PRE ENGINEERING STEEL WORK
C2	FALSE CEILING

NOTE:
 1- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED
 2- ALL LEVELS ARE IN METERS (M) UNLESS OTHERWISE SPECIFIED



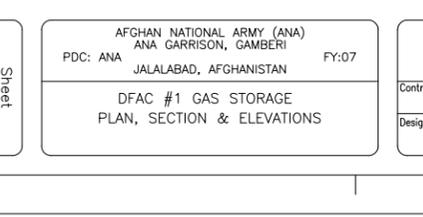
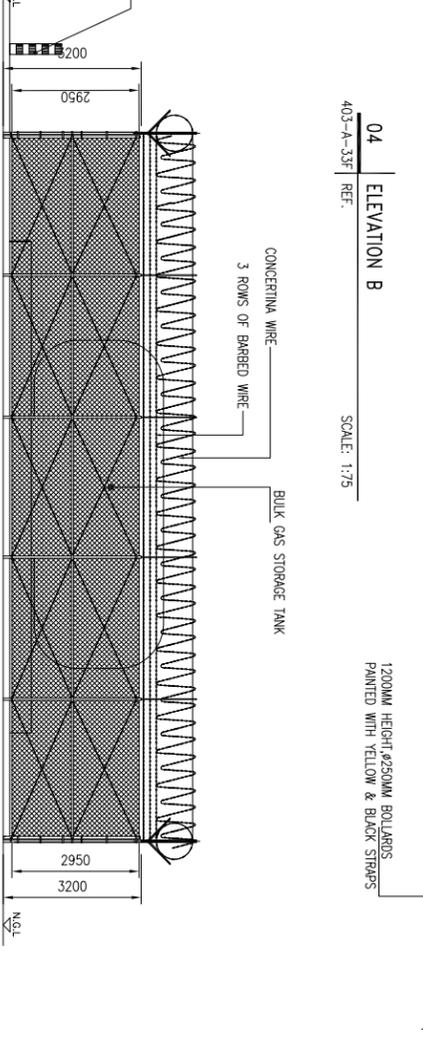
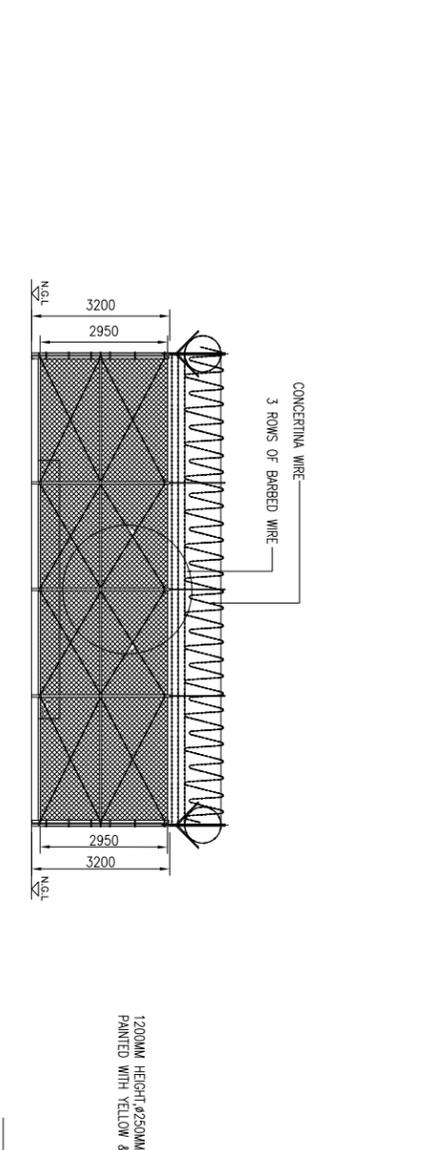
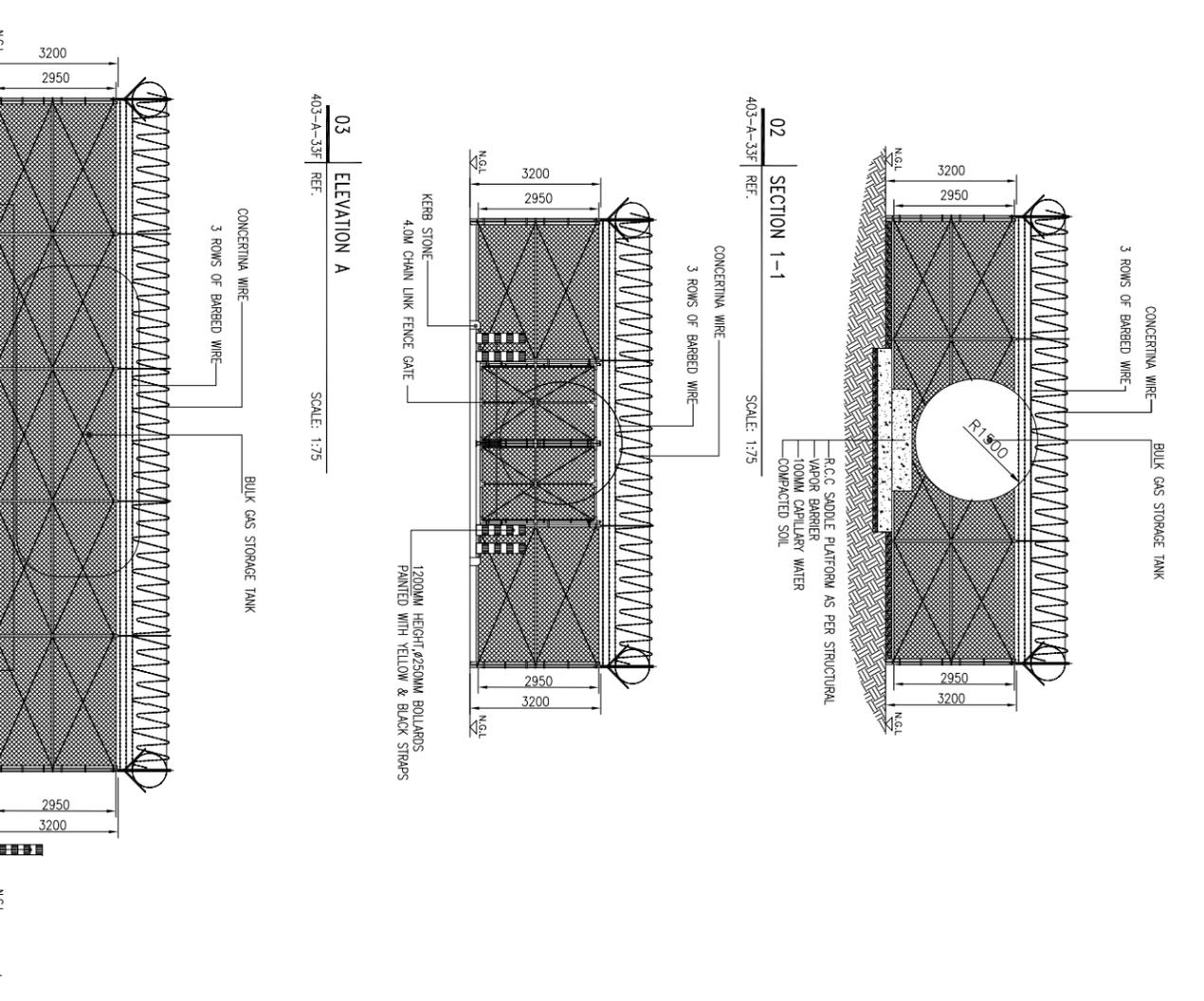
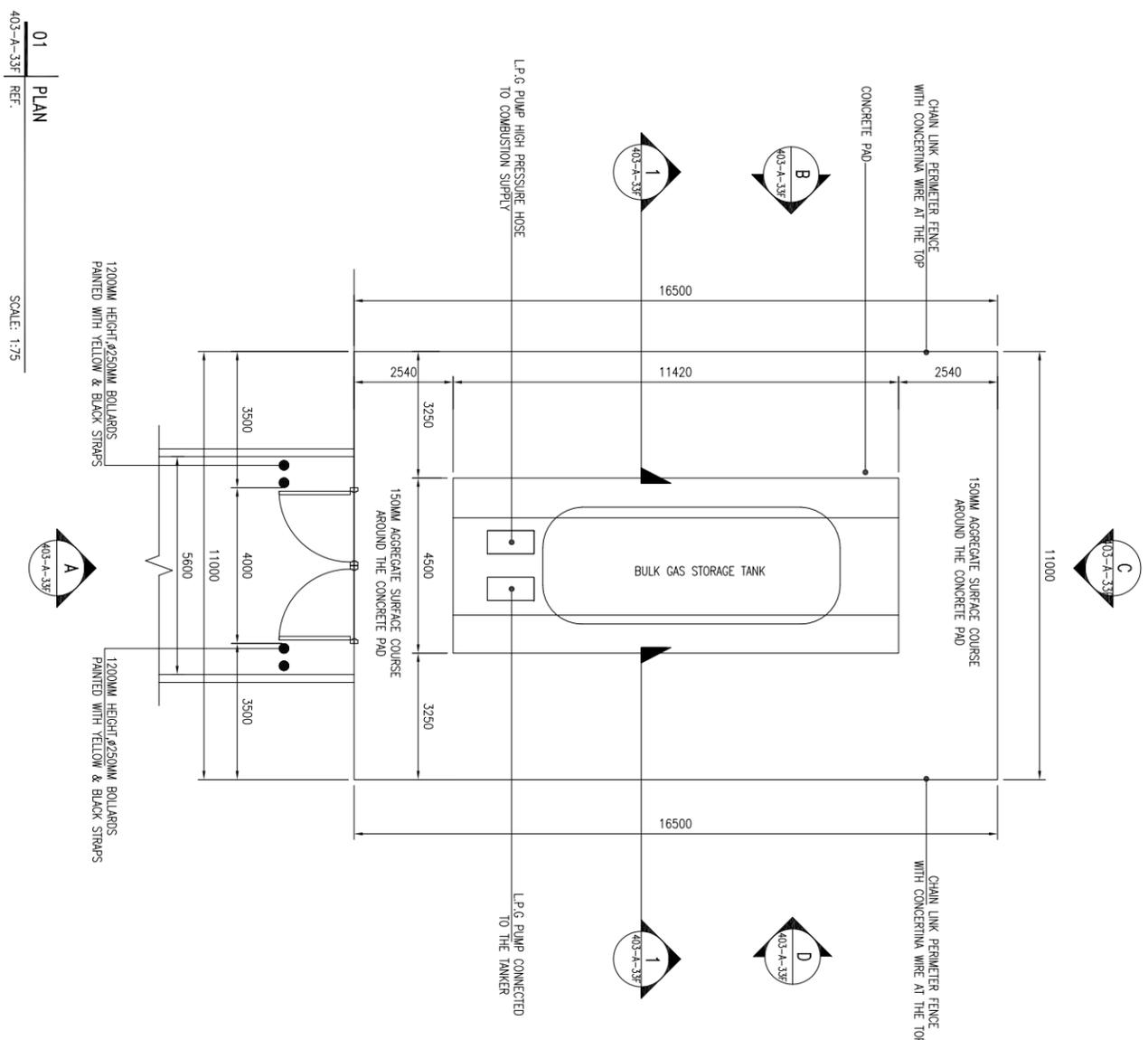
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	Designer	Submitted by:	Draw Code:	Contract No:	Description Date Appr.

DEPARTMENT OF THE ARMY
 U.S. ARMY CORPS OF ENGINEERS
 AFGHANISTAN ENGINEERS DISTRICT
 KABUL, AFGHANISTAN

U.S. ARMY CORPS OF ENGINEERS
 AFGHANISTAN DISTRICT

Sheet Reference Number:
 4.17

1 2 3 4 5



01 PLAN
403-A-33F REF.
SCALE: 1:75

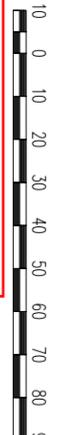
02 SECTION 1-1
403-A-33F REF.
SCALE: 1:75

03 ELEVATION A
403-A-33F REF.
SCALE: 1:75

04 ELEVATION B
403-A-33F REF.
SCALE: 1:75

05 ELEVATION C
403-A-33F REF.
SCALE: 1:75

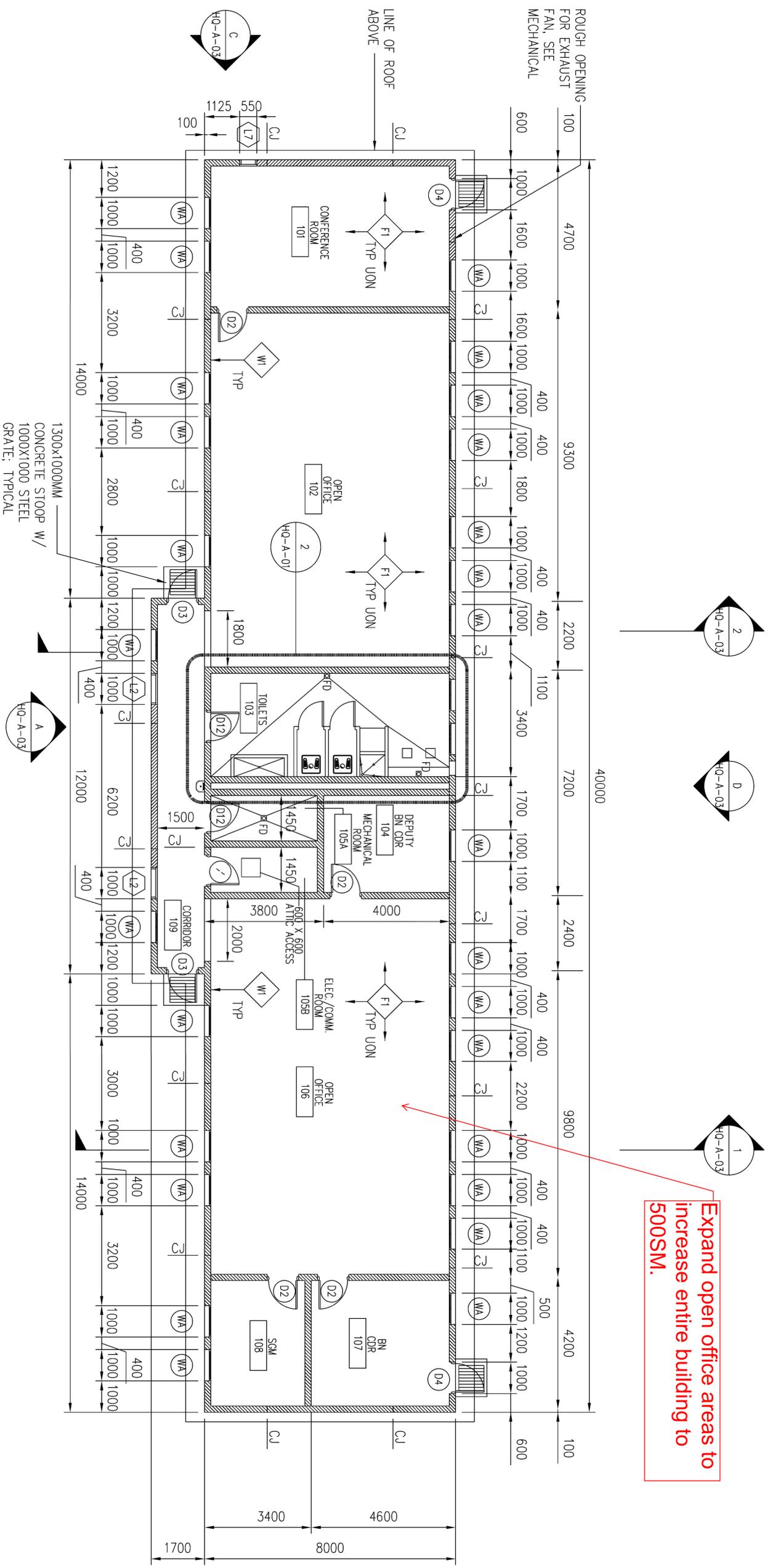
06 ELEVATION D
403-A-33F REF.
SCALE: 1:75



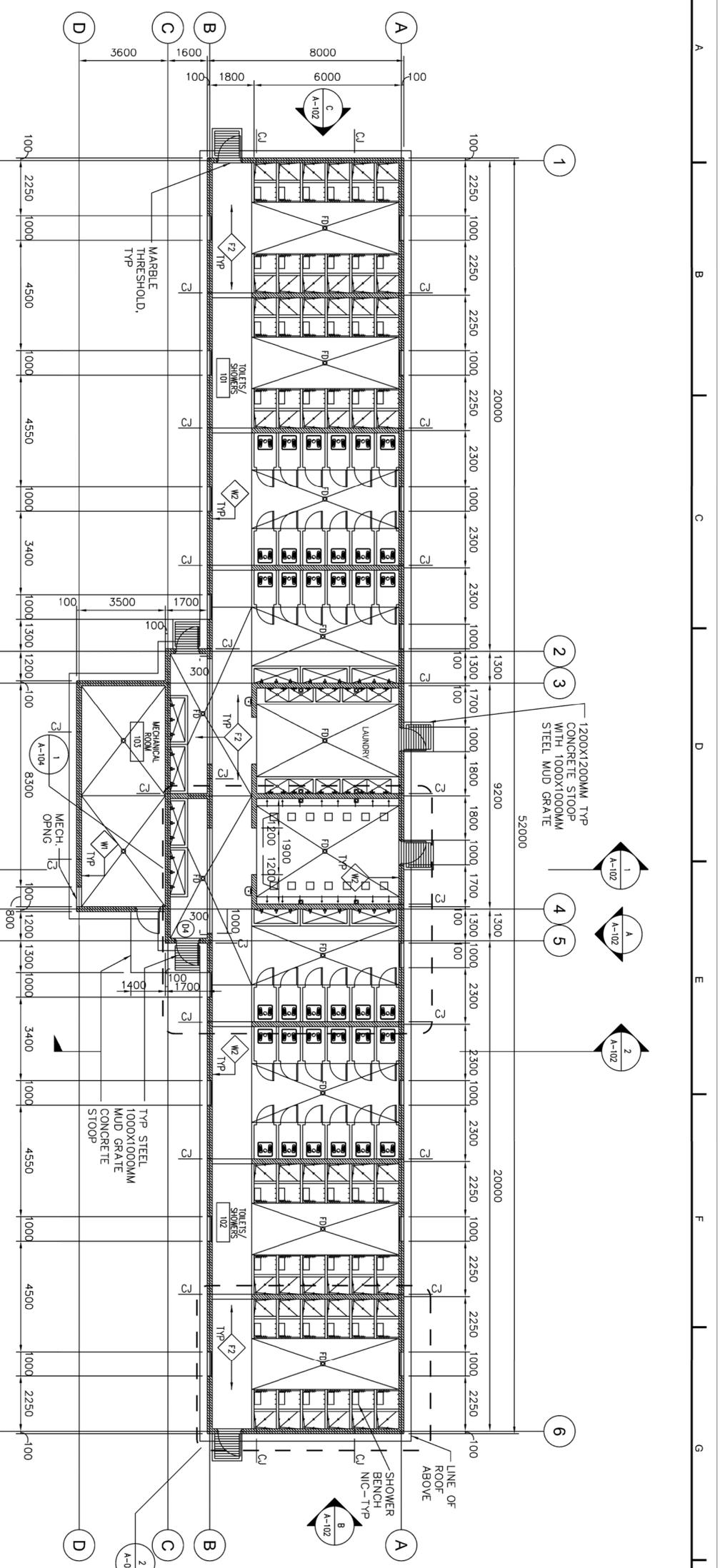
APPENDIX A_4.17

4.17

Sheet Reference Number: 403-A-112 819 OF 849	AFGHAN NATIONAL ARMY (ANA) ANA GARRISON, GAMBERI PDC: ANA JALALABAD, AFGHANISTAN FY:07	DFAC #1 GAS STORAGE PLAN, SECTION & ELEVATIONS	DEPARTMENT OF THE ARMY U.S. ARMY CORPS OF ENGINEERS AFGHANISTAN ENGINEERS DISTRICT KABUL, AFGHANISTAN	Designed By: PJWB Reviewed By: PJWB Submitted By: ROBERT SCAGLIONE P.E.	Drawn By: REW Drawing Code: 403-A-112 Plot Date: 28-07-08 Plot Scale: 1:1	Contract Date: 25-11-07 File Name: 403-A-112 Contract No.: W917PM-08-C-0009	<table border="1"> <tr> <th>Mark</th> <th>Description</th> <th>Date</th> <th>Appr.</th> <th>Mark</th> <th>Description</th> <th>Date</th> <th>Appr.</th> </tr> <tr> <td>▲</td> <td>90% DESIGN SUBMITTAL</td> <td>25A028</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>▲</td> <td>65% DESIGN SUBMITTAL</td> <td>01-04-08</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>▲</td> <td>35% DESIGN RESUBMITTAL # 02</td> <td>25-02-08</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>▲</td> <td>35% DESIGN RESUBMITTAL # 01</td> <td>09-02-08</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>▲</td> <td>35% DESIGN SUBMITTAL</td> <td>06-01-08</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>▲</td> <td>AREA USE PLAN AND MOBILIZATION</td> <td>16-12-07</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Mark	Description	Date	Appr.	Mark	Description	Date	Appr.	▲	90% DESIGN SUBMITTAL	25A028						▲	65% DESIGN SUBMITTAL	01-04-08						▲	35% DESIGN RESUBMITTAL # 02	25-02-08						▲	35% DESIGN RESUBMITTAL # 01	09-02-08						▲	35% DESIGN SUBMITTAL	06-01-08						▲	AREA USE PLAN AND MOBILIZATION	16-12-07						
Mark	Description	Date	Appr.	Mark	Description	Date	Appr.																																																									
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▲	35% DESIGN SUBMITTAL	06-01-08																																																														
▲	AREA USE PLAN AND MOBILIZATION	16-12-07																																																														



APPENDIX A_4.18



1 FLOOR PLAN
A-101 SCALE = 1:100

F.1.6H.1* 6CHED8/E/E*E1D	
F/225	F1 SEALED CONCRETE
	F2 300MMX300MM TERRAZZO TILE
	F3 CERAMIC TILE
: A/	
W1	WHITE PAINTED PLASTER
W2	150MMX150MM GLAZED CERAMIC TILES UP TO 2000MM A.F.F.L.
: CE/1*	
C1	GYPSUM BOARD - PAINTED
C3	MOISTURE RESISTANT GYPSUM BOARD - PAINTED

F.1.6H.1* 6CHED8/E				
5RP	8sDgH	FORU	: DD	CHdG
101	TOILETS/SHOWERS	F3	W1\W2	C3
102	TOILETS/SHOWERS	F3	W1\W2	C3
103	MECHANICAL ROOM	F1	W1	C1
: A/ 6Y0 B2/6:				
	CMU WALL			
	CMU LOW HEIGHT WALL +/- 2000 MM WITH CERAMIC TILE FINISH			
	CMU CONTROL JOINT			

- 127EG:**
- 1- ALL WALLS ARE 200MM CMU UNLESS NOTED OTHERWISE.
 - 2- ALL INTERIOR WALLS TERMINATE AT CEILING UNLESS NOTED OTHERWISE REF. STRUCT. DWGS.
 - 3- ALL DOOR JAMBS ARE 200MM UNLESS NOTED OTHERWISE.
 - 4- ALL DIMENSIONS ARE TO FACE OF CMU UNLESS NOTED OTHERWISE.
 - 5- ALL VERTICAL DIMENSIONS & LEVELS ARE FROM GROUND FLOOR FINISHED SLAB. THIS ELEVATION IS +0000.
 - 6- TOTAL AREA OF BUILDING IS 470 M2.

APPENDIX A_4.19

4.19



U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN ENGINEER DISTRICT
APO AE 09356

ENGINEERING AND
CONSTRUCTION DIVISION

DESIGNED BY: AED	DATE: XX-XX-XX	REV.
DWN BY: AED	CKD BY: AED	DESIGN FILE NO.
REVIEWED BY:	DRAWING CODE:	
SUBMITTED BY:	FILE NAME:	
	PLOT SCALE: AS SHOWN	
	CONTRACT NO. XX-XX-XX	

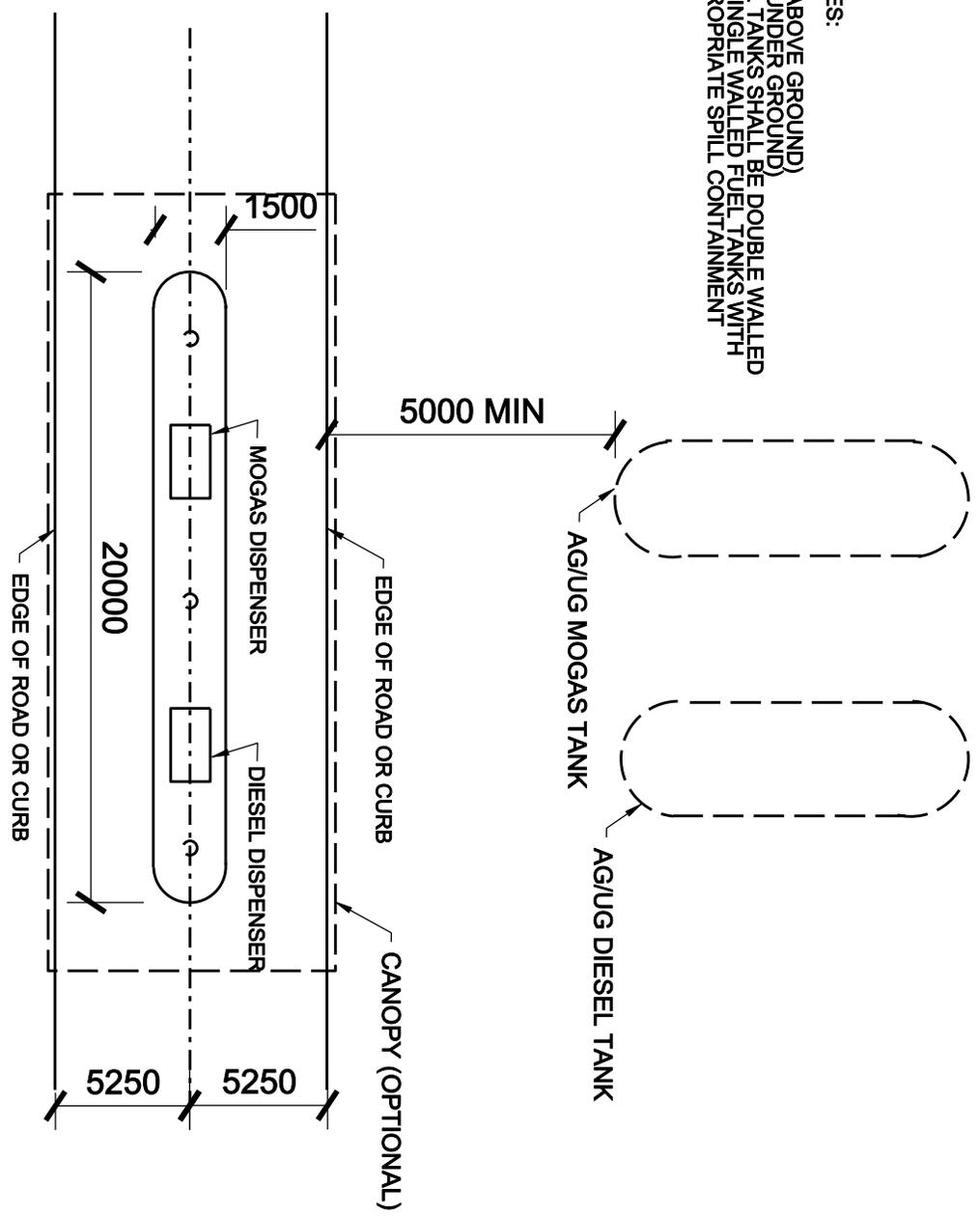
SYMBOL	DESCRIPTION	DATE	APP

ANA KANDAK
QALA-E-NAW
AFGHANISTAN

**TOILET/SHOWER/ABULUTION
LAUNDRY BUILDING
FLOOR PLAN**

SHEET
REFERENCE
NUMBER:
A-101

NOTES:
 AG (ABOVE GROUND)
 UG (UNDER GROUND)
 FUEL TANKS SHALL BE DOUBLE WALLED
 OR SINGLE WALLED FUEL TANKS WITH
 APPROPRIATE SPILL CONTAINMENT



VEHICLE RE-FUELING POINT (NTS)

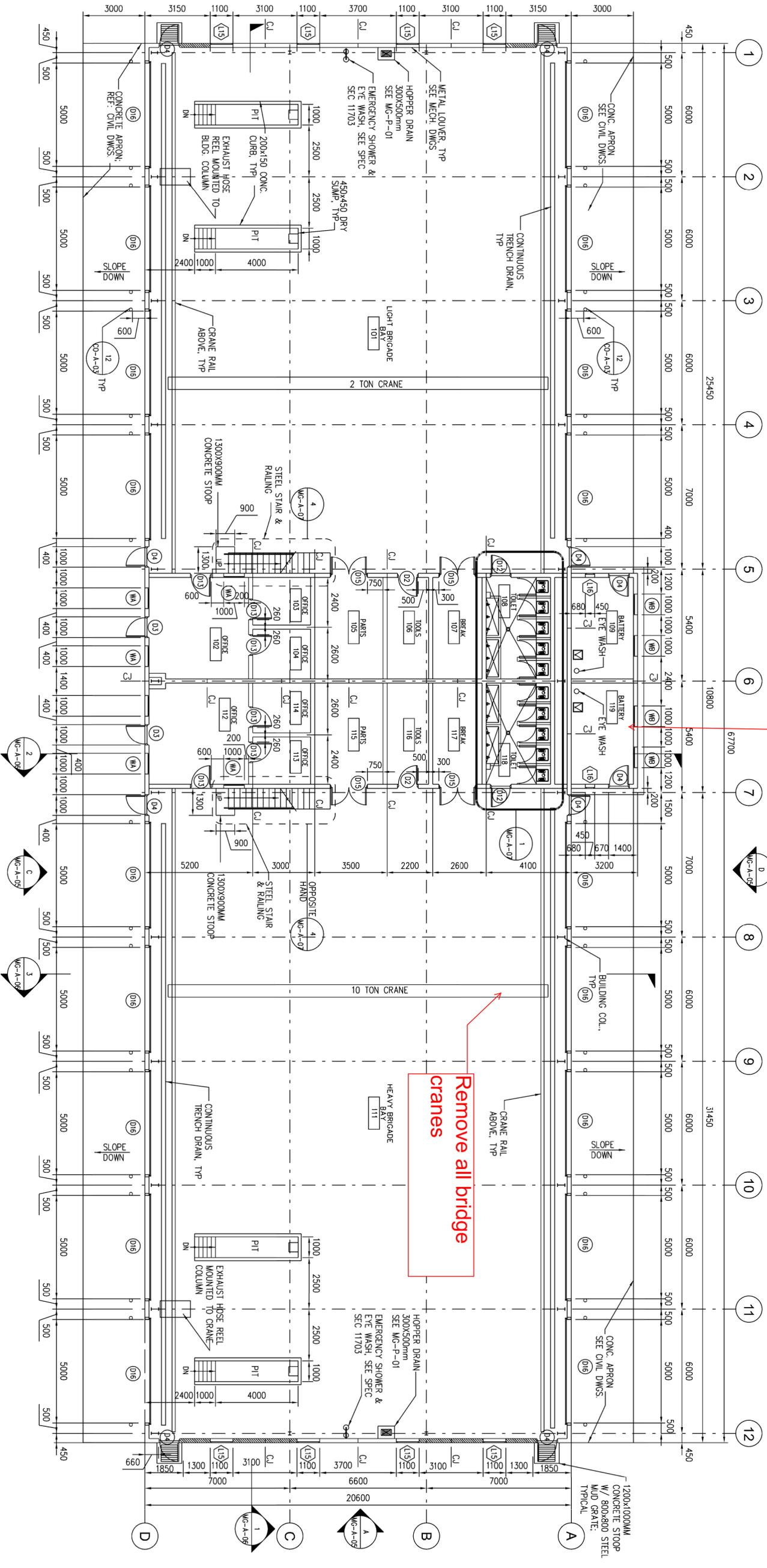
APPENDIX A_4.20

4.20

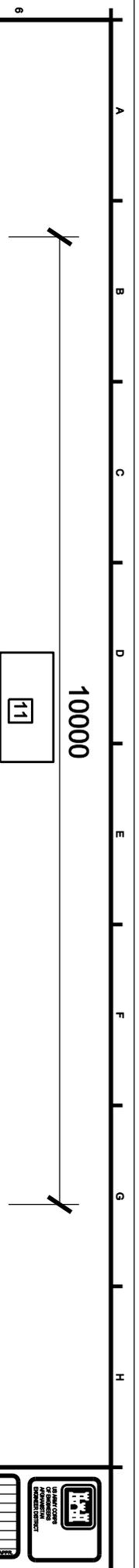
A1 Size 594mm x 841mm

SHEET NUMBER X-XXX SHEET - OF -	PROJECT NO. XXXX PROJECT TITLE INSTALLATION NAME	U.S. ARMY ENGINEER DISTRICT, AFGHANISTAN CORPS OF ENGINEERS APO AE 96338	DESIGNED BY: DRAWN BY: REVIEWED BY: SUBMITTED BY:	DATE: DESIGN/ISSUE FILE NO. DRAWING CODE: FILE NAME: PLOT SCALE: PLOT DATE: 20-06-05	<table border="1"> <thead> <tr> <th>SYMBOL</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APP.</th> <th>SYMBOL</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APP.</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	SYMBOL	DESCRIPTION	DATE	APP.	SYMBOL	DESCRIPTION	DATE	APP.																																	
	SYMBOL	DESCRIPTION	DATE	APP.	SYMBOL	DESCRIPTION	DATE	APP.																																						
DRAWING TITLE		ENGINEERING AND CONSTRUCTION DIVISION																																												

Redesign battery room per drawing of Lead Acid Battery Shop.



1 FLOOR PLAN
A-101 SCALE = 1:200



- 1 LOOKER
- 2 EMERGENCY EYEWASH AND SHOWER
- 3 ACID-RESISTANT FLOOR DRAIN
- 4 BASE CABINET AND SINK
- 5 BENCH AND SHELVES
- 6 FIRE EXTINGUISHER

- 7 BATTERY BENCH
- 8 EXHAUST FAN
- 9 DUMP SINK
- 10 ELEC PANEL
- 11 ACID HOLDING TANK

- E ELEC CONVENIENCE OUTLET
- T TELEPHONE OUTLET
- A COMPRESSED AIR OUTLET

LEAD ACID BATTERY SHOP
 SCALE: NTS

APPENDIX A_4.22

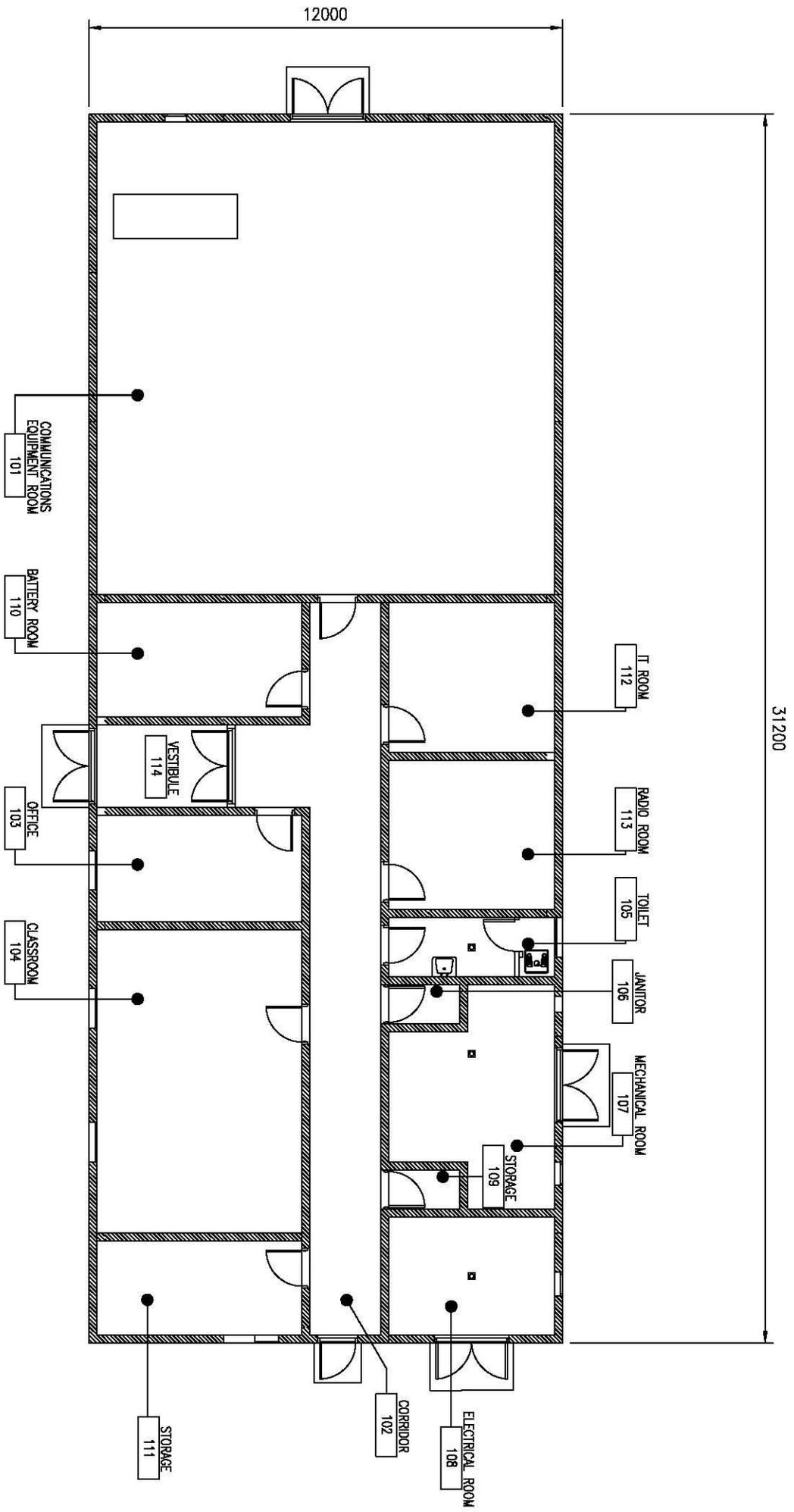
1. FLOOR SHALL BE ACID RESISTANT
2. PROVIDE 3 FOOT WIDE NON-SLIP MATTING IN FRONT OF ALL CHARGING BENCHES
3. WALLS SHALL BE CMU ONE HOUR FIRE WALL WITH 45 MINUTE RATED DOOR. COMMON WALL SHALL BE 2 HOUR FIRE WALL
4. DOOR SHALL BE PROVIDED WITH FIRE RATED PANIC HARDWARE
5. CEILING SHALL BE WATER PROOF
6. SINK AND FLOOR DRAIN SHALL EMPTY INTO EXTERIOR ACID HOLDING TANK
7. ROOF VENTILATOR SHALL BE INSTALLED AT THE HIGHEST POINT AND PROVIDE MINIMUM OF 3 ACH
8. DAMPER WALL MAKEUP AIR OPENING WITH MOTORIZED DAMPER AND 2 INCH THICK WASHABLE FILTERS

A1 Size 594mm x 841mm

PROJECT NO. XXXX PROJECT TITLE INSTALLATION NAME DRAWING TITLE	U.S. ARMY ENGINEER DISTRICT, AFGHANISTAN CORPS OF ENGINEERS APO AE 96358 ENGINEERING AND CONSTRUCTION DIVISION	DESIGNED BY: _____ DRAWN BY: _____ CHECKED BY: _____ REVIEWED BY: _____ SUBMITTED BY: _____	DATE: _____ DESIGN FILE NO.: _____ DRAWING CODE: _____ FILE NAME: _____ PLOT SCALE: _____ PLOT DATE: 20/04/08
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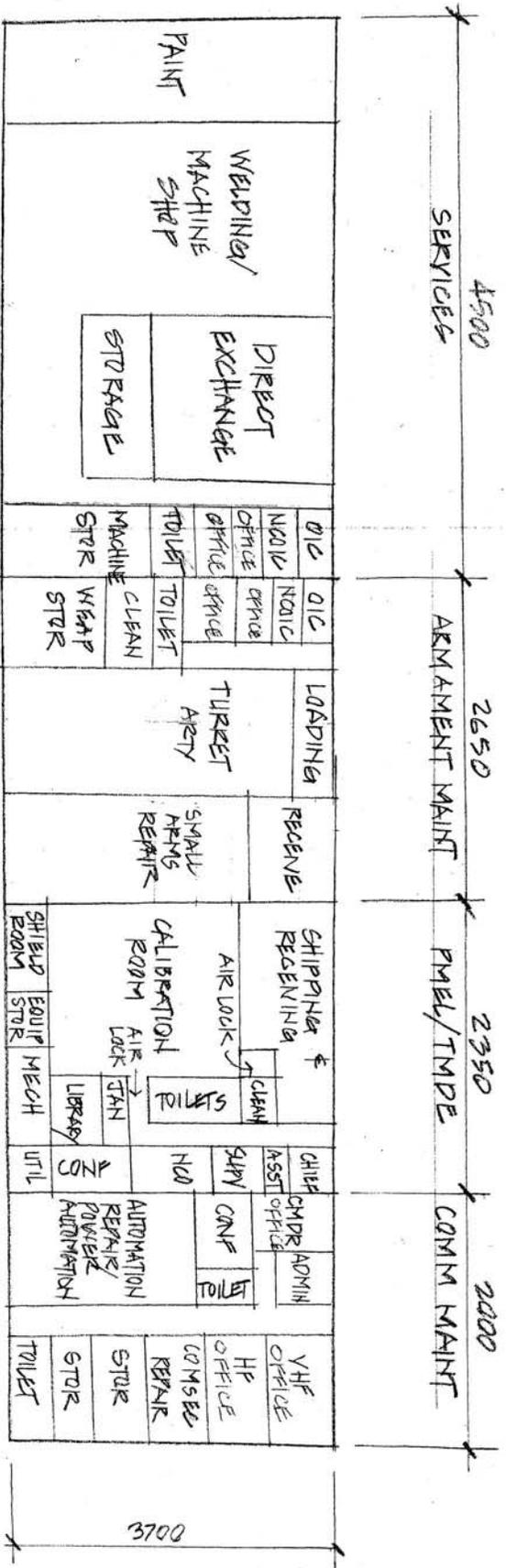
NO.	DESCRIPTION	DATE	APP.	REVISION	DESCRIPTION	DATE	APP.

U.S. ARMY
CORPS OF ENGINEERS
ENGINEERING DISTRICT



COMMUNICATION BUILDING

APPENDIX A_4.23

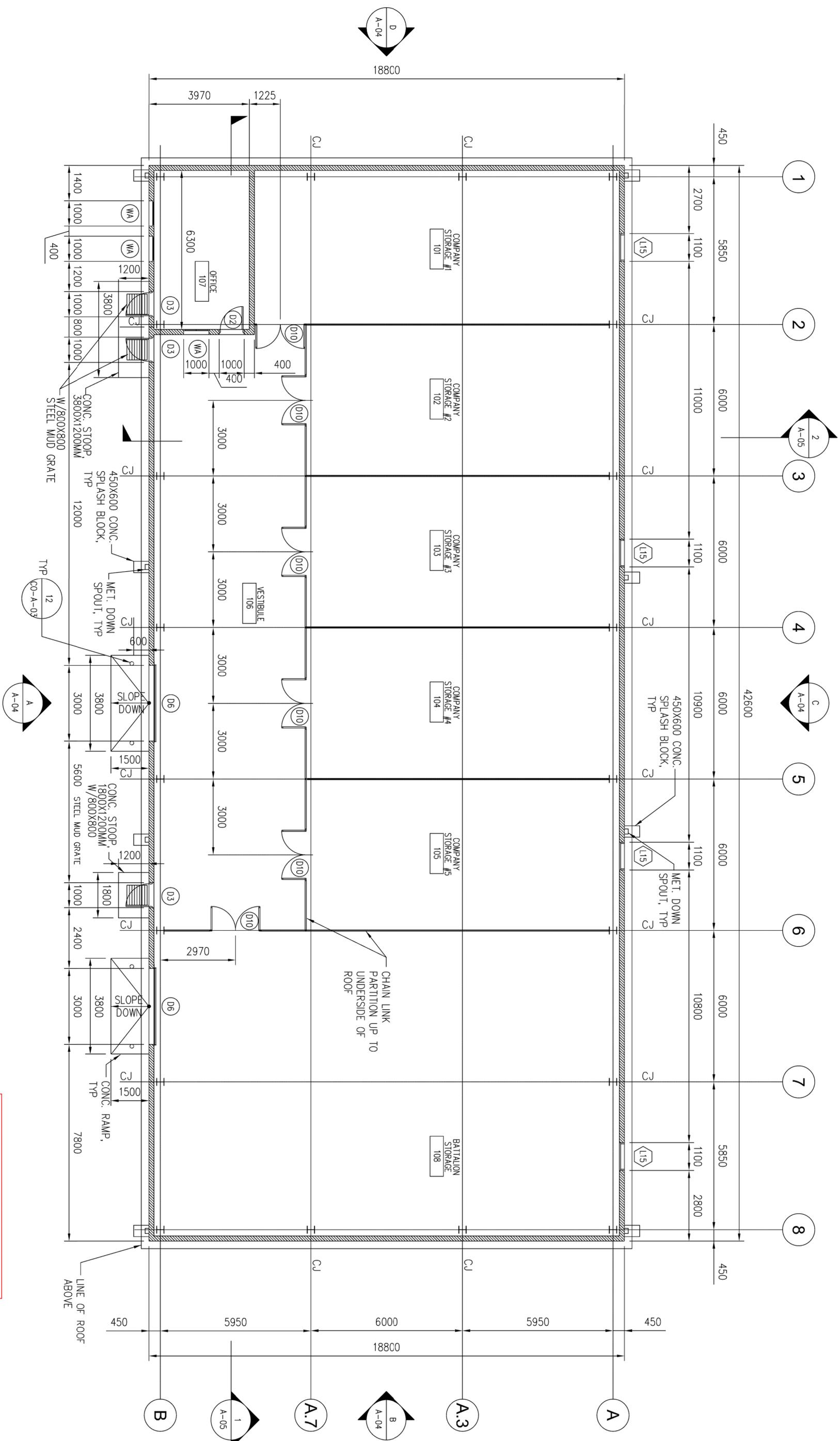


GSE COMP & ARMS MAINT. FAC.

NT'S.

APPENDIX A_4.24

4.24



APPENDIX A_4.26

FINISHING SCHEDULE LEGEND

FLOOR

F1 HARDENER CONCRETE

WALL

W1 WHITE PAINTED PLASTER

CEILING

C1 GYPSUM BOARD - PAINTED

WALL SYMBOLS:

CMU WALL

CMU CONTROL JOINT

FINISHING SCHEDULE

Room No.	USAGE	FLOOR	WALL	CEILING
101	OFFICE	F1	W1	C1
102	ENTRANCE HALL	F1	W1	C1
103	BATTALION ARMS ROOM	F1	W1	C1
104	BATTALION ARMS ROOM	F1	W1	C1
105	BATTALION ARMS ROOM	F1	W1	C1
106	BATTALION ARMS ROOM	F1	W1	C1
107	BATTALION ARMS ROOM	F1	W1	C1

NOTES:

- 1- ALL WALLS ARE 200mm CMU UNLESS OTHERWISE NOTED.
- 2- ALL INTERIOR WALLS TERMINATE AT CEILING UNLESS NOTED OTHERWISE. REF. STRUCT. DWGS.
- 3- ALL DOOR JAMBS ARE 200MM UNLESS OTHERWISE NOTED.
- 4- ALL DIMENSIONS ARE TO FACE OF CMU UNLESS NOTED OTHERWISE.
- 5- ALL VERTICAL DIMENSIONS & LEVELS ARE FROM GROUND FLOOR FINISHED SLAB. THIS ELEVATION IS +0000.
- 6- SEE DRAWING CO-A-05 & CO-A-06 FOR OPENING SCHEDULE & TYPES.
- 7- SEE DRAWING CO-A-02, CO-A-03 & CO-A-04 FOR STANDARD DETAILS.
- 8- SEE STRUCTURAL DRAWINGS FOR LOCATION OF BUILDING CONTROL, EXPANSION AND SEISMIC JOINTS.
- 9- TOTAL AREA OF BUILDING 349.7 M².

1 0 1 2 3 4 5 METERS

Scale 1:100

NO.	DATE	DESCRIPTION	BY	CHK	APP
0	MAY 25, 2008	ISSUE AS SHOWN	MM	MM	MM

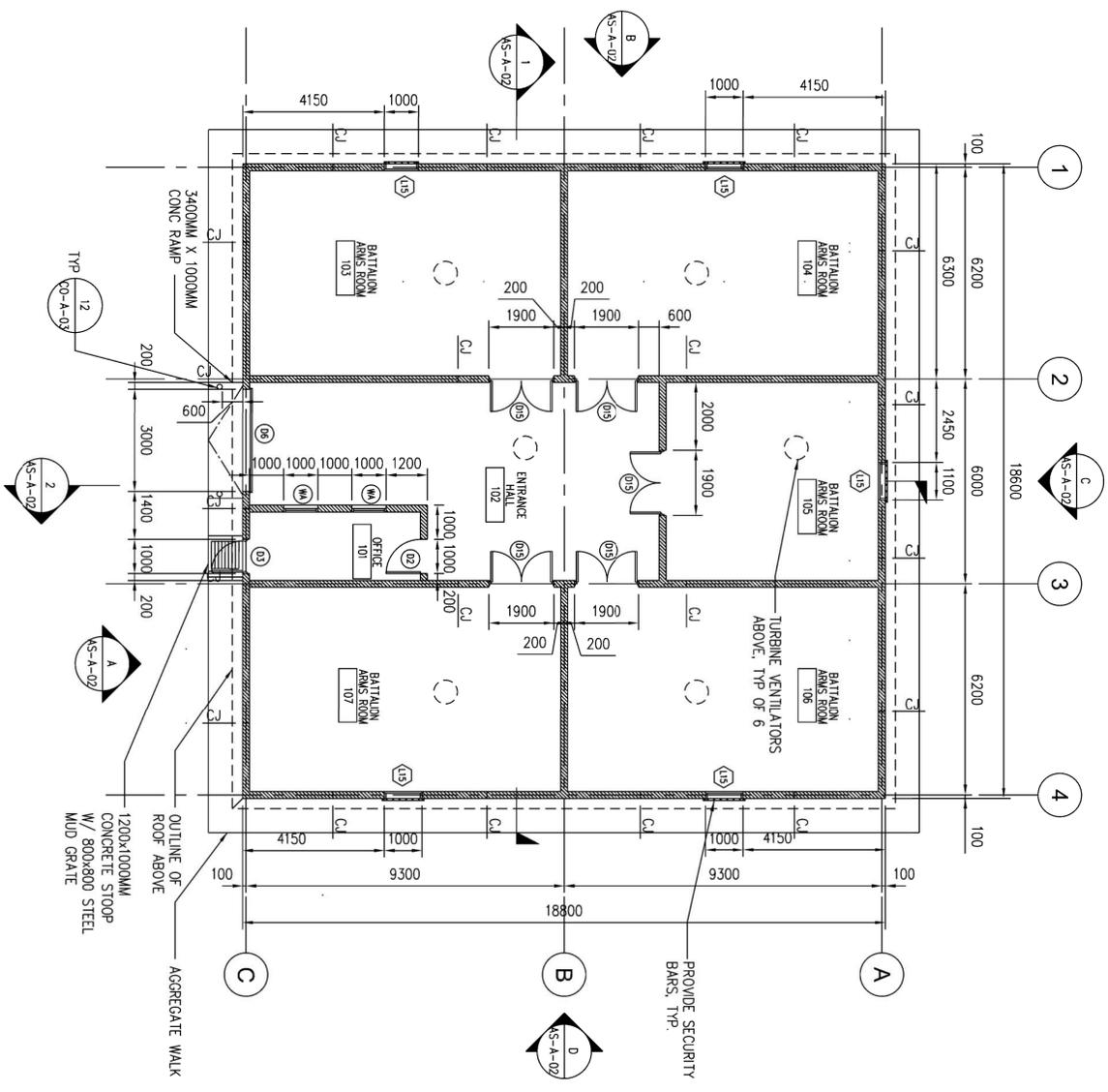
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U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN, AFGHANISTAN

PROJECT:
ANA
REGIONAL BRIGADE
AFGHANISTAN

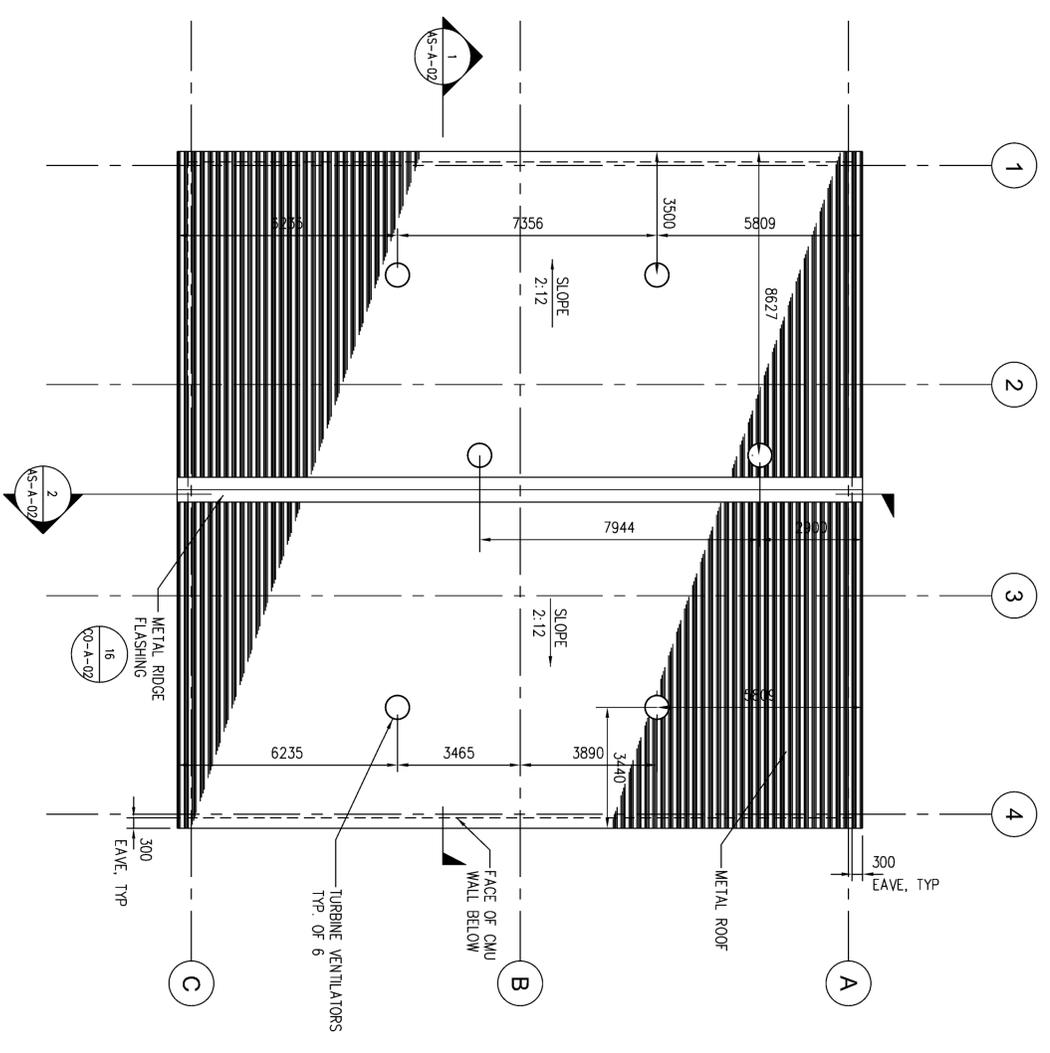
TITLE:
ARM STORAGE BUILDING
FLOOR AND ROOF PLANS
BLDG#324

ACTION	NAME	DATE	DOCUMENT NO.	SCALE	NO.	DATE
ISSUED FOR CONSTRUCTION	MM	MAY 25, 2008	AS-A-01	1:100	9	MAY 25, 2008



1 FLOOR PLAN

SCALE: 1:100



2 ROOF PLAN

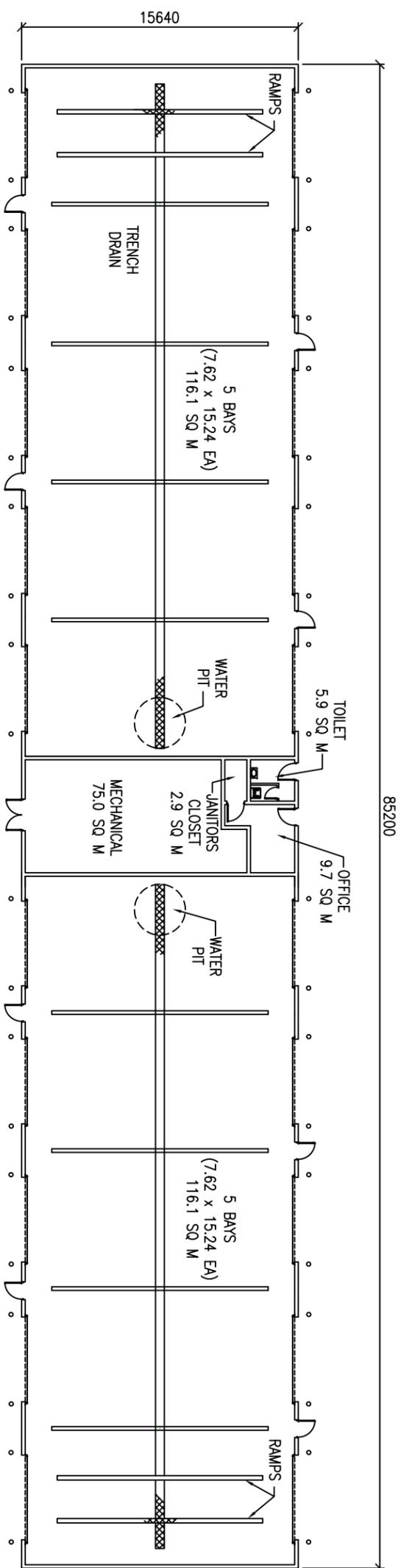
SCALE: 1:100

APPENDIX A_4.27



NORTH

NOTE:
NORTH ARROW INDICATED
REFERS TO THE RELATIVE
ORIENTATION OF THIS PLAN.
IF FINAL ORIENTATION CHANGES
THEN THE RESTROOM
ORIENTATIONS MUST CHANGE.



WASH RACK

APPROXIMATE TOTAL AREA = 1292.0 SQ M



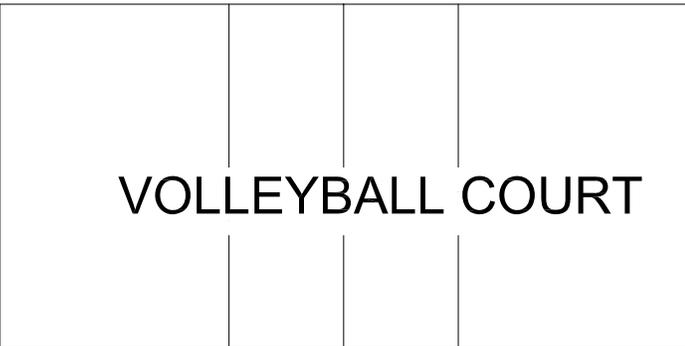
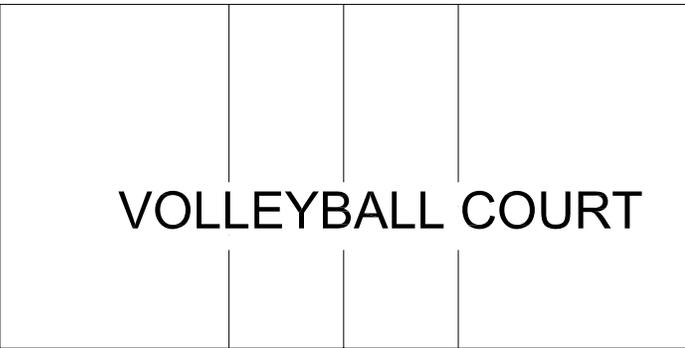
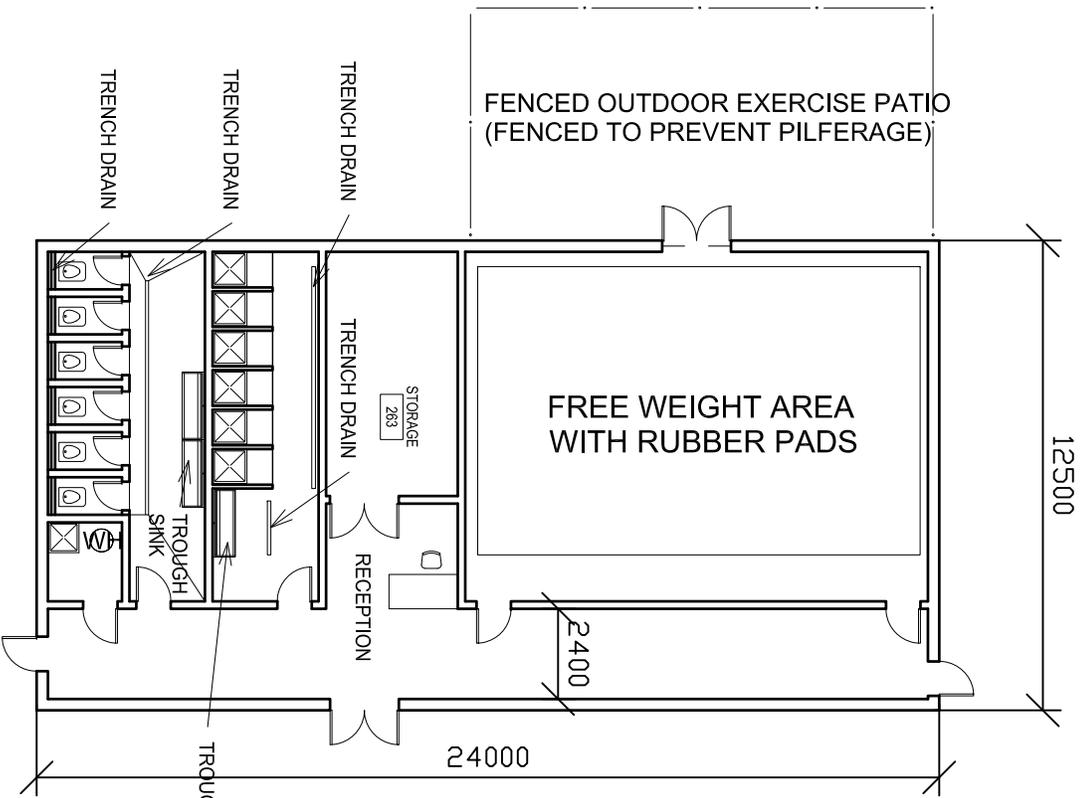
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APPENDIX A_4.28

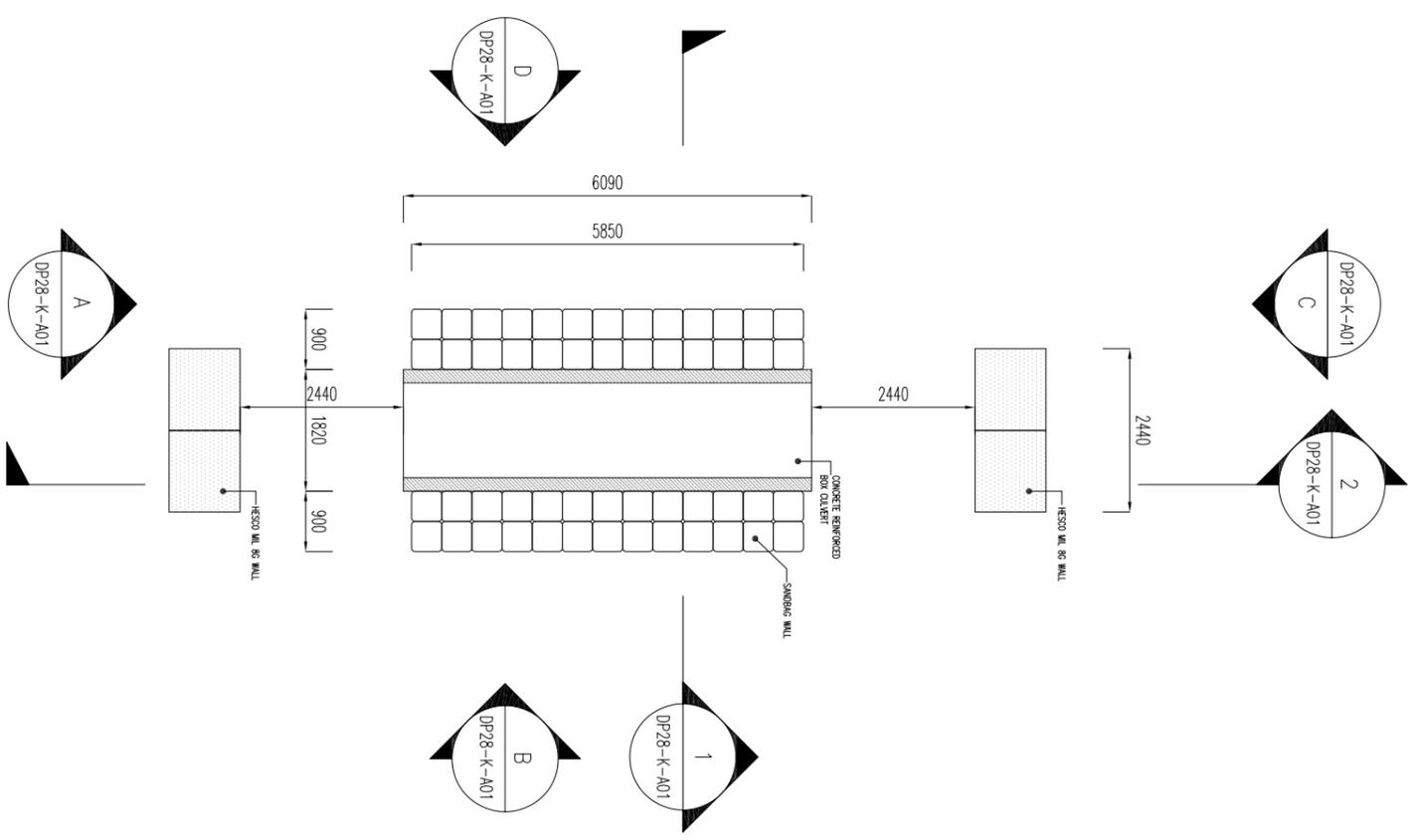
GYM (300 SM)

APPENDIX A_4.29

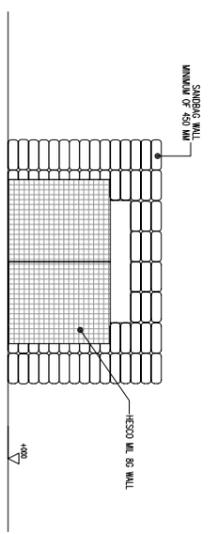
US Army Corps of Engineers - Afghanistan Engineer District



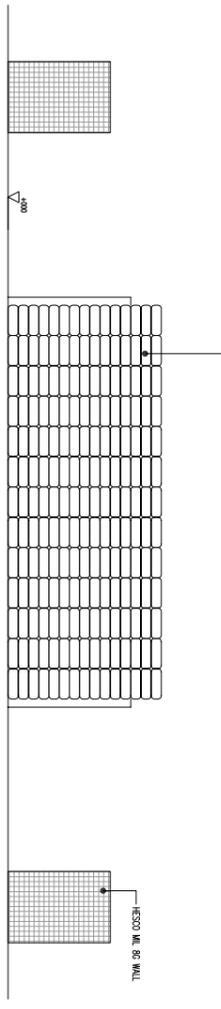
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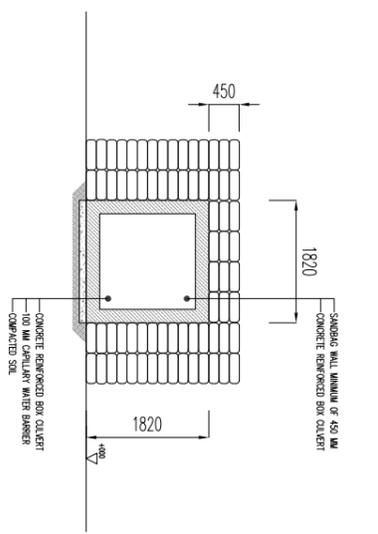
C ELEVATION
SCALE: 1:50



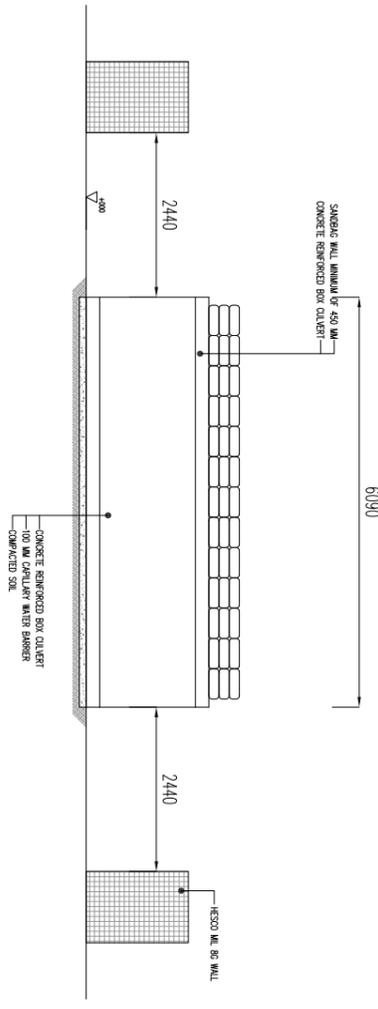
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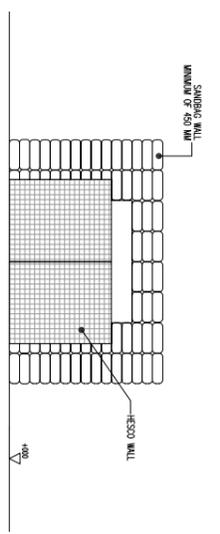
1 SECTION
SCALE: 1:50



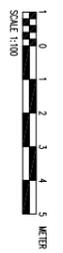
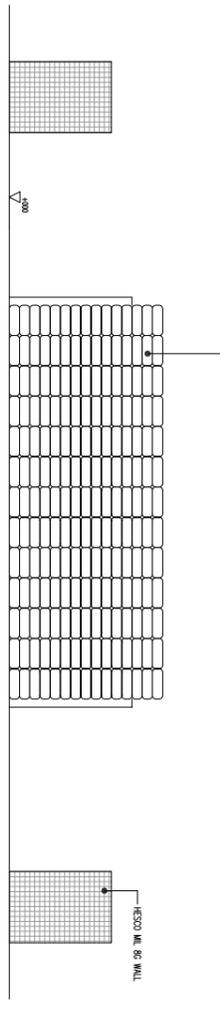
2 SECTION
SCALE: 1:50



A ELEVATION
SCALE: 1:50



B ELEVATION
SCALE: 1:50



APPENDIX A_4.35

4.35

Sheet Reference Number: DP28-K-A01

ANA POL-E KHOMRI FOB
POL-E KHOMRI, AFGHANISTAN

AMMUNITION SUPPLY BUNKER
PLAN, ELEVATIONS AND SECTIONS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN ENGINEERS DISTRICT
POL-E KHOMRI, AFGHANISTAN

Contractor: **YMTYZ JV**
Designer: In Association with IRMAK, KONKAN, TİMKA, DELTA OM&BERKMEH

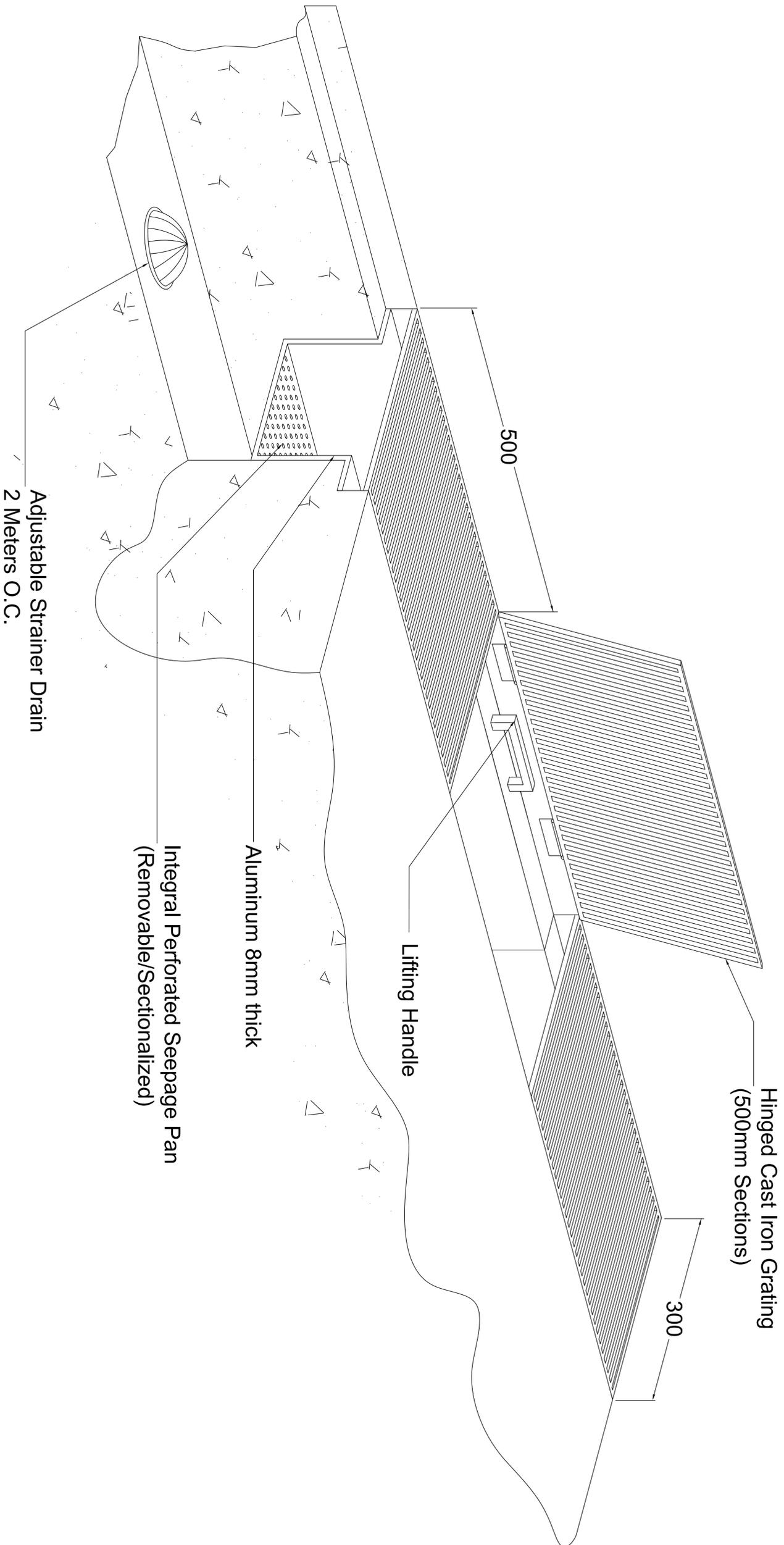
Designed By: G.IRMAK
Reviewed by: G.IRMAK
Submitted by: IRMAK
Contract No: W917PM-07-D-0017 TO 0005

Drawn By: B.SERTSÖZ, B.YILDIRIM
Draw Code: DP28-K-A01
Plot Date: 26-OCT-08
Plot Scale: 1:50

Contract Date: CONTRACT DATE
FILE NAME: AMMUNITION SUPPLY BUNKER

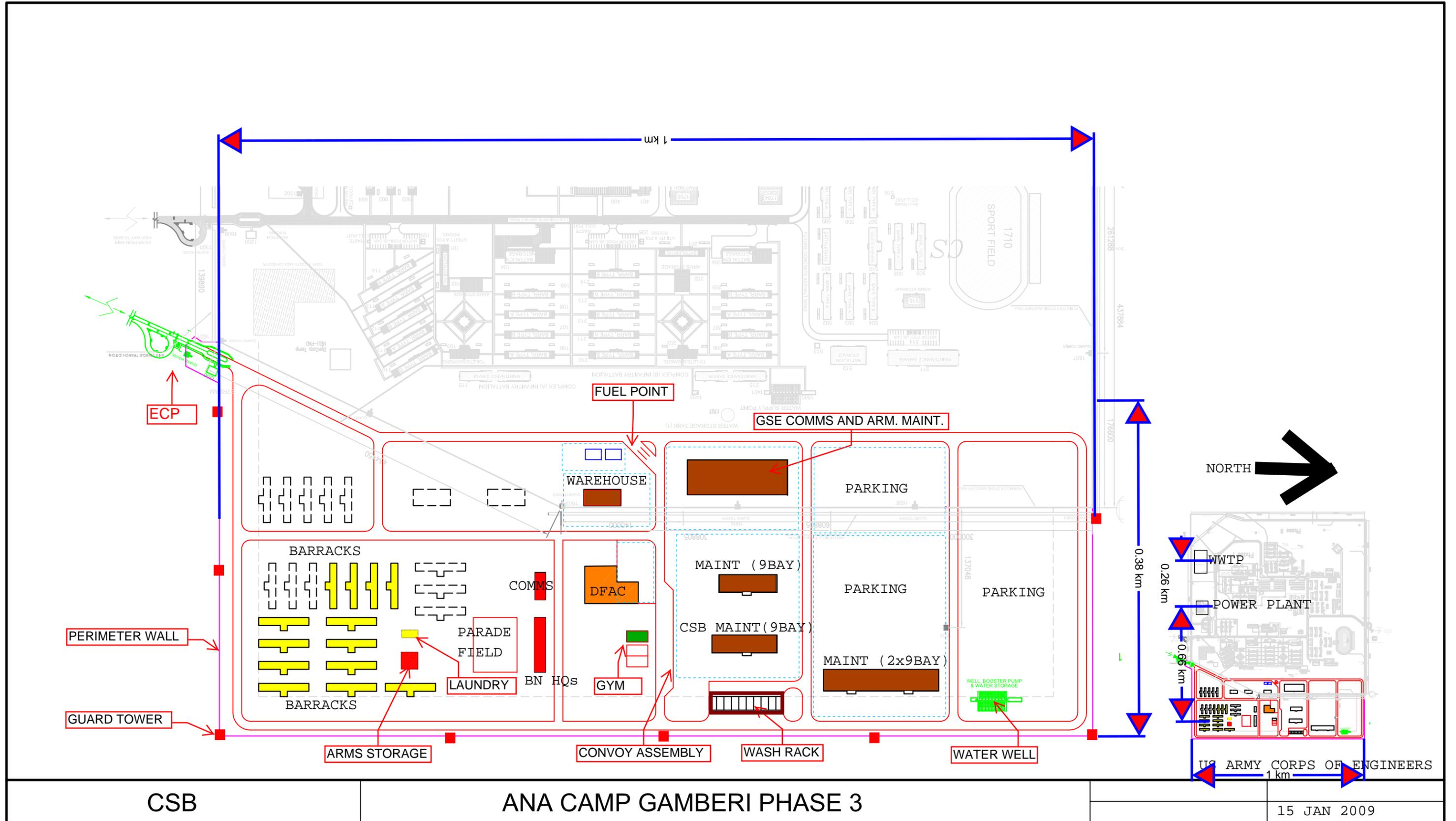
Symbol	Description	Date	Appr.	Symbol	Description	DATE	Appr.
▲	99%DESIGNSUBMITTAL	26-OCT-08					
▲	35%DESIGNSUBMITTAL	25-AUG-08					

U.S. ARMY CORPS OF ENGINEERS
AFGHANISTAN ENGINEERS DISTRICT

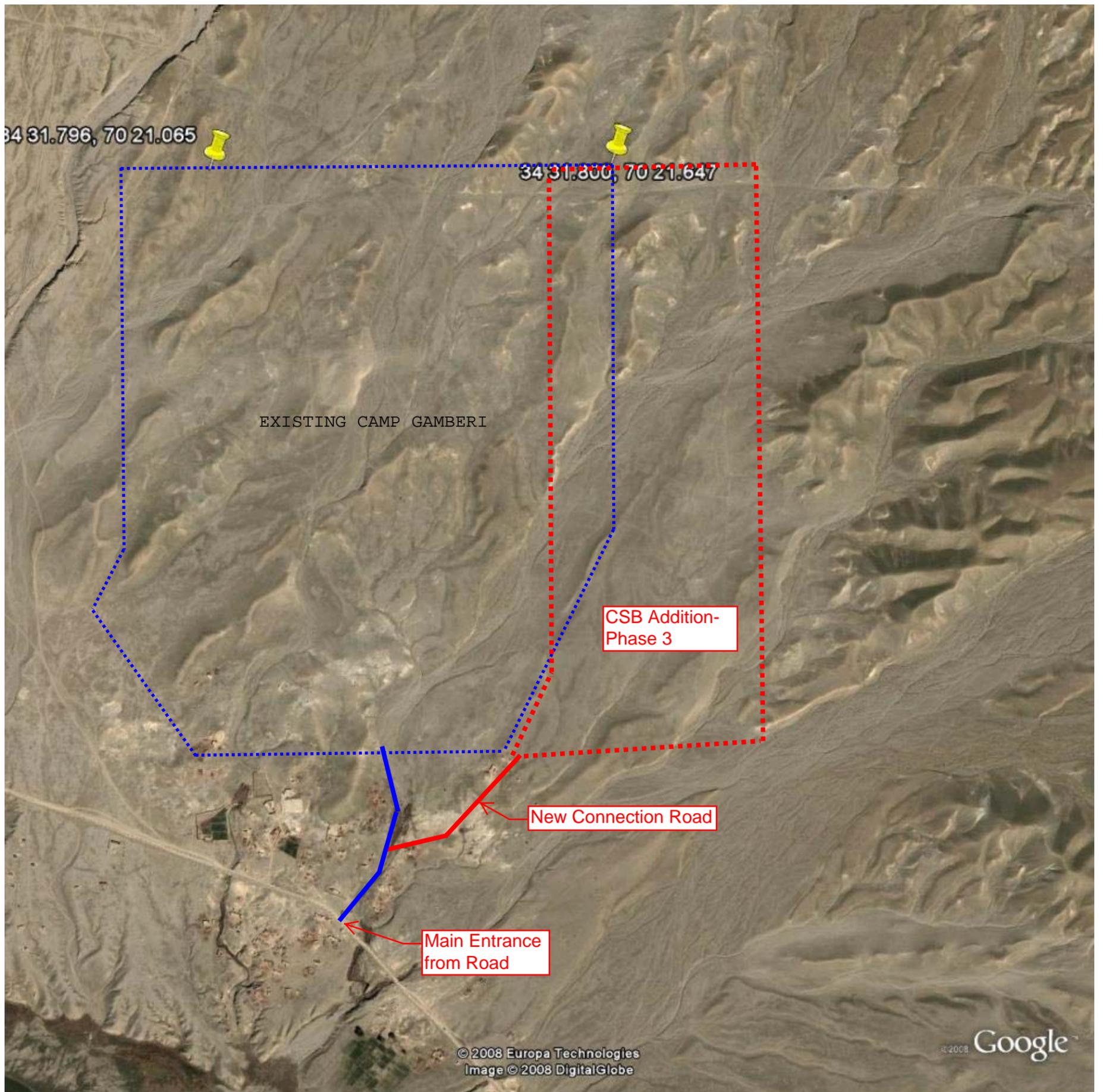


FLOOR TRENCH DETAIL

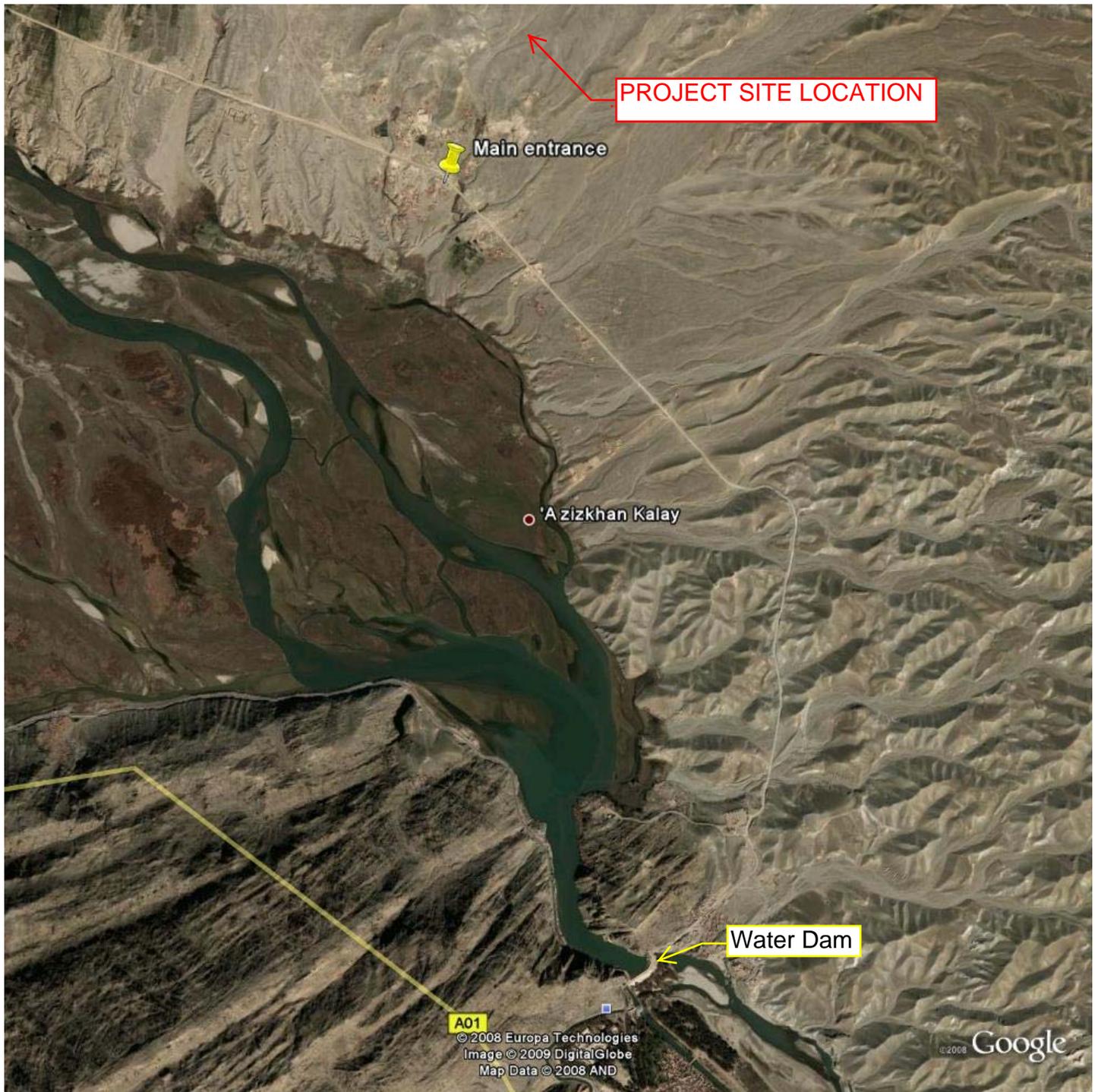
TRENCH DRAIN DETAIL	 US ARMY CORPS OF ENGINEERS AFGHAN ENGR DISTRICT	Project number	MECH
		Date: 30 JULY 2007	
		Checked by	Scale



APPENDIX A. CONCEPTUAL SITE LAYOUT PLAN



APPENDIX A_4.2



Gamberi CSB

APPENDIX A_4.2