SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO. W917PM-09-R-0120	2. TYPE OF SOLICITATION [ ] SEALED BID (IFB) [X] NEGOTIATED *(RFP)*	3. DATE ISSUED 23-Sep-2009	PAGE OF PAGES 1 OF 327

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.

7. ISSUED BY CODE W917PM	8. ADDRESS OFFER TO *(If Other Than Item 7)* CODE
AFGHANISTAN ENGINEER DISTRICT US ARMY CORPS OF ENGINEERS KABUL APO AE 09356 TEL: FAX:	**See Item 7** TEL: FAX:

9. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE NO. *(Include area code)* *(NO COLLECT CALLS)*
	EVAN B CARTER	

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying no., date):*

ROTARY WING RAMP PHASE II, KANDAHAR AIR FIELD (KAF), KANDAHAR, AFGHANISTAN

PROJECT IS A DESIGN/BUILD, FIRM FIXED PRICE CONSTRUCTION CONTRACT.

NAICS CODE: 237310
SIZE STANDARD: $33.5 MILLION
POP - 270 DAYS FROM RECEIPT OF NOTICE TO PROCEED

USACE-AES POC:
EVAN B. CARTER
CONTRACTING SPECIALIST
US: 540-667-3173; AF: 070-663-5155
evan.b.carter@usace.army.mil

11. The Contractor shall begin performance within 10 calendar days and complete it within 270 calendar days after receiving [ ] award, [X] notice to proceed. This performance period is [X] mandatory, [ ] negotiable. *(See* SECTION 00800 *.)*

12 A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES," indicate within how many calendar days after award in Item 12B.)* [ ] YES [X] NO	12B. CALENDAR DAYS

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 1 copies to perform the work required are due at the place specified in Item 8 by 02:00 PM *(hour)* local time 22 Oct 2009 *(date).* If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee [ ] is, [X] is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 120 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

SOLICITATION, OFFER, AND AWARD (Continued)

(Construction, Alteration, or Repair)

OFFER ***(Must be fully completed by offeror)***

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*		15. TELEPHONE NO. *(Include area code)*
		16. REMITTANCE ADDRESS *(Include only if different than Item 14)* **See Item 14**
CODE	FACILITY CODE	

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. *(Insert any number equal to or greater than the minimum requirements stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)*

AMOUNTS	SEE SCHEDULE OF PRICES

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*	20B. SIGNATURE	20C. OFFER DATE

AWARD ***(To be completed by Government)***

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)*	**ITEM**	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C. 2304(c) ☐ 41 U.S.C. 253(c)
26. ADMINISTERED BY CODE		27. PAYMENT WILL BE MADE BY: CODE

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _ _ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work, requisitions identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications or incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation, is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*		31A. NAME OF CONTRACTING OFFICER *(Type or print)* TEL: EMAIL:
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY
		31C. AWARD DATE

Section 00010 - Solicitation Contract Form

BID SCHEDULE

PROPOSAL SCHEDULE

PROJECT: Rotary Wing Ramp and Taxiway, Phase 2
LOCATION: Kandahar, AF

Work Item	Description	Qty	Unit	Total
0001	Mobilization and Demobilization	1	LS	_____
0002	Design and Construct Rotary Wing Ramp and Taxiway, including, but not limited to, pavement, lighting, markings, tie-downs, and associated site work, as per the contract documents.	1	LS	_____
0003	Design and Construct Aircraft Direct Fueling Facility, including, but not limited to, pavement, lighting, markings, berms, pumps and associated site work, as per the contract documents.	1	LS	_____
0004	Defense Base Act (DBA) Insurance	1	LS	_____
	Total Proposed Price (CLINS 0001 - 0004)			_____

Section 00100 - Bidding Schedule/Instructions to Bidders

CLAUSES INCORPORATED BY REFERENCE

52.204-6	Data Universal Numbering System (DUNS) Number	APR 2008
52.214-34	Submission Of Offers In The English Language	APR 1991
52.214-35	Submission Of Offers In U.S. Currency	APR 1991
52.215-1	Instructions to Offerors--Competitive Acquisition	JAN 2004
52.217-4	Evaluation Of Options Exercised At The Time Of Contract Award	JUN 1988
52.217-5	Evaluation Of Options	JUL 1990

CLAUSES INCORPORATED BY FULL TEXT

52.215-20 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA (OCT 1997)—ALTERNATE III (OCT 1997)

(a) Exceptions from cost or pricing data. (1) In lieu of submitting cost or pricing data, offerors may submit a written request for exception by submitting the information described in the following subparagraphs. The Contracting Officer may require additional supporting information, but only to the extent necessary to determine whether an exception should be granted, and whether the price is fair and reasonable.

(i) Identification of the law or regulation establishing the price offered. If the price is controlled under law by periodic rulings, reviews, or similar actions of a governmental body, attach a copy of the controlling document, unless it was previously submitted to the contracting office.

(ii) Commercial item exception. For a commercial item exception, the offeror shall submit, at a minimum, information on prices at which the same item or similar items have previously been sold in the commercial market that is adequate for evaluating the reasonableness of the price for this acquisition. Such information may include--

(A) For catalog items, a copy of or identification of the catalog and its date, or the appropriate pages for the offered items, or a statement that the catalog is on file in the buying office to which the proposal is being submitted. Provide a copy or describe current discount policies and price lists (published or unpublished), e.g., wholesale, original equipment manufacturer, or reseller. Also explain the basis of each offered price and its relationship to the established catalog price, including how the proposed price relates to the price of recent sales in quantities similar to the proposed quantities;

(B) For market-priced items, the source and date or period of the market quotation or other basis for market price, the base amount, and applicable discounts. In addition, describe the nature of the market;

(C) For items included on an active Federal Supply Service Multiple Award Schedule contract, proof that an exception has been granted for the schedule item.

(2) The offeror grants the Contracting Officer or an authorized representative the right to examine, at any time before award, books, records, documents, or other directly pertinent records to verify any request for an exception under this provision, and the reasonableness of price. For items priced using catalog or market prices, or law or regulation , access does not extend to cost or profit information or other data relevant solely to the offeror's determination of the prices to be offered in the catalog or marketplace.

(b) Requirements for cost or pricing data. If the offeror is not granted an exception from the requirement to submit cost or pricing data, the following applies:

(1) The offeror shall prepare and submit cost or pricing data and supporting attachments in accordance with Table 15-2 of FAR 15.408.

(c) Submit the cost portion of the proposal via the following electronic media: email to evan.b.carter@usace.army.mil

As soon as practicable after agreement on price, but before contract award (except for unpriced actions such as letter contracts), the offeror shall submit a Certificate of Current Cost or Pricing Data, as prescribed by FAR 15.406-2.

(End of provision)

CLAUSES INCORPORATED BY FULL TEXT

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a firm fixed price contract resulting from this solicitation.

(End of provision)

CLAUSES INCORPORATED BY FULL TEXT

52.233-2 SERVICE OF PROTEST (SEP 2006)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from:

U.S. Army Corp of Engineer (USACE)
Bldg. 720 KAF Road
Kandahar Air Field
Kandahar, AF
Attn: John A Cominotto

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

CLAUSES INCORPORATED BY FULL TEXT

52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995)

(a) The clauses at 52.236-2, Differing Site Conditions, and 52.236-3, Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) There is no Site Visit currently scheduled for at this time. Please contact Contracing Officer for more information.

(End of provision)

CLAUSES INCORPORATED BY FULL TEXT

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/loadmainre.html

http://farsite.hill.af.mil/VFDFARA.HTM

(End of provision)

52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (APR 1984)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of"(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any Defense FAR Suppliments (48 CFR Chapter 2) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

SECTION 00110

SECTION 00110 PROPOSAL PREPARATION

DESIGN-BUILD

LOW-PRICED, TECHNICALLY ACCEPTABLE

1. 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 e-mail to:

Evan Carter
or
Hamilton Batista

E-MAIL ADDRESS: evan.b.carter@usace.army.mil or Hamilton.batista@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 10 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.

2. DIRECTIONS FOR SUBMITTING PROPOSALS

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

MARK PACKAGES: **Rotary Wing Ramp and Taxiway, Phase 2**

Solicitation No: W917PM-09-R-0120

Closing Date: 23 October 2009

Closing Time: Proposals must be received at the gate ECP-3, Kandahar Air Field, Kandahar, Afghanistan between 09:00 to11:00 A.M. Afghanistan Time or to the U.S. Corps of Engineer Compound (USACE) Contracting Office 720 KAF Road Kandahar Air Field across from the bazaar.

ADDRESS PACKAGES TO: Hamilton Batista
USACE-AES
APO-AE 09355

Special Instruction Pertaining to Hand Carried Offers: All Contractors submitting proposals must notify USACE Contracting Office personnel Hamilton Batista or Evan Carter by e-mail to request a letter of approval to Hand-Carry proposals through the gate at ECP-3 Kandahar Air Field, by no later than 15 October 2009.

3. PREPROPOSAL CONFERENCE / SITE VISIT

No organized Pre-Proposal Conferences/Site-Visit is set for this acquisition at this time. If an organized Pre-Proposal Conference/Site-Visit is scheduled, it will be announced by Solicitation Amendment. Offerors may contact the local representative to arrange a site visit individually. See FAR Provision 52.236-27 Site Visit (Construction)

IMPORTANT NOTES. (1) Remarks and explanations addressed during the conference or site visit 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.

4. 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.

5. FACSIMILE OFFERS

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

Facsimile and email responses to acknowledge Solicitation Amendments are not allowed. Only hard copy acknowledgements of amendments are permitted.

6. PROPOSAL SUBMISSION REQUIREMENTS AND INSTRUCTIONS

a. REQUIREMENT FOR SEPARATE PRICE AND TECHNICAL PROPOSALS.

(1) Each Offeror must submit both a Price Proposal and a Technical Proposal. The Price Proposal and the Technical Proposal must be submitted as separate volumes. Ensure that the outside of each separate volume is clearly marked to indicate its contents; and the identity of the offeror. Additionally, clearly identify the “original” cost/price proposal and the “original” technical proposal on the outside cover.

(2) Both the Price Proposal and the Technical Proposal must be received by the closing date and time set for receipt of proposals.

(3) No dollar amounts from the Price Proposal are to be included in the Technical Proposal.

(4) All information intended to be evaluated as part of the Technical Proposal must be submitted as part of the Technical Proposal. Do not cross-reference similar material in the Price Proposal, or vice versa. Also, do not include links to websites in lieu of incorporating information into your proposal.

(5) Do not include exceptions to the terms and conditions of the solicitation in either the technical or price proposal. Should the offer include any standard company terms and conditions that conflict with the terms and conditions of the solicitation, the offer may be determined "unacceptable" and thus ineligible for award. Should the offeror have any questions related to specific terms and conditions, these should be resolved prior to submission of the offer. Notwithstanding the above, the Offeror must clearly describe in the Proposal Cover Sheet submitted with the Price Proposal any exceptions to the contractual and/or technical terms and conditions of the solicitation contained in the Offer.

b. DISCUSSIONS. The Government **does not** intend to enter into discussions with offerors prior to determining those contractors within the competitive range, in accordance with FAR 52.215-1, Instructions to Offerors—Competitive Acquisitions, Alternate I.

c. COST OR PRICING DATA. Offerors are not required to submit Cost or Pricing Data with their offers.

d. GENERAL INSTRUCTIONS.

(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. Do not use fold-outs (e.g., 11” x 14” or 11” x 17” sheets) unless specifically authorized in this 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 herein 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.

e. SPECIFIC INSTRUCTIONS FOR THE PRICE PROPOSAL

(1) Number of Sets of the Price Proposal. Submit the ORIGINAL and ONE additional hard copy sets of the Price Proposal.

(2) Size Restrictions and Page Limits. Use only 8 ½” x 11” pages. There are no page limits set for the price proposal. However, limit your response to information required by this solicitation. Excess information will not be considered in the Government’s evaluation.

(3) Format and Contents of the Price Proposal and List of Tabs. The Price Proposal shall be appropriately labeled as such and shall be organized as indicated in the following chart.

TAB	CONTENTS OF THE PRICE PROPOSAL

#1	The Proposal Cover Sheet
#2	The SF 1442 and Acknowledgement of Amendments
#3	Section 00010, Pricing Schedule
#4	Representations, Certifications, and Other Statements of Offerors
#5	JV Agreement, if applicable.

(4) Detailed Submission Instructions for the Price Proposal

TAB 1: The proposal cover sheet is required by FAR 52.215-1(2) (c) (i)-(v) and must be submitted by all offerors. This provision, titled "Instructions to Offerors—Competitive Acquisition," and the format for the proposal cover sheet are furnished elsewhere in this section.

TAB 2: The SF 1442, Solicitation, Offer, and Award is to be completed by all Offerors and duly executed with an original signature by an official authorized to bind the company in accordance with FAR 4.102. Any and all amendments must be acknowledged by all Offerors in accordance with the instructions on the Standard Form 30, Amendment of Solicitation.

TAB 3: Section 00010 is to be completed in its entirety by all Offerors. See Sections 00010 with attached notes, for further instructions.

TAB 4: All Offerors must have electronically completed the annual representations and certifications on the "Online Representations and Certifications Application" (ORCA) website or respond with the completed representations / certifications found in the solicitation. The offerors are responsible for ensuring that these on-line Representations and Certifications are updated as necessary to reflect changes, but at least annually to ensure that they are kept current, accurate and complete. Additionally, the offeror must also complete and return the "Representations, Certifications, and Other Statements of Offerors" included in the solicitation. If the offeror is a Joint Venture, all participants must separately complete both the ORCA Representations and Certifications.

TAB 5: If the Offeror is a Joint Venture (JV), include a copy of the JV Agreement. If a JV Agreement has not yet been finalized/approved, indicate its status. JV Agreements must clearly indicate the percentages of the JV participants, in particular the percent of the controlling party, and a clear delineation of responsibilities and authorities between the JV parties.

f. SPECIFIC INSTRUCTIONS FOR THE TECHNICAL PROPOSAL

(1) Number of Sets of the Technical Proposal. Submit the ORIGINAL and ONE (1) additional sets of the written Technical Proposal, with each set separately packaged.

(2) Format and Contents of the Technical Proposal and List of Tabs. The original and all copies of the technical proposal will be appropriately labeled as such. Each set shall be organized using the tabs specified in the following chart. Note: The main tabs directly correlate to the evaluation factors identified in Section 00120.

TAB	**CONTENTS OF THE TECHNICAL PROPOSAL**
Factor #1	EXPERIENCE
Factor #2	PERSONNEL
Factor #3	PAST PERFORMANCE

(3) Page Limitations. See paragraphs 6.d.(2) and 6.d.(6) above for format and page count instructions. The following page limitations are established for each factor described above:

- Factor #1, Experience – Limited to 5 pages (maximum of 5 forms)
- Factor #2, Personnel – Limited to 1 page for each resume provided
- Factor #3, Past Performance – No page limitation

Pages submitted which exceed limitations listed above will not be evaluated. Tables of content, proposal cover letters, and tabs between proposal information do not count toward any page limitations in the proposal.

(4) Detailed Submission Requirements for the Technical Proposal. The following is a detailed description of the information to be submitted under each TAB.

(i) **TAB 1: FACTOR 1, EXPERIENCE:** Demonstrate the experience of the offeror and/or the proposed team, including sub-contractors, on projects that are the same or similar to that described in the solicitation for design-build construction work.

The Contractor shall complete a minimum of two (2), but no more than five (5), “Experience Information” forms, attached at the end of this section, in response to this factor. All blocks must be filled in and all data should be accurate, current, and complete. All projects submitted must have been underway or completed within the last 5years. At least one (1) of the projects provided must be valued at over $20,000,000.00.

If any of the information required by the Experience Information Form is not included in the form then the contractor may be considered non-responsive and evaluated as unacceptable.

(ii) **TAB 2: FACTOR 2, PERSONNEL**: The offeror must provide resume data for the following key personnel: Project Manager – Safety Officer, Quality Control Manager,, Senior Electrical Engineer, Senior Mechanical Engineer, Senior Civil Engineer, and Construction Superintendent.

Resumes must include the following information and not exceed one page (1), except resumes for Safety Officer, Quality Control Manager and Construction Superintendent do not require degrees.

- Name and title
- Project assignment
- Name of firm with which associated
- Years experience with this firm and with other firms
- Education degree(s), year, specialization, if applicable
- Active professional registration, year first registered, if applicable
- Other experience and qualifications relevant to same/similar work required under this contract

The following key personnel, Project Manager, Senior Electrical Engineer, Senior Mechanical Engineer and Senior Civil Engineer, should have a degree in the field of work governed by the position they are assigned to.

All key personnel should have a minimum of three (3) years of professional experience in that field. For example, a Civil Engineer must have a degree in Civil Engineering and 3 years of professional civil engineering experience.

(iii) **TAB 3: FACTOR 3, PAST PERFORMANCE:** For the projects listed under Factor 1 – Experience, provide references, letters of recommendations, commendations and/or awards. The Contractor Performance Assessment Reporting System (to include ACASS, CCASS, and CPARS) will be utilized to validate past performance ratings on Department of Defense contracts, as well as any other past performance information the Government deems necessary to evaluate a contractor's past performance.

The Government may contact references provided as part of Factor 1 – Experience for information regarding the offeror's past performance on the project and for the purposes of assessing and verifying the scope of the work performed. Offerors should provide accurate, current, and complete contact information for references provided in the project descriptions.

For the purpose of the past performance evaluation, offerors shall be defined as business arrangements and relationships, such as Joint Venture participants, teaming partners, and major subcontractors. The past performance record of each firm in the business arrangement may be evaluated by the Government

In the case of an Offeror without a record of recent, relevant past performance (and for which there is also no recent, relevant past performance information for its predecessor companies of key subcontractors), or for whim information on past performance is not available or cannot be verified, the Offeror will not be evaluated favorably or unfavorably on past performance. This does not preclude the Government from making award to a higher-priced Offeror with a favorable past performance record over a lower-priced Offeror with a favorable past performance record over a lower-priced Offeror with a neutral past performance rating.

7. Proposal Cover Sheet

PROPOSAL COVER SHEET

1. Solicitation Number:

2. The name, address, and telephone and facsimile numbers of the Offeror

(and electronic address if available):

3. A statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered at the price set opposite each item. Statement to include any exceptions in technical or cost/price proposal or exceptions inherent in Offeror's standard terms and conditions.

4. Names, titles, and telephone and facsimile numbers (and electronic addresses if available) of persons authorized to negotiate on the Offeror's behalf with the Government in connection with this solicitation:

5. Name, title, and signature of person authorized to sign the proposal. Proposals signed by an agent shall be accompanied by evidence of that agent's authority, unless that evidence has been previously furnished to the issuing office.

8. SOURCE SELECTION USING THE LOW-PRICED, TECHNICALLY ACCEPTABLE PROCESS. An evaluation for acceptability will be performed on eligible proposals in accordance with FAR 15.101-2(b). The proposal that provides the reasonable and realistic lowest price and is otherwise technically acceptable in all factors will be selected for award. To be considered technically acceptable, no technical factor in the proposal may be determined to be unacceptable. The failure of a proposal to meet any of the factors will result in a technically unacceptable rating and the proposal will be precluded from award. A proposal with a price determined to be unrealistically low or unreasonably high will not be eligible for award. See also Section 00120.

EXPERIENCE INFORMATION

(To be completed by Contractor)

1. Contractor: **Name:** **Address:**	**2. Contract /Task Order(TO) /Purchase Order (PO) Number:**
	3. Contract/TO/PO Dollar Value:
	4. Contract/TO /PO Status: ☐ **Active** ☐ **Complete** **Completion Date (w/ extensions):**

5. Project Title:

Location:

---

6. Project Description:

7. Project Owner or Project Manager for the Client – provide:

Name:

Address:

Telephone Number and E-mail:

SECTION 00120

SECTION 00120 PROPOSAL EVALUATION AND CONTRACT AWARD

DESIGN-BUILD
LOW-PRICED, TECHNICALLY ACCEPTABLE (LPTA)

1. ELIGIBILITY FOR CONTRACT AWARD. In accordance with the FAR, no contract shall be entered into unless the contracting officer ensures that all requirements of law, executive orders, regulations, and all other applicable procedures, including clearances and approvals, have been met. This includes the FAR requirement that no award shall be made unless the contracting officer makes an affirmative determination of responsibility. To be determined responsible, a prospective contractor must meet the general standards in FAR Part 9 and any special standards set forth in the solicitation.

2. SOURCE SELECTION USING THE LOW-PRICED, TECHNICALLY ACCEPTABLE PROCESS. An evaluation for acceptability will be performed on eligible proposals in accordance with FAR 15.101-2(b). The proposal that provides the reasonable and realistic lowest price and is otherwise technically acceptable in all factors will be selected for award. To be considered technically acceptable, no technical factor in the proposal may be determined to be unacceptable. The failure of a proposal to meet any of the factors will result in a technically unacceptable rating and the proposal will be precluded from award. A proposal with a price determined to be unrealistically low or unreasonably high will not be eligible for award.

3. BASIS OF AWARD. Award of a contract will be made to the responsible offeror who submits the lowest priced, technically acceptable proposal that is both realistically and reasonably priced for the work to be performed. Offers will be evaluated in accordance with the evaluation criteria stipulated in the Request for Proposal (RFP). An offeror may not receive award, even if it has the lowest-priced, technically acceptable proposal, if its price proposal fails to demonstrate that it understands the scope of work required by the solicitation.

4. EVALUATION OF THE PRICE PROPOSALS

a. Price will be evaluated and considered but will not be scored or combined with other aspects of the proposal evaluation. The proposed prices will be analyzed for reasonableness. They may also be analyzed to determine whether they are realistic for the work to be performed, reflect a clear understanding of the requirements, and are consistent with the information provided by the Offeror. Additionally, all offers will be analyzed for unbalanced pricing. The price analysis will be conducted on offeror prices using techniques pursuant to FAR 15.404-1(b) and in accordance with the solicitation. As part of the price analysis, the Government will perform a realism analysis for the purpose of measuring each offeror's understanding of the requirements and to assess the risk inherent in an offeror's proposal. Price proposals determined to be unrealistically low or unreasonably high for the work to be performed will be considered to indicate a lack of understanding of the requirement and to present an unacceptable performance risk. Proposals with total prices that fail the price analysis will not be considered further because they are ineligible for award under the criteria of the solicitation as either unrealistically low or as unreasonable high.

b. The otherwise technically-acceptable, lowest-priced offeror may be required to confirm its price on either, a CLIN, element, or total price basis, and/or provide additional information in support of their price, prior to contract award at the Government's request and discretion. An Offeror may not receive award, even if it has the lowest-priced, technically acceptable proposal, if its price proposal fails to demonstrate that it understands the scope of work required by the solicitation.

5. EVALUATION OF THE TECHNICAL PROPOSAL. The Technical Proposal will be evaluated based on the following evaluation criteria:

a. **FACTOR 1: EXPERIENCE:** The Government will review the project experience of the offeror, including subcontractors, on projects provided in response to Section 00110, Factor 1. Offerors must meet all of the following standards to receive a "GO" or acceptable rating on this factor:

- Offeror must have at least two (2) projects but no more than five (5) that are the same or similar to that of the design-build construction work found in this solicitation; AND
- At least one (1) of the projects submitted must be valued at over $20,000,000.00AND
- All projects must have been completed, or underway, within the last 5 years .

Failure meet all of the standards under this factor may result in a "NO GO" or unacceptable rating and possible elimination from further consideration for contract award.

b. **FACTOR 2: PERSONNEL:** The Government will review the resumes provided in response to Section 00110, Factor 2. Offerors must meet all of the following standards to receive a "GO" or acceptable rating on this factor.

The offeror must submit resumes for the following key personnel: Project Manager, Safety Officer, Quality Control Manager, Senior Civil Engineer, Senior Electrical Engineer, Senior Mechanical Engineer and Construction Superintendent. Resumes must include the following information and not exceed one page, except resumes for Safety Officer, Quality Control Manager and Construction Superintendent do not require degrees.

- a degree in the field of work governed by the position they are assigned to; AND
- a minimum of three (3) years of professional experience in that field; AND
- experience in design-build construction contracts working in the position they are assigned to under this contract.

Failure to meet the standards under this factor may result in a "NO GO" or unacceptable rating and possible elimination from further consideration for contract award.

c. **FACTOR 3: PAST PERFORMANCE:** The Government will review the letters of reference submitted by the offeror in response to Section 00110, Factor 1, and may contact points of contact listed on the "Experience Information" forms submitted under Factor 1. Offerors must meet the following standards to receive a "GO" or acceptable rating on this factor:

- All past or current references must recommend either hiring or using the offeror again for future work and/or reflects positive performance of the work requirements.

Failure to meet the standards under this factor may result in a "NO GO" or unacceptable rating and possible elimination from further consideration for contract award. Offerors with no past performance information will receive a "NEUTRAL" rating for this factor.

In the case of an Offeror without a record of recent, relevant past performance (and for which there is also no recent, relevant past performance information for its predecessor companies of key subcontractors), or for when information on past performance is not available or cannot be verified, the Offeror will not be evaluated favorably or unfavorably on past performance.

6. GENERAL TECHNICAL CRITERIA

a. Material omission(s) may cause the technical proposal to be rejected as unacceptable.

b. Technical proposals which do not provide the specified information in the specified location in accordance with the submission instructions may be downgraded. The Government is under no obligation to search for information that is not in the specified location.

c. Proposals which are generic, vague, or lacking in detail may be considered unacceptable. The offeror's failure to include information that the Government has indicated should be included may result in the proposal being found deficient if inadequate detail is provided.

d. The Government cannot make award based on a deficient offer. Therefore, receipt of a "NO GO" determination of acceptability for any factor will make the offer ineligible for award, unless the Government elects to enter into discussions with that Offeror and all deficiencies are remedied in a revised proposal.

7. AGREEMENTS AND RESPONSIBILITY CONSIDERATIONS

a. Other Award Factors: The Contracting Officer shall consider several factors in the selection process which are important, but not quantified, such as:

(1) Agreement by the offeror to all general and special contract provisions and clauses.

(2) Determination of responsibility of the contractor by the Contracting Officer in accordance with the provisions of the Federal Acquisition Regulation, Part 9.1. In order to be determined responsible, a prospective contractor must:

(a) Have adequate financial resources to perform the contract or the ability to obtain them.

(b) Be able to comply with the required or proposed delivery or performance schedule taking into consideration all existing commercial and Governmental business commitments.;

(c) Have a satisfactory performance record.

(d) Have a satisfactory record of integrity and business ethics.

(e) Have the necessary organization, experience, accounting and operational controls, and technical skills, or the ability to obtain them.

(f) Have the necessary production, construction, and technical equipment and facilities, or the ability to obtain them.

(g) Be otherwise qualified and eligible to receive an award under applicable laws and regulations.

--END OF SECTION--

Section 00600 - Representations & Certifications

011000.1210 - SCOPE OF WORK

SECTION 01 10 00.12 10
SCOPE OF WORK

PART 1 GENERAL

1.1 PROJECT DESCRIPTION

This project is the second phase of the Rotary-Wing Ramp and Taxiway project. The first phase is being performed under contract W912ER-09-C-0014. This phase consists of the design and construction of aviation parking apron to support twenty-eight (28) parking spaces, connecting taxiways, an Aircraft Direct Fueling Facility, and associated lighting, markings, tie down and grounding points as shown and defined in SECTION 01 80 00.12 10 TECHNICAL REQUIREMENTS. The work does not include any Unexploded Ordinance (UXO) clearing or de-mining. The work shall include the preparation of construction design documents and the construction required to provide fully functional facilities. These facilities shall be designed and constructed in accordance with current U.S. Design Standards, Department of Defense, and Department of the Army, safety and security standards, applicable local standards and other criteria.

1.2 LOCATION

The site location is within the Kandahar Air Base in Afghanistan.

1.3 PERIOD OF PERFORMANCE

All work, including de-mobilization and final clean up, shall be completed within the outlined phasing plan from Notice to Proceed for design.

1.4 SUMMARY OF WORK

The Contractor shall design and construct the work listed as a
design-construct contract and in accordance with the requirements stated in the specification sections and other contract documents.

1.5 AIR TRAFFIC OPERATIONS AND CONSTRUCTION OPERATIONS

The existing Bagram Air Field runway and taxiways shall remain operational during construction of these projects. The Contractor shall prepare a construction phasing plan that will lay out a detailed plan for integrating construction operations with airfield operations, and that allows for continued flight operations throughout the performance period of this contract. As a minimum this plan shall address the detailed plan for accomplishing work, major work activity durations and start and finish milestones for each phase, intended work hours, personnel, equipment, traffic hauling patterns to, and around the work site, Foreign Object Damage prevention and Security. This plan shall be submitted for approval within 10 calendar days of NTP, and will be updated from time to time as operational requirements demand. During construction within 30 meters of the runway, and within 15 meters of all active taxiways the contractor will have access to the work site, except for planned and unplanned interruptions for flight operations. During interruptions the contractor shall relocate workers and equipment off the runway or taxiway a safe distance to allow aircraft to taxi, land and/or takeoff, as directed by the Contracting Officer or Airfield Management Representative. The Government estimates that these interruptions shall last 30-45 minutes for each incident, but the duration is largely controlled by how quickly the contractor can move his equipment off the runway and or taxiway prior to, and back into position after aircraft take off and landing or taxi. The Government estimates there will be five of these interruptions per normal work shift. The Contractor shall incorporate these anticipated interruptions into the appropriate activity durations of its progress schedule for all construction activities within 30 meters of the runway. Within 15m of an active taxiway or 30m of the runway the height limitation is

1.5m. Outside of that area on the airfield material will not be allowed to be stockpiled for any length of time except in locations and for durations approved by the Contracting Officer. Equipment height shall not penetrate the airspace criteria of the UFC 3-260-01, without approval of the Contracting Officer. The plan shall address in detail how the contractor will accomplish this work in an efficient manner and still comply with this requirement. The detailed construction phasing plan will utilize the construction phasing parameters called out below. The Construction Phasing Plan shall also be incorporated into the Contractor's Project Schedule. In addition daily coordination is required with the Bagram Airfield Operations staff to ensure safe construction and unimpeded airfield operations. Airfield Management will coordinate with escort officials and contractor foreman daily (prior to daily activity) to mitigate hazards associated with scheduled construction activity. See Section 01 31 13.12 10, Special Clauses, paragraph 1.19 for additional construction coordination guidance.

1.6 AIRFIELD SAFETY PROCEDURES

The contractor will comply with all requirements of Section 32 Airfield Operations of EM 385-1-1 Safety and Health requirements Manual, 3 November 2003, Engineering Technical Letter 04-02 Standard Airfield Pavement Marking Schemes Change 1, UFC 3-260-01 Airfield and Heliport Planning and Design, Attachment 15 Construction Phasing Plan and Operational Safety on the Airfield During Construction and with the Kandahar Airfield Operations safety and housekeeping requirements. The contractor will be required to provide both day/night barriers and solar lighting to mark construction areas, before beginning any construction activities within 30m of the runway or 15m of an active taxiway. The contractor shall maintain all necessary equipment onsite at all times while work is progressing, to perform the required clean up activities. All surfaces where aircraft travel; and all adjacent surfaces shall be cleaned at the completion of each work shift and otherwise when a threat to aircraft safety is eminent, as directed by the Contracting Officer.

1.7 UNEXPLODED ORDNANCE (UXO)

The contract limits of this project are believed to be clear of UXO, however, UXO may be discovered and/or uncovered within or around the construction work areas. If, during construction activities, UXO is unexpectedly discovered or uncovered, or suspected to be present, all operations shall cease immediately. The Contractor shall safeguard the site pending notification and arrival of the Government's UXO team. No further work shall be conducted in that location until the Government's UXO team has assessed the situation to determine if disposal action is required. Once the UXO has been removed and the Government's UXO team has issued an "All Clear" notice, construction work may continue.

1.8 SECURITY

The Contractor shall comply with current base security requirements to
include trans-loading aggregates before entering the base and inspection of vehicles.

1.9 PHASED ACCEPTANCE OF THE WORK BY THE GOVERNMENT

The Government may take beneficial use of each completed phase of the work as it is accepted by the Contracting Office. Contractor's responsibility for warranty begins from the individual dates of each phased acceptance and extends as further defined elsewhere in the Contract.

-- End of Section --

CLAUSES INCORPORATED BY REFERENCE

52.236-28	Preparation of Proposals--Construction	OCT 1997
252.209-7001	Disclosure of Ownership or Control by the Government of a Terrorist Country	JAN 2009

252.209-7002	Disclosure Of Ownership Or Control By A Foreign Government	JUN 2005
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	DEC 2006
252.247-7022	Representation Of Extent Of Transportation Of Supplies By Sea	AUG 1992

CLAUSES INCORPORATED BY FULL TEXT

52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (FEB 2009)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 237310.

(2) The small business size standard is $33.5 Million.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b)(1) If the clause at 52.204-7, Central Contractor Registration, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the clause at 52.204-7 is not included in this solicitation, and the offeror is currently registered in CCR, and has completed the ORCA electronically, the offeror may choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The offeror shall indicate which option applies by checking one of the following boxes:

(__) Paragraph (d) applies.

(__) Paragraph (d) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c)(1) The following representations or certifications in ORCA are applicable to this solicitation as indicated:

(i) 52.203-2, Certificate of Independent Price Determination. This provision applies to solicitations when a firm-fixed-price contract or fixed-price contract with economic price adjustment is contemplated, unless--

(A) The acquisition is to be made under the simplified acquisition procedures in Part 13;

(B) The solicitation is a request for technical proposals under two-step sealed bidding procedures; or

(C) The solicitation is for utility services for which rates are set by law or regulation.

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $100,000.

(iii) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the clause at 52.204-7, Central Contractor Registration.

(iv) 52.204-5, Women-Owned Business (Other Than Small Business).This provision applies to solicitations that--

(A) Are not set aside for small business concerns;

(B) Exceed the simplified acquisition threshold; and

(C) Are for contracts that will be performed in the United States or its outlying areas.

(v) 52.209-5, Certification Regarding Responsibility Matters. This provision applies to solicitations where the contract value is expected to exceed the simplified acquisition threshold.

(vi) 52.214-14, Place of Performance--Sealed Bidding. This provision applies to invitations for bids except those in which the place of performance is specified by the Government.

(vii) 52.215-6, Place of Performance. This provision applies to solicitations unless the place of performance is specified by the Government.

(viii) 52.219-1, Small Business Program Representations (Basic & Alternate I). This provision applies to solicitations when the contract will be performed in the United States or its outlying areas.

(A) The basic provision applies when the solicitations are issued by other than DoD, NASA, and the Coast Guard.

(B) The provision with its Alternate I applies to solicitations issued by DoD, NASA, or the Coast Guard.

(ix) 52.219-2, Equal Low Bids. This provision applies to solicitations when contracting by sealed bidding and the contract will be performed in the United States or its outlying areas.

(x) 52.222-22, Previous Contracts and Compliance Reports. This provision applies to solicitations that include the clause at 52.222-26, Equal Opportunity.

(xi) 52.222-25, Affirmative Action Compliance. This provision applies to solicitations, other than those for construction, when the solicitation includes the clause at 52.222-26, Equal Opportunity.

(xii) 52.222-38, Compliance with Veterans' Employment Reporting Requirements. This provision applies to solicitations when it is anticipated the contract award will exceed the simplified acquisition threshold and the contract is not for acquisition of commercial items.

(xiii) 52.223-1, Biobased Product Certification. This provision applies to solicitations that require the delivery or specify the use of USDA-designated items; or include the clause at 52.223-2, Affirmative Procurement of Biobased Products Under Service and Construction Contracts.

(xiv) 52.223-4, Recovered Material Certification. This provision applies to solicitations that are for, or specify the use of, EPA-designated items.

(xv) 52.225-2, Buy American Act Certificate. This provision applies to solicitations containing the clause at 52.225-1.

(xvi) 52.225-4, Buy American Act--Free Trade Agreements—Israeli Trade Act Certificate. (Basic, Alternate I, and Alternate II) This provision applies to solicitations containing the clause at 52.225-3.

(A) If the acquisition value is less than $25,000, the basic provision applies.

(B) If the acquisition value is $25,000 or more but is less than $50,000, the provision with its Alternate I applies.

(C) If the acquisition value is $50,000 or more but is less than $67,826, the provision with its Alternate II applies.

(xvii) 52.225-6, Trade Agreements Certificate. This provision applies to solicitations containing the clause at 52.225-5.

(xviii) 52.225-20, Prohibition on Conducting Restricted Business Operations in Sudan--Certification.

(xix) 52.226-2, Historically Black College or University and Minority Institution Representation. This provision applies to--

(A) Solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions; and

(B) For DoD, NASA, and Coast Guard acquisitions, solicitations that contain the clause at 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns.

(2) The following certifications are applicable as indicated by the Contracting Officer:

(Contracting Officer check as appropriate.)

----(i) 52.219-19, Small Business Concern Representation for the Small Business Competitiveness Demonstration Program.

------(ii) 52.219-21, Small Business Size Representation for Targeted Industry Categories Under the Small Business Competitiveness Demonstration Program.

------(iii) 52.219-22, Small Disadvantaged Business Status.

------(A) Basic.

------(B) Alternate I.

------(iv) 52.222-18, Certification Regarding Knowledge of Child Labor for Listed End Products.

------(v) 52.222-48, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment Certification.

------(vi) 52.222-52 Exemption from Application of the Service Contract Act to Contracts for Certain Services--Certification.

------(vii) 52.223-9, with its Alternate I, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (Alternate I only).

------(viii) 52.223-13, Certification of Toxic Chemical Release Reporting.

------(ix) 52.227-6, Royalty Information.

------ (A) Basic.

------ (B) Alternate I.

------(x) 52.227-15, Representation of Limited Rights Data and Restricted Computer Software.

(d) The offeror has completed the annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website at http://orca.bpn.gov. After reviewing the ORCA database information, the offeror verifies by submission of the offer that the representations and certifications

currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below (offeror to insert changes, identifyingchange by clause number, title, date). These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause	Title	Date	Change

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on ORCA.

(End of Provision)

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	JUL 2004
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-6	Restrictions On Subcontractor Sales To The Government	SEP 2006
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	JAN 1997
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	SEP 2007
52.203-13	Contractor Code of Business Ethics and Conduct	DEC 2008
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.204-7	Central Contractor Registration	APR 2008
52.204-9	Personal Identity Verification of Contractor Personnel	SEP 2007
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	SEP 2006
52.211-18	Variation in Estimated Quantity	APR 1984
52.222-50	Combating Trafficking in Persons	FEB 2009
52.223-6	Drug-Free Workplace	MAY 2001
52.225-13	Restrictions on Certain Foreign Purchases	JUN 2008
52.227-1	Authorization and Consent	DEC 2007
52.227-14	Rights in Data--General	DEC 2007
52.232-5	Payments under Fixed-Price Construction Contracts	SEP 2002
52.232-17	Interest	OCT 2008
52.232-23	Assignment Of Claims	JAN 1986
52.232-27	Prompt Payment for Construction Contracts	OCT 2008
52.232-33	Payment by Electronic Funds Transfer--Central Contractor Registration	OCT 2003
52.233-1	Disputes	JUL 2002
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.236-2	Differing Site Conditions	APR 1984
52.236-3	Site Investigation and Conditions Affecting the Work	APR 1984
52.236-3	Site Investigation and Conditions Affecting the Work	APR 1984
52.236-4	Physical Data	APR 1984
52.236-5	Material and Workmanship	APR 1984
52.236-5	Material and Workmanship	APR 1984
52.236-6	Superintendence by the Contractor	APR 1984
52.236-6	Superintendence by the Contractor	APR 1984
52.236-7	Permits and Responsibilities	NOV 1991
52.236-8	Other Contracts	APR 1984
52.236-9	Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements	APR 1984
52.236-10	Operations and Storage Areas	APR 1984
52.236-11	Use and Possession Prior to Completion	APR 1984
52.236-12	Cleaning Up	APR 1984
52.236-13	Accident Prevention	NOV 1991
52.236-15	Schedules for Construction Contracts	APR 1984
52.236-21	Specifications and Drawings for Construction	FEB 1997

52.242-13	Bankruptcy	JUL 1995
52.248-3	Value Engineering-Construction	SEP 2006
52.249-2 Alt I	Termination for Convenience of the Government (Fixed-Price) (May 2004) - Alternate I	SEP 1996
52.249-10	Default (Fixed-Price Construction)	APR 1984
52.253-1	Computer Generated Forms	JAN 1991
252.203-7000	Requirements Relating to Compensation of Former DoD Officials	JAN 2009
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	DEC 2008
252.203-7002	Requirement to Inform Employees of Whistleblower Rights	JAN 2009
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004 Alt A	Central Contractor Registration (52.204-7) Alternate A	SEP 2007
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	DEC 2006
252.223-7004	Drug Free Work Force	SEP 1988
252.223-7006	Prohibition On Storage And Disposal Of Toxic And Hazardous Materials	APR 1993
252.225-7012	Preference For Certain Domestic Commodities	DEC 2008
252.225-7031	Secondary Arab Boycott Of Israel	JUN 2005
252.227-7023	Drawings and Other Data to become Property of Government	MAR 1979
252.227-7025	Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends	JUN 1995
252.227-7033	Rights in Shop Drawings	APR 1966
252.232-7003	Electronic Submission of Payment Requests and Receiving Reports	MAR 2008
252.232-7010	Levies on Contract Payments	DEC 2006
252.236-7000	Modification Proposals-Price Breakdown	DEC 1991
252.236-7003	Payment for Mobilization and Preparatory Work	JAN 1997
252.236-7004	Payment for Mobilization and Demobilization	DEC 1991
252.243-7001	Pricing Of Contract Modifications	DEC 1991
252.243-7002	Requests for Equitable Adjustment	MAR 1998
252.247-7023	Transportation of Supplies by Sea	MAY 2002
252.247-7024	Notification Of Transportation Of Supplies By Sea	MAR 2000

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52.232-16 PROGRESS PAYMENTS (JUL 2009)

The Government will make progress payments to the Contractor when requested as work progresses, but not more frequently than monthly, in amounts of $2,500 or more approved by the Contracting Officer, under the following conditions:

(a) Computation of amounts. (1) Unless the Contractor requests a smaller amount, the Government will compute each progress payment as 80 percent of the Contractor's total costs incurred under this contract whether or not actually paid, plus financing payments to subcontractors (see paragraph (j) of this clause), less the sum of all previous progress payments made by the Government under this contract. The Contracting Officer will consider cost of money that would be allowable under FAR 31.205-10 as an incurred cost for progress payment purposes.

(2) The amount of financing and other payments for supplies and services purchased directly for the contract are limited to the amounts that have been paid by cash, check, or other forms of payment, or that are determined due and will be paid to subcontractors--

(i) In accordance with the terms and conditions of a subcontract or invoice; and

(ii) Ordinarily within 30 days of the submission of the Contractor's payment request to the Government.

(3) The Government will exclude accrued costs of Contractor contributions under employee pension plans until actually paid unless--

(i) The Contractor's practice is to make contributions to the retirement fund quarterly or more frequently; and

(ii) The contribution does not remain unpaid 30 days after the end of the applicable quarter or shorter payment period (any contribution remaining unpaid shall be excluded from the Contractor's total costs for progress payments until paid).

(4) The Contractor shall not include the following in total costs for progress payment purposes in paragraph (a)(1) of this clause:

(i) Costs that are not reasonable, allocable to this contract, and consistent with sound and generally accepted accounting principles and practices.

(ii) Costs incurred by subcontractors or suppliers.

(iii) Costs ordinarily capitalized and subject to depreciation or amortization except for the properly depreciated or amortized portion of such costs.

(iv) Payments made or amounts payable to subcontractors or suppliers, except for --

(A) Completed work, including partial deliveries, to which the Contractor has acquired title; and

(B) Work under cost-reimbursement or time-and-material subcontracts to which the Contractor has acquired title.

(5) The amount of unliquidated progress payments may exceed neither (i) the progress payments made against incomplete work (including allowable unliquidated progress payments to subcontractors) nor

(ii) the value, for progress payment purposes, of the incomplete work. Incomplete work shall be considered to be the supplies and services required by this contract, for which delivery and invoicing by the Contractor and acceptance by the Government are incomplete.

(6) The total amount of progress payments shall not exceed 80 percent of the total contract price.

(7) If a progress payment or the unliquidated progress payments exceed the amounts permitted by subparagraphs (a)(4) or (a)(5) of this clause, the Contractor shall repay the amount of such excess to the Government on demand.

(8) Notwithstanding any other terms of the contract, the Contractor agrees not to request progress payments in dollar amounts of less than $2,500. The Contracting Officer may make exceptions.

(9) The costs applicable to items delivered, invoiced, and accepted shall not include costs in excess of the contract price of the items.

(b) Liquidation. Except as provided in the Termination for Convenience of the Government clause, all progress payments shall be liquidated by deducting from any payment under this contract, other than advance or progress payments, the unliquidated progress payments, or 80 percent of the amount invoiced, whichever is less. The Contractor shall repay to the Government any amounts required by a retroactive price reduction, after computing liquidations and payments on past invoices at the reduced prices and adjusting the unliquidated progress payments

accordingly. The Government reserves the right to unilaterally change from the ordinary liquidation rate to an alternate rate when deemed appropriate for proper contract financing.

(c) Reduction or suspension. The Contracting Officer may reduce or suspend progress payments, increase the rate of liquidation, or take a combination of these actions, after finding on substantial evidence any of the following conditions:

(1) The Contractor failed to comply with any material requirement of this contract (which includes paragraphs (f) and (g) of this clause).

(2) Performance of this contract is endangered by the Contractor's --

(i) Failure to make progress or

(ii) Unsatisfactory financial condition.

(3) Inventory allocated to this contract substantially exceeds reasonable requirements.

(4) The Contractor is delinquent in payment of the costs of performing this contract in the ordinary course of business.

(5) The fair value of the undelivered work is less than the amount of unliquidated progress payments for that work.

(6) The Contractor is realizing less profit than that reflected in the establishment of any alternate liquidation rate in paragraph (b) of this clause, and that rate is less than the progress payment rate stated in subparagraph (a)(1) of this clause.

(d) Title.

(1) Title to the property described in this paragraph (d) shall vest in the Government. Vestiture shall be immediately upon the date of this contract, for property acquired or produced before that date. Otherwise, vestiture shall occur when the property is or should have been allocable or properly chargeable to this contract.

(2) "Property," as used in this clause, includes all of the below-described items acquired or produced by the Contractor that are or should be allocable or properly chargeable to this contract under sound and generally accepted accounting principles and practices.

(i) Parts, materials, inventories, and work in process;

(ii) Special tooling and special test equipment to which the Government is to acquire title under any other clause of this contract;

(iii) Nondurable (i.e., noncapital) tools, jigs, dies, fixtures, molds, patterns, taps, gauges, test equipment, and other similar manufacturing aids, title to which would not be obtained as special tooling under paragraph (d) (2)(ii) of this clause; and

(iv) Drawings and technical data, to the extent the Contractor or subcontractors are required to deliver them to the Government by other clauses of this contract.

(3) Although title to property is in the Government under this clause, other applicable clauses of this contract; e.g., the termination or special tooling clauses, shall determine the handling and disposition of the property.

(4) The Contractor may sell any scrap resulting from production under this contract without requesting the Contracting Officer's approval, but the proceeds shall be credited against the costs of performance.

(5) To acquire for its own use or dispose of property to which title is vested in the Government under this clause, the Contractor must obtain the Contracting Officer's advance approval of the action and the terms. The Contractor shall (i) exclude the allocable costs of the property from the costs of contract performance, and (ii) repay to the Government any amount of unliquidated progress payments allocable to the property. Repayment may be by cash or credit memorandum.

(6) When the Contractor completes all of the obligations under this contract, including liquidation of all progress payments, title shall vest in the Contractor for all property (or the proceeds thereof) not--

(i) Delivered to, and accepted by, the Government under this contract; or

(ii) Incorporated in supplies delivered to, and accepted by, the Government under this contract and to which title is vested in the Government under this clause.

(7) The terms of this contract concerning liability for Government-furnished property shall not apply to property to which the Government acquired title solely under this clause.

(e) Risk of loss. Before delivery to and acceptance by the Government, the Contractor shall bear the risk of loss for property, the title to which vests in the Government under this clause, except to the extent the Government expressly assumes the risk. The Contractor shall repay the Government an amount equal to the unliquidated progress payments that are based on costs allocable to property that is damaged, lost, stolen, or destroyed.

(f) Control of costs and property. The Contractor shall maintain an accounting system and controls adequate for the proper administration of this clause.

(g) Reports, forms, and access to records. (1) The Contractor shall promptly furnish reports, certificates, financial statements, and other pertinent information (including estimates to complete) reasonably requested by the Contracting Officer for the administration of this clause. Also, the Contractor shall give the Government reasonable opportunity to examine and verify the Contractor's books, records, and accounts.

(2) The Contractor shall furnish estimates to complete that have been developed or updated within six months of the date of the progress payment request. The estimates to complete shall represent the Contractor's best estimate of total costs to complete all remaining contract work required under the contract. The estimates shall include sufficient detail to permit Government verification.

(3) Each Contractor request for progress payment shall:

(i) Be submitted on Standard Form 1443, Contractor's Request for Progress Payment, or the electronic equivalent as required by agency regulations, in accordance with the form instructions and the contract terms; and

(ii) Include any additional supporting documentation requested by the Contracting Officer.

(h) Special terms regarding default. If this contract is terminated under the Default clause, (i) the Contractor shall, on demand, repay to the Government the amount of unliquidated progress payments and (ii) title shall vest in the Contractor, on full liquidation of progress payments, for all property for which the Government elects not to require delivery under the Default clause. The Government shall be liable for no payment except as provided by the Default clause.

(i) Reservations of rights.

(1) No payment or vesting of title under this clause shall --

(i) Excuse the Contractor from performance of obligations under this contract or

(ii) Constitute a waiver of any of the rights or remedies of the parties under the contract.

(2) The Government's rights and remedies under this clause

(i) Shall not be exclusive but rather shall be in addition to any other rights and remedies provided by law or this contract and

(ii) Shall not be affected by delayed, partial, or omitted exercise of any right, remedy, power, or privilege, nor shall such exercise or any single exercise preclude or impair any further exercise under this clause or the exercise of any other right, power, or privilege of the Government.

(j) Financing payments to subcontractors. The financing payments to subcontractors mentioned in paragraphs (a)(1) and (a)(2) of this clause shall be all financing payments to subcontractors or divisions, if the following conditions are met:

(1) The amounts included are limited to--

(i) The unliquidated remainder of financing payments made; plus

(ii) Any unpaid subcontractor requests for financing payments.

(2) The subcontract or interdivisional order is expected to involve a minimum of approximately 6 months between the beginning of work and the first delivery; or, if the subcontractor is a small business concern, 4 months.

(3) If the financing payments are in the form of progress payments, the terms of the subcontract or interdivisional order concerning progress payments--

(i) Are substantially similar to the terms of this clause for any subcontractor that is a large business concern, or this clause with its Alternate I for any subcontractor that is a small business concern;

(ii) Are at least as favorable to the Government as the terms of this clause;

(iii) Are not more favorable to the subcontractor or division than the terms of this clause are to the Contractor;

(iv) Are in conformance with the requirements of FAR 32.504(e); and

(v) Subordinate all subcontractor rights concerning property to which the Government has title under the subcontract to the Government's right to require delivery of the property to the Government if--

(A) The Contractor defaults; or

(B) The subcontractor becomes bankrupt or insolvent.

(4) If the financing payments are in the form of performance-based payments, the terms of the subcontract or interdivisional order concerning payments--

(i) Are substantially similar to the Performance-Based Payments clause at FAR 52.232-32 and meet the criteria for, and definition of, performance-based payments in FAR Part 32;

(ii) Are in conformance with the requirements of FAR 32.504(f); and

(iii) Subordinate all subcontractor rights concerning property to which the Government has title under the subcontract to the Government's right to require delivery of the property to the Government if--

(A) The Contractor defaults; or

(B) The subcontractor becomes bankrupt or insolvent.

(5) If the financing payments are in the form of commercial item financing payments, the terms of the subcontract or interdivisional order concerning payments--

(i) Are constructed in accordance with FAR 32.206(c) and included in a subcontract for a commercial item purchase that meets the definition and standards for acquisition of commercial items in FAR Parts 2 and 12;

(ii) Are in conformance with the requirements of FAR 32.504(g); and

(iii) Subordinate all subcontractor rights concerning property to which the Government has title under the subcontract to the Government's right to require delivery of the property to the Government if--

(A) The Contractor defaults; or

(B) The subcontractor becomes bankrupt or insolvent.

(6) If financing is in the form of progress payments, the progress payment rate in the subcontract is the customary rate used by the contracting agency, depending on whether the subcontractor is or is not a small business concern.

(7) Concerning any proceeds received by the Government for property to which title has vested in the Government under the subcontract terms, the parties agree that the proceeds shall be applied to reducing any unliquidated financing payments by the Government to the Contractor under this contract.

(8) If no unliquidated financing payments to the Contractor remain, but there are unliquidated financing payments that the Contractor has made to any subcontractor, the Contractor shall be subrogated to all the rights the Government obtained through the terms required by this clause to be in any subcontract, as if all such rights had been assigned and transferred to the Contractor.

(9) To facilitate small business participation in subcontracting under this contract, the Contractor shall provide financing payments to small business concerns, in conformity with the standards for customary contract financing payments stated in Subpart 32.113. The Contractor shall not consider the need for such financing payments as a handicap or adverse factor in the award of subcontracts.

(k) Limitations on undefinitized contract actions. Notwithstanding any other progress payment provisions in this contract, progress payments may not exceed 80 percent of costs incurred on work accomplished under undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes. This limitation shall apply to the costs incurred, as computed in accordance with paragraph (a) of this clause, and shall remain in effect until the contract action is definitized. Costs incurred which are subject to this limitation shall be segregated on Contractor progress payment requests and invoices from those costs eligible for higher progress payment rates. For purposes of progress payment liquidation, as described in paragraph (b) of this clause, progress payments for undefinitized contract actions shall be liquidated at 80 percent of the amount invoiced for work performed under the undefinitized contract action as long as the contract action remains undefinitized. The amount of unliquidated progress payments for undefinitized contract actions shall not exceed 80 percent of the maximum liability of the Government under the undefinitized contract action or such lower limit specified elsewhere in the contract. Separate limits may be specified for separate actions.

(l) Due date. The designated payment office will make progress payments on the 30th day after the designated billing office receives a proper progress payment request. In the event that the Government requires an audit or

other review of a specific progress payment request to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the specified due date. Progress payments are considered contract financing and are not subject to the interest penalty provisions of the Prompt Payment Act.

(m) Progress payments under indefinite--delivery contracts. The Contractor shall account for and submit progress payment requests under individual orders as if the order constituted a separate contract, unless otherwise specified in this contract.

(End of clause)

52.249-5000 BASIS FOR SETTLEMENT OF PROPOSALS

Actual costs will be used to determine equipment costs for a settlement proposal submitted on the total cost basis under FAR 49.206-2(b). In evaluating a terminations settlement proposal using the total cost basis, the following principles will be applied to determine allowable equipment costs:

(1)Actual costs for each piece of equipment, or groups of similar serial or series equipment, need not be available in the contractor's accounting records to determine total actual equipment costs.

(2)If equipment costs have been allocated to a contract using predetermined rates , those charges will be adjusted to actual costs.

(3) Recorded job costs adjusted for unallowable expenses will be used to determine equipment operating expenses.

(4) Ownership costs (depreciation) will be determined using the contractor's depreciation schedule (subject to the provisions of FAR 31.205-11).

(5) License, taxes, storage and insurance costs are normally recovered as an indirect expense and unless the contractor charges these costs directly to contracts, they will be recovered through the indirect expense rate.

(End of Clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/loadmainre.html

http://farsite.hill.af.mil/VFDFARA.HTM

(End of clause)

252.236-7001 CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

See Attached Drawings for Sheet List

(End of clause)

CENTOM CLAUSES

DEFENSE BASE ACT INSURANCE RATES – LIMITATION – FIXED-PRICE (OCT 2008)

(a) The U. S. Army Corps of Engineers (USACE) has entered into a contract with **CNA Insurance** to provide all Defense Base Act (DBA) insurance to USACE and JCC-I/A contractors and subcontractors at a contracted fixed rate. The fixed rates for this insurance are as follows:

Service	$4.00	per $100 of employee remuneration
Construction	$7.50	per $100 of employee remuneration
Aviation	$20.00	per $100 of employee remuneration
Security	$12.50	per $100 of employee remuneration

(b) Bidders/Offerors should compute the total compensation or total payroll, (salary, plus overseas recruitment incentive and post differential, but excludes per diem, housing allowance, travel expenses, temporary quarters allowance, education allowance and other miscellaneous post allowances) to be paid to employees who will be covered by DBA insurance. Compute the cost of DBA Insurance by utilizing the spaces provided below for the base period and whatever extension there may be thereafter, if applicable.

(1) Compensation of Covered Employees: _____

(Total Payroll Not Total Contract Value) Ex:: If total Payroll is $100,000.00

(2) Applicable DBA Rate: _____

(Use appropriate Rate) Ex: If a Service, the rate is $4.00/$100 or 4%

(3) Total DBA Cost: _____

(Amount of DBA Premium) Ex:: $100 K multiplied by 4% is $4,000.00

(c) Bidders/Offerors shall include a statement as to whether or not local nationals or third country nationals will be employed on the resultant contract.

(d) CNA Insurance is utilizing Rutherfoord International as their managing Broker. The primary POC is the USACE DBA Program Administrator is Ramoan Jones, (703) 813-6571 ramoan.jones@rutherfoord.com. The alternate POC is Sara Payne, Senior Vice President, (703) 813-6503 sara.payne@rutherfoord.com.

WORKERS COMPENSATION INSURANCE (DEFENSE BASE ACT) – SERVICES (OCT 2008)

(a) This Special Contract Requirement supplements FAR Clause 52.228-3 Workers' Compensation Insurance (Defense Base Act).

(b) The contractor agrees to procure Defense Base Act (DBA) insurance pursuant to the terms of the contract between the U.S. Army Corps of Engineers (USACE) and **CNA Insurance** unless the contractor has a DBA self-insurance program approved by the Department of Labor. Proof of this self-insurance

shall be provided to the Contracting Officer. The contractor shall submit proof of a valid DBA Insurance policy with CNA Insurance for the Prime and their Subcontractor's at every tier prior to performance of the contract. The current rate under the USACE and JCC-I/A contract is **$4.00 per $100 of compensation for services.**

(c) The contractor agrees to insert a Special Contract Requirement substantially the same as this one in all subcontracts (at every tier) to which DBA is applicable.

(d) Should the rates for DBA insurance coverage increase or decrease during the performance of this contract, USACE shall modify the contract accordingly. However, the revised rates will not be applicable until the Contractor's or Subcontractor's DBA Insurance policy is due to be renewed.

(e) Premiums will be reimbursed only if coverage is purchased through the USACE mandatory requirements DBA contract administered by CNA Insurance and their Managing Broker, Rutherfoord International.

(f) Failure to comply and purchase Defense Base Act (DBA) Insurance in accordance with FAR Clauses 52.228-3 Workers' Compensation Insurance (Defense Base Act), from the U.S. Army Corps of Engineers mandatory Insurance Carrier/Broker (CNA Insurance/Rutherfoord International) for the Prime and all of the Subcontractors at every tier, shall be considered a material breach and could cause your contract to be terminated for default/cause.

CLASS DEVIATION 2007-O0010, IMPLEMENTATION OF THE SYNCHRONIZED PREDEPLOYMENT AND OPERATIONAL TRACKER (SPOT) TO ACCOUNT FOR CONTRACTOR PERSONNEL PERFORMING IN THE UNITED STATES CENTRAL COMMAND AREA OF RESPONSIBILITY.

(i) "Performance in the United States Central Command Area of Responsibility (USCENTCOM AOR)" means performance of a service or construction, as required by the contract. For supply contracts, production of the supplies or associated overhead functions are not covered, but services associated with the acquisition of the supplies are covered (e.g., installation or maintenance).

(ii) If a contract requires performance in the USCENTCOM AOR, but some personnel performing the contract are authorized to accompany the U.S. Armed Forces, and other personnel performing the contract are not authorized to accompany the U.S. Armed Forces, include in the solicitation and contract both the clause at DFARS 252.225-7040 and the clause provided by Class Deviation 2007-O0010. Paragraph (b)(1) of each clause limits the applicability of the clause to the appropriate personnel. There are differences between the two clauses, primarily in Government support to contractor personnel (e.g., security protection and limited medical treatment) and potential applicability of the Uniform Code of Military Justice to contractor employees that are authorized to accompany the U.S. Armed Forces.

(iii) The requirements of paragraph (g) of the clause in Class Deviation 2007-O0010 are not applicable to subcontracts for which the period of performance of the subcontract is less than 30 days.

(iv) In exceptional circumstances, the head of the agency may authorize deviations from the requirements of Class Deviation 2007-O0010, in accordance with FAR Subpart 1.4 and DFARS Subpart 201.4.

(end clause)

APPLICATION OF US CRIMINAL JURISDICTION

Reference DODI 5525.11. The contractor is directed to provide all of its personnel working under this contract, and to require all of its subcontractors to provide their personnel, with written notification that - with the exception of nationals of Afghanistan and those ordinarily resident in Afghanistan - contractor and subcontractor personnel, and the dependents of contractor and subcontractor personnel who are residing with such personnel, may be subject to US criminal jurisdiction as provided for in the Military Extraterritorial Jurisdiction Act, 18 USC 3261-3267; see Section 3267(1)(A)(iii)(I) and (2)(A)(iii). A copy of the notice ***shall be furnished to the contracting officer upon award of the contract***, along with a certification by an authorized company representative attesting to the provision of the notification to contractor personnel.

TRAVEL WARNINGS

The contractor shall provide all personnel working under this contract, and shall require subcontractors to provide their personnel, with a written notification advising such personnel to be aware of US State Department Travel Warnings with respect to Afghanistan, available at http://travel.state.gov, in the event they wish to consider bringing their dependants into Afghanistan. A copy of the notice ***shall be furnished to the contracting officer upon award of the contract***, along with a certification by an authorized company representative attesting to the provision of the notification to contractor personnel. At no time, subject to the written approval of the contracting officer, may the contractor allow such dependants, or any other unauthorized individuals, to be present on the project site grounds, whether in transit or otherwise.

AI 26.6 Projected Afghan and Third Country National (TCN) Employment (5 Nov 07)

Projected Afghan Employment
Collecting & Reporting Employment Statistics

The purpose of this clause is to collect data on the projected number of Afghans employed for the term of the contract. Offerors are required to identify in the space provided below the total projected number that will be directly employed in the performance of this contract.

Employment is the total number of Afghan persons expected to be on the payroll (contractors, subcontractors, & sub-subcontractors) emp1oyed full or part time who received pay for my part of the term of the contract. Temporary and intermittent employees are included, as are any workers who are on paid sick leave, on paid holiday, R&R leave or who work during only part of the pay period." Enter into spaces provided in item #l. Next enter in the spaces provided in item #2 what is the average number employed throughout the term of the contract. Item #3 An "Afghan-Based Company" is a company (including a subsidiary company) whose principal place of business is located within Afghanistan.

1. Total Afghan (Afghan Residents) Employed:

Afghan: Men _____

Afghan: Females _____

Total: _____

2. Average Afghans (Afghan Residents) Employed:

Afghan: Men _____

Afghan: Females _____

Total: _____

1. Is your company an “Afghan Based" company? Yes ___ No___. If no, what country is your company registered/incorporated: _____

2. Afghan Company Certification. The offeror ____is or ____is not an Iraqi owned firm. If the firm is Afghan owned, the Ministry of Trade registration/license number is: _____.

(End)

952.222.0001 – PROHIBITION AGAINST HUMAN TRAFFICKING, INHUMANE LIVING CONDITIONS AND WITHHOLDING OF EMPLOYEE PASSPORTS (MAR 2009)

(a) All contractors (“contractors” refers to both prime contractors and all subcontractors at all tiers) are reminded of the prohibition contained in Title 18, United States Code, Section 1592, against knowingly destroying, concealing, removing, confiscating, or possessing any actual or purported passport or other immigration document, or any other actual or purported government identification document, of another person, to prevent or restrict or to attempt to prevent or restrict, without lawful authority, the person’s liberty to move or travel, in order to maintain the labor or services of that person, when the person is or has been a victim of a severe form of trafficking in persons.

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

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

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

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

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

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

(6) Contractors shall comply with international laws regarding transit/exit/entry procedures, and the requirements for work visas. Contractors shall follow all Host Country entry and exit requirements.
(c) Contractors have an affirmative duty to advise the Contracting Officer if they learn of their employees violating the human trafficking and inhumane living conditions provisions contained herein. Contractors are advised that contracting officers and/or their representatives will conduct random checks to ensure contractors and subcontractors at all tiers are adhering to the law on human trafficking, humane living conditions and withholding of passports.
(d) The contractor agrees to incorporate the substance of this clause, including this paragraph, in all subcontracts under his contract.

952.223.0001 – REPORTING KIDNAPPINGS, SERIOUS INJURIES AND DEATHS
(MAR 2009)
Contractors shall notify the Contracting Officer, as soon as practicable, whenever employee kidnappings, serious injuries or deaths occur.
Report the following information:
Contract Number
Contract Description & Location
Company Name
Reporting party:
Name
Phone number
e-mail address
Victim:
Name
Gender (Male/Female)
Age
Nationality
Country of permanent residence
Incident:
Description
Location
Date and time
Other Pertinent Information
In accordance with AI 25.1103□ 101, JCC□ I/A clause 952.225□ 0001, Arming Requirements and Procedures for Personal Security Services Contractors and for Requests for Personal Protection, shall be included in all contracts with performance in Iraq or Afghanistan.
(1) Iraq: The OPARC maintains copies of all necessary approval documents that must be completed and submitted to MNC□ I for approval. Staffing of arming approval is the responsibility of the requiring activity.
(2) Afghanistan: All necessary documents shall be submitted by the Customer for approval through the RC□ E CG. Once approved, the responsible RCC/Division Chief shall be provided and maintain copies of all necessary approval documents completed by the requiring activity prior to contract execution.

952.225.0001 – ARMING REQUIREMENTS AND PROCEDURES FOR PERSONAL SECURITY SERVICES CONTRACTORS AND FOR REQUESTS FOR PERSONAL PROTECTION

General. Contractor and its subcontractors at all tiers that require arming under this contract agree to obey all laws, regulations, orders, and directives applicable to the use of private security personnel in Iraq and Afghanistan, including U.S. CENTCOM, Multi- National Force Commander and Multi-National Corps Commander orders, instructions and directives. Contractors will ensure that all employees, including employees at any tier of subcontracting relationships, armed under the provisions of this contract, comply with the contents of this clause and with the requirements set forth in the following:

DODI 3020.41, *Program Management for Acquisition and Operational Contract Support in Contingency Operations*;

DFARS 252.225-7040, *Contractor Personnel Supporting a Force Deployed Outside the United States*;

Class Deviation 2007-O0010, Contractor Personnel in the United States Central Command Area of Responsibility

CPA Order #17, *Registration Requirements for Private Security Companies*, dated 27 Jun 04;

U.S. CENTCOM Policy Letter, Mod 1, *Personal Protection and Contract Security Service Arming*, dated 7 Nov 2006

Required Government Documentation. The unit requesting the contractor security shall provide a description of the following to the arming approval authority and to the contracting officer:

The specific location where the PSC will operate;

The persons and/or property that require protection;

The anticipated threat;

The required weapon types; and

The reason current security/police forces are inadequate.

Required Contractor Documentation. Contractors and their subcontractors at all tiers that require arming approval shall provide the following to the contracting officer representative (COR):

Documentation that each employee who will be armed under the contract received the following training—

Weapons Qualification/Familiarization. All employees must meet the qualification requirements established by any DoD or other U.S. government agency

Law of Armed Conflict (LOAC);

Rules for the Use of Force (RUF), as defined in the U.S. CENTCOM Policy, dated 23 December 2005; and Distinction between the above-prescribed RUF and the Rules of Engagement (ROE), which are applicable only to military forces.

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

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

One (1) copy of an operating license (or a temporary operating license) from the Ministry of Interior;

A communications plan that, at a minimum, sets forth the following:

The contractor's method of notifying military forces and requesting assistance where hostilities arise or combat action is needed;

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

How the contractor will coordinate transportation with appropriate military authorities.
An acceptable plan for accomplishing background checks on all contractor and subcontractor employees who will be armed under the contract. The contractor shall, at a minimum, perform the following (which will be specifically addressed in its plan and which will be documented and furnished to the COR upon completion): Use one or more of the following sources when conducting the background checks: Interpol, FBI, Country of Origin Criminal Records, Country of Origin U.S. Embassy Information Request, CIA records, and/or any other records available;
Verify with MNC-I or Afghanistan RCE – CG Provost Marshal that no employee has been barred by any commander within Iraq or Afghanistan; and Certify, after completing all checks, that all persons armed under this contract are not prohibited under U.S. law from possessing a weapon or ammunition.
Required Contractor Acknowledgements. Contractors and their subcontractors at all tiers that require arming approval will provide written acknowledgement of the following to the COR:
Penalties for Non-Compliance. Failure of contractor or subcontractor employee(s) to comply with the laws, regulations, orders, and rules (including those specified herein) governing the use of force may result in the revocation of weapons authorization for such employee(s). Where appropriate, such failure may also result in the total revocation of weapons authorization for the contractor (or subcontractor) and sanctions under the contract, including termination.
Criminal and Civil Liability. Arming of contractor or subcontractor employees under this contract may subject the contractor, its subcontractors, and persons employed by the same, to U.S. and Host Nation prosecution and civil liability. “Host Nation” refers to the nation or nations where services under this contract are performed. Lapses in Training. Failure to successfully retrain an employee who is armed under this contract within twelve (12) months of the last training date will constitute a lapse in the employee’s authorization to possess and carry the weapon. All unauthorized employees will immediately surrender their weapon to the contractor and will remain unarmed until such time as they are retrained and the COR determines that the retraining is sufficient.

Authorized Weapon & Ammunition Types. Unless DCDRUSCENTCOM (or a designee) provides otherwise, all arming requests and authorizations for contractor or subcontractor employees under this contract shall be limited to U.S. Government approved weapons and ammunition. This restriction applies to all weapons in the possession of contractor employees, even if such weapons are required for personal protection. The following weapons and ammunition are currently authorized by the U.S. Government for use in Iraq and Afghanistan:
The M9, M4, M16, or equivalent (e.g. .45 CAL, AK-47). The M9 or equivalent sidearm will be the standard personal protection weapon unless other weapons are specifically requested and approved. U.S. government Ball ammunition is the standard approved ammunition.
Requirements for Individual Weapons Possession. All employees of the contractor and its subcontractors at all tiers who are armed under this contract must: Possess only those U.S. Government-approved weapons and ammunition for which they are qualified under the training requirements of section (c);
Carry weapons only when on duty or at a specific post;
Not conceal any weapons, unless specifically authorized; Carry proof of authorization to be armed. Employees not possessing such proof will be deemed unauthorized and must surrender their weapon to their employer; and IAW USCENTCOM G.O. #1, consumption of alcohol in Iraq or Afghanistan is prohibited. In the event of a suspension or and exception to G.O. #1, employees shall not consume any

alcoholic beverage while armed or within eight (8) hours of the next work period where they will be armed.

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

Rules for the Use of Force (RUF). In addition to the RUF and ROE training referenced in paragraph (c), the contractor and its subcontractors at all tiers will monitor and report all activities of its armed employees that may violate the RUF. Prompt reporting demonstrates a desire by the contractor and its subcontractors to minimize the impact of any violations and, therefore, will be given favorable consideration. Violations of the RUF include, though are not limited to: Taking a direct part in hostilities or combat actions, other than to exercise self-defense; Failing to cooperate with Coalition and Host Nation forces; Using deadly force, other than in self-defense where there is a reasonable belief of imminent risk of death or serious bodily harm; Failing to use a graduated force approach; Failing to treat the local civilians with humanity or respect; and

Detaining local civilians, other than in self-defense or as reflected in the contract terms.

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

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

Quarterly Reporting. The prime contractor will report quarterly (i.e. NLT 1 January, 1 April, 1 July and 1 October for each quarter of the calendar year) to the Contracting Officer responsible for this contract, and any other organization designated by the Contracting Officer, the following information under this contract: The total number of armed civilians and contractors; The names and contact information of its subcontractors at all tiers; and A general assessment of the threat conditions, adequacy of force numbers, and any problems that might require a change to force levels. Note: this information is in addition to the information the contractor promises to immediately provide under the communications plan referenced at paragraph (c)(5).

952.225.0002 – ARMED PERSONNEL INCIDENT REPORTS (MAR 2009)

(a) All contractors and subcontractors in the Multi-National Forces-Iraq (MNF-I) or Combined Joint Task Force (Afghanistan) theater of operations shall comply with and shall ensure that their personnel supporting MNF-I or CJTF forces are familiar with and comply with all applicable orders, directives, and instructions issued by the respective MNF-I or CJTF Commanders relating to force protection and safety.

(b) IRAQ: Contractors shall provide all incidents and use of weapons firing incidents to the MNC-I Contractor Operations Cell (CONOC) as soon as practical, based upon the situation, and submit a written report to CONOC within 4 hours. The initial report shall include the name of the company, location of the

incident, time when the incident occurred, a brief description of the events leading up to the incident, and a company point of contact. A follow-up, comprehensive written report shall be provided to the CONOC within 96 hours of the incident. Reports shall be submitted to CONOC at: mncic3conoc@iraq.centcom.mil;, DSN 318-435-2369; Iraqna 0044 203 286 9851 or 0044 203 239 5894; or Skype: MNCICONOC.
(c) AFGHANISTAN: Contractors shall report all incidents and use of weapons through their Contracting Officers who will notify the JOC Watch at Bagram AB. (JOC SHIFT DIRECTOR, DSN: 318-431-4116; SVOIP: 431-7108) Information should include: the name of the company, where the incident occurred, time when the incident occurred, a brief description of the events leading up to the incident, and a point of contact for the company. The JOC Watch duty officer will issue guidance for further reporting requirements.
(d) Contractors shall provide first aid and request MEDEVAC of injured persons, and remain available for U.S. or Coalition response forces, based upon the situation. In the event contractor personnel are detained by U.S. or Coalition Forces, prolonged detention due to lack of proper identification can be alleviated by contractor personnel possessing on their person information that includes the contractor's name, the contract number, a contractor management POC, and the phone number of the CONOC/JOC Watch.

JCC-I/A CLAUSE 952.225-0003
FITNESS FOR DUTY AND MEDICAL/DENTAL CARE LIMITATIONS (MAR 2009)
(1) The contractor shall perform the requirements of this contract notwithstanding the fitness for duty of deployed employees, the provisions for care offered under this section, and redeployment of individuals determined to be unfit. The contractor bears the responsibility for ensuring all employees are aware of the conditions and medical treatment available at the performance. The contractor shall include this information and requirement in all subcontracts with performance in the theater of operations.
(2) The contractor shall not deploy an individual with any of the following conditions unless approved by the appropriate CENTCOM Service Component (ie. ARCENT, AFCENT, etc.) Surgeon: Conditions which prevent the wear of personal protective equipment, including protective mask, ballistic helmet, body armor, and chemical/biological protective garments; conditions which prohibit required theater immunizations or medications; conditions or current medical treatment or medications that contraindicate or preclude the use of chemical and biological protectives and antidotes; diabetes mellitus, Type I or II, on pharmacological therapy; symptomatic coronary artery disease, or with myocardial infarction within one year prior to deployment, or within six months of coronary artery bypass graft, coronary artery angioplasty, or stenting; morbid obesity (BMI >/= 40); dysrhythmias or arrhythmias, either symptomatic or requiring medical or electrophysiologic control; uncontrolled hypertension, current heart failure, or automatic implantable defibrillator; therapeutic anticoagulation; malignancy, newly diagnosed or under current treatment, or recently diagnosed/treated and requiring frequent subspecialist surveillance, examination, and/or laboratory testing; dental or oral conditions requiring or likely to require urgent dental care within six months' time, active orthodontic care, conditions requiring prosthodontic care, conditions with immediate restorative dentistry needs, conditions with a current requirement for oral-maxillofacial surgery; new onset (< 1 year) seizure disorder, or seizure within one year prior to deployment; history of heat stroke; Meniere's Disease or other vertiginous/motion sickness disorder, unless well controlled on medications available in theater; recurrent syncope, ataxias, new diagnosis (<

1year) of mood disorder, thought disorder, anxiety, somotoform, or dissociative disorder, or personality disorder with mood or thought manifestations; unrepaired hernia; tracheostomy or aphonia; renalithiasis, current; active tuberculosis; pregnancy; unclosed surgical defect, such as external fixeter placement; requirement for medical devices using AC power; HIV antibody positivity; psychotic and bipolar disorders. (Reference: Mod 8 to USCENTCOM Individual Protection and Individual/Unit Deployment Policy, PPG-Tab A: Amplification of the Minimal Standards of Fitness for Deployment to the CENTCOM AOR).

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

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

(5) Notwithstanding any other provision of the contract, the contractor shall be liable for any and all medically-related services or transportation rendered. In accordance with OUSD(C) Memorandum dated 4 June 2008, the following reimbursement rates will be charged for services at all DoD deployed medical facilities. These rates are in effect until changed by DoD direction.

(a) Inpatient daily rate: $2,041.00. Date of discharge is not billed unless the patient is admitted to the hospital and discharged the same day.

(b) Outpatient visit rate: $195.00. This includes diagnostic imaging, laboratory, pathology, and pharmacy provided at the medical facility.

952.225.0004 – COMPLIANCE WITH LAWS AND REGULATIONS (MAR 2009)

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

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

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

(d) Contractor employees performing in the USCENTCOM Area of Operations (AOR) may be subject to the jurisdiction of overlapping criminal codes, including, but not limited to, the Military Extraterritorial Jurisdiction Act (18 U.S.C. Sec. 3261, et al) (MEJA), the Uniform Code of Military Justice (10 U.S.C. Sec. 801, et al)(UCMJ), and the laws of the Host Nation. Non-US citizens may also be subject to the laws of their home country while performing in the USCENTCOM AOR. Contractor employee status in these overlapping criminal jurisdictions may be modified from time to time by the United States, the Host Nation, or by applicable status of forces agreements.
(e) Under MEJA, a person who engages in felony misconduct outside the United States while employed by or accompanying the Armed Forces is subject to arrest, removal and prosecution in United States federal courts. Under the UCMJ, a person serving with or accompanying the Armed Forces in the field during a declared war or contingency operation may be disciplined for a criminal offense, including by referral of charges to a General Court Martial. Contractor employees may be ordered into confinement or placed under conditions that restrict movement within the AOR or administratively attached to a military command pending resolution of a criminal investigation.
(f) Contractors shall immediately notify military law enforcement and the Contracting Officer if they suspect an employee has committed an offense. Contractors shall take any and all reasonable and necessary measures to secure the presence of an employee suspected of a serious felony offense. Contractors shall not knowingly facilitate the departure of an employee suspected of a serious felony offense or violating the Rules for the Use of Force to depart Iraq or Afghanistan without approval from the senior U.S. commander in the country.

952.225.0005 – MONTHLY CONTRACTOR CENSUS REPORTING (MAR 2009)
Contractor shall provide monthly employee census information to the Contracting Officer, by province, for this contract. Information shall be submitted either electronically or by hard-copy. Information shall be current as of the 25th day of each month and received by the Contracting Officer no later than the first day of the following month. The following information shall be provided for each province in which work was performed:
(1) The total number (prime and subcontractors at all tiers) employees.
(2) The total number (prime and subcontractors at all tiers) of U.S. citizens.
(3) The total number (prime and subcontractors at all tiers) of local nationals (LN).
(4) The total number (prime and subcontractors at all tiers) of third-country nationals (TCN).
(5) Name of province in which the work was performed.
(6) The names of all company employees who enter and update employee data in the Synchronized Predeployment & Operational Tracker (SPOT) IAW DFARS 252.225-7040 or DFARS DOD class deviation 2007-O0010.

In accordance with AI 25.1103□ 106, JCC□ I/A clause 952.225□ 0006, Contract Delivery Requirements, shall be included in all contracts (with completed information) providing supplies to be delivered to Iraq or Afghanistan.

952.225.0006 – CONTRACT DELIVERY REQUIREMENT (MAR 2009)

(a) REQUIRED DELIVERY DATE:
(b) CONTRACTOR DELIVERY LOCATION:
(c) POINT-OF-CONTACT RESPONSIBLE FOR INSPECTION & ACCEPTANCE:
Name:
Phone No.: email:
(d) FINAL DELIVERY DESTINATION:
(e) POINT-OF-CONTACT AT FINAL DESTINATION:
Name:
Phone No.: email:
(f) REQUIRING ACTIVITY:

952.225.0007 – MANDATORY SHIPPING INSTRUCTIONS IRAQ (MAR 2009)
(a) The Commercial Logistics Distribution Agency (CLDA) is required to track supplies and materiel shipped into Iraq. Prompt notification of shipment movements and compliance with information requirements will assist in providing advance notice to the point of entry for all inbound shipments.
(b) In accordance with the U.S./Iraq Security Agreement, no taxes shall be imposed on goods and services purchased.
(c) Upon contract award, the contractor/consignor the contractor shall provide the necessary logistical information required by CLDA.
STEP 1:
-- Upon contract award go to the following JCCS website:
-- https://www.rebuilding-iraq.net/portal/page?_pageid=95,1&_dad=portal&_schema=PORTAL
STEP 2:
-- Select the “Logistics” and then the “Customs” radio buttons.
-- Select and complete the “Customs Levy Waiver Form”.
STEP 3:
-- Select the “Logistics” and then the “Logistics Information Requirements” radio buttons.
-- Select and complete the “Logistics Information Requirements Form”.
STEP 4:
-- (a) Email the (1) completed “Customs Levy Exemption Form”, (2) a copy of the front page of the signed contract; and (3) the pages from the contract that describe the required supplies, equipment or end product to the Logistics Movement Coordination Center (LMCC) at pcocustoms@pco-iraq.net. The LMCC can be contacted by telephone at +1 (281) 669-2372 or +964 (790) 192 4129.
-- (b) The “Customs Levy Exemption Form” will be reviewed by a Government of Iraq representative. If the shipment qualifies for a levy exemption, the “Customs Levy Exemption Form” will be stamped and emailed back to the contractor. The stamped form must accompany every shipment for which a levy exemption is desired.
-- (c) Contact the Logistics Movement Coordination Center (LMCC) Watch Officer at the following e-mail address: pcolmcc@pco-iraq.net if there are any problems with the administrative requirements of this clause.
-- (d) Complete a Form DD-250 form, Material Inspection and Receiving Report, and provide it and the invoice for the shipment with the cargo.

-- (e) Commercial Air Shipments require (1) airway bills and (2) the “Customs Levy Exemption” form to be emailed to SkyLink Arabia at logistics@ska-arabia.com at least 7 days prior to the arrival of the cargo at the port of entry. SkyLink Arabia can be contacted at +964 (7901) 926 284.
It is the contractor’s responsibility to provide all the requested information in sufficient time to allow coordination of required delivery. Failure to comply with these instructions may result in delaying the arrival of supplies and materiel at their final destinations.
STEP 5:
-- (a) Email the following documents to GRD Programs at GRD.NONCON@pcoiraq.
net:
(1) Approved Customs Levy Waiver Form
(2) Logistics Information Requirements Form
(3) Completed DD-250
(4) Airway bills (if applicable)
-- (b) Provide the following information in the subject line of the email:
(1) Contract Number
(2) Task/Delivery Order Number (if applicable)
(3) Full or Partial Shipment
-- (c) Provide the following information in the body of the email:
(1) All information from the subject line
(2) CLIN Number
(3) Iraq Point of Entry
(4) Freight Forwarding Information (if applicable)
(5) Contractor point-of-contact (name, phone number, email address)

In accordance with AI 25.1103□ 108, JCC□ I/A clause 952.225□ 0008, Shipping Instructions for Weapons, shall be included in all contracts that require delivery of weapons to Iraq or Afghanistan.

952.225.0008 – SHIPPING INSTRUCTIONS FOR WEAPONS (MAR 2009)
(a) All weapons shall be shipped with a complete serial number manifest that is included with the shipping documents (inventory, bill of lading, etc.).
(b) All individual boxes or crates shall be numbered and correspond to a list annotated on the serial number manifest.
(c) Each individual box or crate shall have a packing list both inside and outside the box.
That packing list shall contain a list of the contents and the serial numbers for the weapons in that box or crate.
(d) The contract number shall be listed on all serial number manifests and packing lists.
All serial numbers shall be unique and non-recurring in any previous or future shipments.
Shipments received with recurring serial numbers will not be accepted by the U.S. Government, and the contractor will be required to return the shipment at his own expense and replace with new weapons having non-recurring serial numbers. In accordance with AI 25.1103□ 109, JCC□ I/A clause 952.225□ 0009, Medical Screening and Vaccination Requirements for Locally Hired Employees, shall be

included in all contracts that may employ locally hired employees working on bases supporting U.S. Forces with performance in Iraq, in accordance with MNF□ I draft FRAGO 09□ xxx.

952.225.0009 – MEDICAL SCREENING AND VACCINATION REQUIREMENTS FOR LOCALLY HIRED EMPLOYEES (MAR 2009)
(a) Contractors, and subcontractors at any tier shall ensure and provide satisfactory evidence that all locally hired employees, including Local National (LN), Third Country National, and U.S. employees, working on military have been screened for and do not currently have active tuberculosis (TB).
(1) Contractors may utilize a testing method of either a chest x-ray or TB skin test (TST).
(i) Chest x-rays shall be taken and TBTs administered within 90 days prior to the start of employment.
(ii) Screening may be performed either by a licensed medical provider from the local economy or by contractors' licensed medical staffs. Contractors shall maintain medical screening documentation and make it available to the Contracting Officer upon request.
(2) TB screening documentation will be required by the responsible Base Defense Operations Center (BDOC) prior to issuance of base access badges.
(b) Contractor employees, including subcontractors at any tier, who work in positions where they are working with food or water production and distribution shall have current Typhoid and Hepatitis "A" (full series) vaccinations, in addition to the TB tests required above.
(a) At least the first inoculation in the Hepatitis "A" series must be given prior to the start of employment, with continuation and completion of the inoculation series. The Typhoid inoculation must be completed within two years prior to the date of employment in the food and water service capacity.
(i) Once the complete Hepatitis "A" vaccination series is completed, it does not have to be repeated. The Typhoid vaccination requires a booster immunization every three years.
(ii) Proof of individual employee vaccinations shall be provided to the Contracting Officer and maintained by the Contractor for examination by the Contracting Officer.

In accordance with AI 36.521□ 100, JCC□ I/A clause 952.236□ 0001, Electrical and Structural Building Standards for Construction Projects shall be included in all construction contracts; including minor construction, renovation, alteration, and refurbishment; in Iraq or Afghanistan.

952.225-0010 – CONTRACTOR EMPLOYEE LEGAL REQUIREMENTS (MAR 2009)
(a) The contractor shall not employ, nor allow a subcontractor to employ, any person that has ever been convicted, in any U.S. court, including a court-martial, of any crime against an Iraqi and/or an Afghan national, regardless of the place at which the crime occurred.
(b) For the purpose of this clause, "crime" is defined as: "a violation of a law in which there is injury to the public or a member of the public and a term in jail or prison, and/or a fine as possible penalties." Further, the crime must be an offense that could be classified as a Class B misdemeanor, or any higher class up to a Class A felony, as referenced at 18 USC §3559.
(c) Contractors shall exercise effective screening processes to ensure that individuals not conforming to this standard are identified and prohibited from, or removed from (if already employed) working under this contract.

(d) Contractor employees discovered to have one of more prior convictions as described above shall be removed from the contract at the contractor's expense.
(e) Failure to adhere to the requirements of this clause could result in a termination for cause or termination for default, in accordance with the terms and conditions of this contract.

952.236.0001 – ELECTRICAL AND STRUCTURAL BUILDING STANDARDS FOR CONSTRUCTION PROJECTS (MAR 2009)
(a) The standards set forth herein are the minimum requirements for the contract. These standards must be followed unless a more stringent standard is specifically included. In such case the most stringent standard shall be required for contract acceptance.
(b) The contractor, in coordination with the Contracting Officer, Base Camp Mayor, Base/Unit Engineers, and requiring activity shall evaluate, upgrade, build, and/or refurbish buildings to a safe and livable condition. This work may include refurbishment, construction, alterations, and upgrades. All work shall be in accordance with accepted standards of quality.
(c) As dictated by the Unified Facilities Criteria (UFC) the contract shall meet:
(1) "the minimum requirements of United States' National Fire Protection Association (NFPA) 70,
(2) National Electrical Code (NEC),
(3) the American National Standards Institute (ANSI) C2, and
(4) the United States' National Electrical Safety Code (NESC).
(d) These standards must be met when it is reasonable to do so with available materials.
When conditions dictate deviation, then provisions within the International Electrical Code (IEC) or British Standard (BS 7671) shall be followed. Any deviations from the above necessary to reflect market conditions, shall receive prior written approval from a qualified engineer and the Contracting Officer. (e) The following internet links provide access to some of these standards:
UFC: http://65.204.17.188/report/doc_ufc.html
NFPA 70: http://www.nfpa.org
NESC: http://www.standards.ieee.org/nesc

CLAUSES INCORPORATED BY REFERENCE

52.211-10	Commencement, Prosecution, and Completion of Work	APR 1984
52.211-12	Liquidated Damages--Construction	SEP 2000
52.211-13	Time Extensions	SEP 2000
52.211-18	Variation in Estimated Quantity	APR 1984
52.242-14	Suspension of Work	APR 1984
52.246-12	Inspection of Construction	AUG 1996
52.246-21	Warranty of Construction	MAR 1994
252.201-7000	Contracting Officer's Representative	DEC 1991

003110 - METRIC MEASUREMENTS

SECTION 00 31 10
METRIC MEASUREMENTS
04/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 621	(1994; R 1999e1) Use of Metric (SI) Units in Building Design and Construction (Committee E-6 Supplement to E380)
ASTM SI 10	(2002) American National Standard for Use of the International System of Units (SI): The Modern Metric System

1.2 GENERAL

This project includes metric units of measurements. The metric units used are the International System of Units (SI) developed and maintained by the General Conference on Weights and Measures (CGPM); the name International System of Units and the international abbreviation SI were adopted by the 11th CGPM in 1960. A number of circumstances require that both metric SI units and English inch-pound (I-P) units be included in a section of the specifications. When both metric and I-P measurements are included, the section may contain measurements for products that are manufactured to I-P dimensions and then expressed in mathematically converted metric value (soft metric) or, it may contain measurements for products that are manufactured to an industry recognized rounded metric (hard metric) dimensions but are allowed to be substituted by I-P products to comply with the law. Dual measurements are also included to indicate industry and/or Government standards, test values or other controlling factors, such as the code requirements where I-P values are needed for clarity or to trace back to the referenced standards, test values or codes.

1.3 USE OF MEASUREMENTS IN SPECIFICATIONS

Measurements in specifications shall be either in SI or I-P units as indicated, except for soft metric measurements or as otherwise authorized. When only SI or I-P measurements are specified for a product, the product shall be procured in the specified units (SI or I-P) unless otherwise authorized by the Contracting Officer. The Contractor shall be responsible for all associated labor and materials when authorized to substitute one system of units for another and for the final assembly and performance of the specified work and/or products.

1.3.1 Hard Metric

A hard metric measurement is indicated by an SI value with no expressed correlation to an I-P value. Hard metric measurements are often used for field data such as distance from one point to another or distance above the floor. Products are considered to be hard metric when they are manufactured to metric dimensions or have an industry recognized metric designation.

1.3.2 Soft Metric

a. A soft metric measurement is indicated by an SI value which is a mathematical conversion of the I-P value shown in parentheses (e.g. 38.1 mm (1-1/2 inches)). Soft metric measurements are used for measurements pertaining to products, test values, and other situations where the I-P units are the standard for manufacture, verification, or other controlling factor. The I-P value shall govern while the metric measurement is provided for information.

b. A soft metric measurement is also indicated for products that are manufactured in industry designated metric dimensions but are required by law to allow substitute I-P products. These measurements are indicated by a manufacturing hard metric product dimension followed by the substitute I-P equivalent value in parentheses (e.g., 190 x 190 x 390 mm (7-5/8 x 7-5/8 x 15-5/8 inches)).

1.3.3 Neutral

A neutral measurement is indicated by an identifier which has no expressed relation to either an SI or an I-P value (e.g., American Wire Gage (AWG) which indicates thickness but in itself is neither SI nor I-P).

1.4 COORDINATION

Discrepancies, such as mismatches or product unavailability, arising from use of both metric and non-metric measurements and discrepancies between the measurements in the specifications and the measurements in the drawings shall be brought to the attention of the Contracting Officer for resolution.

1.5 RELATIONSHIP TO SUBMITTALS

Submittals for Government approval or for information only shall cover the SI or I-P products actually being furnished for the project. The Contractor shall submit the required drawings and calculations in the same units used in the contract documents describing the product or requirement unless otherwise instructed or approved. The Contractor shall use ASTM SI 10 and ASTM E 621 as the basis for establishing metric measurements required to be used in submittals.

-- End of Document --

SECTION 01 31 13.12 10
SPECIAL CLAUSES

PART 1 GENERAL

1.1 PRECONSTRUCTION CONFERENCE

At the earliest practicable time, prior to commencement of the work, the Contractor and any Subcontractors whose presence is necessary or requested, shall meet in conference with representatives of the Contracting Officer to discuss and develop a mutual understanding relative to the details of the administration and execution of this contract. This will include but not necessarily be limited to the Contractor's Quality Control (CQC) Program, the Contractors Accident Prevention Program, submittals, correspondence, schedule, access to the work site, security requirements, interface requirements, temporary facilities and services, hazards and risks, working after normal hours or on weekends or holidays, assignment of inspectors, representations, special requirements, phasing, and other aspects of this project that warrant clarification and understanding.

1.2 AREA USE PLAN

The Contractor shall submit to the Contracting Officer, within ten (10) calendar days after award of this contract, an Area Use Plan designating intended use of all areas within the project boundaries. This plan shall include, but not necessarily be limited to the following: the proposed location and dimensions of any area to be fenced and used by the Contractor; construction plant and building installations/the number of trailers and

facilities to be used; avenues of ingress/egress to the fenced areas and details of the fence installation; drawings showing temporary electrical installations; temporary water and sewage disposal installations; material storage areas; hazardous storage areas. Any areas that may have to be graveled shall also be identified. The plan shall also include a narrative description of the building structural system, the site utility system and the office or administration facilities. The Contractor shall also indicate if the use of a supplemental or other staging area is desired. The Contractor shall not begin construction of the mobilization facilities prior to approval by the Contracting Officer of the Area Use Plan described herein.

1.3 CONTRACTOR'S MOBILIZATION AREA

Commander, Kandahar Airfield (COMKAF) has designated areas for Contractor's use. The Contractor is responsible for securing his laydown yard with COMKAF's approval through the Planning Board. The Contracting Officer will assist in this effort. The contractor will have the opportunity to visit the LSA during the site visit and then shall be informed of the precise location upon mobilization. If the contractor awarded this contract already has or will be assigned an LSA space at Kandahar Airfield resulting from another contract award, the contractor shall be required to use the existing LSA or shall be assigned an LSA for all of their work. Contractors will not automatically be granted additional LSA space based on multiple contract awards. Additional LSA space will be proportioned as the Government deems necessary. This decision shall be made as expeditiously as possible by the Contracting Officer after contract award.

There will be numerous other contracts underway at Kandahar Airfield during the same period this contract work is underway. The contractor will need to coordinate use of the LSA with other contractors.

The perimeter fence will be extended to enclose the Contractor's work area, but the date of completion for this work is unknown at this time.

1.3.1 Contractor's Temporary Facilities

1.3.1.1 General

All facilities within the Contractor's mobilization area shall be of substantial construction suitable for the local weather conditions. Sanitary facilities shall meet the requirements of Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1. Local nationals will not be granted any privileges under this contract. Government provided services are for American and Foreign national contractors only. It is the Contractor's responsibility to secure any privileges. Government dining facilities are available for Contractor's use.

1.3.1.2 Administrative Field Offices

The Contractor may provide and maintain administrative field office facilities within the mobilization area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.3.1.3 Storage Area

The Contractor shall construct a temporary 1.8 meter (6 foot) high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored green or brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil

conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless approved in writing by the Contracting Officer.

1.3.1.4 Plant Communication

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. These devices shall be made available for use by Government personnel.

1.3.1.5 Appearance of Mobilization Site Facilities and/or Trailers

Mobilization Site Facilities and/or Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers or other transportable structures which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on the construction site until such work or maintenance has been performed to the satisfaction of the Contracting Officer.

1.3.1.6 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse unpaved areas which are not established roadways with construction equipment or other vehicles, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of soil onto paved or established roadways; gravel gradation shall be at the Contractor's discretion.

1.3.1.7 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own facilities and equipment.

1.3.1.8 Sanitation

a. Sanitary Facilities: It is the Contractor's responsibility to provide sanitary waste collection and disposal within the confines of the assigned LSA parcel.

b. Trash Disposal: The Contractor shall be responsible for collection and disposal of trash from the work areas and from the mobilization area. General construction debris and demolition debris shall be collected and transported by the Contractor to a location designated by the Government. Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Loose debris capable of being windblown, shall be immediately placed in sealed or covered containers to prevent it from being blown onto taxiways or runways. Any dirt or soil that is tracked onto paved or surfaced roadways shall be cleaned daily. Materials resulting from demolition activities that are salvageable shall be stored within the fenced area described above. Stored material not indoors, whether new or salvaged, shall be neatly stacked when stored.

1.3.1.9 Telephone

The Contractor shall make arrangements to install and pay all costs for telephone facilities desired.

1.3.1.10 Restoration of Storage Area

Upon completion of the project and after removal of mobilization facilities, trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse unpaved areas shall be removed and all such areas restored to their original conditions.

1.3.2 Protection and Maintenance of Traffic

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the Host Nation and base authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with base traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.3.2.1 Use of Existing Roads as Haul Routes

The Contractor shall be responsible for coordinating with the base authorities for use of any existing roads as haul routes. Construction, and routing of new haul roads, and/or upgrading of existing roads to carry anticipated construction traffic shall be coordinated with the Base authorities and is the sole responsibility of the Contractor. The Contractor shall provide dust control in accordance with paragraph 1.7 "Dust Control", and provide grading for all haul roads utilized.

1.3.2.2 Employee Parking

The Contractor's employees may be allowed parking on the military installation. The Contractor is responsible for transporting workers (local nationals) from off post to the worksite, coordinating security identification screening, and cooperating in gate searches with the base authorities. The government reserves the right to terminate any and all contractor parking at any time.

1.3.3 Temporary Project Safety Fencing and Barricades

The Contractor shall impose all measures necessary to limit public access to hazardous areas and to ensure the restriction of workers to the immediate area of the construction and mobilization site. The Contracting Officer may require in writing that the Contractor remove from the work any employee found to be in violation of this requirement.

1.3.3.1 Barricades

Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night. Travel to and from the project site shall be restricted to a route approved by the Contracting Officer.

1.3.4 Host Nation Authorizations, Permits and Licenses

It shall be the Contractor's responsibility to obtain such local authorizations, permits and licenses necessary to establish his quarry operations, batching operations and haul routes (See Special Clause entitled: COMPLIANCE WITH HOST COUNTRY RULES AND CUSTOMS).

1.4 NOT USED

1.5 RESPONSIBILITY FOR PHYSICAL SECURITY

Prior to mobilization, the Contractor shall submit his proposed means of providing project security to prevent unauthorized access to equipment, facilities, materials and documents, and to safeguard them against sabotage, damage, and theft. 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.

1.6 NOT USED

1.7 DUST CONTROL

The Contractor shall be required to control objectionable dust in the work areas, access roadways, and haul roads by means of controlled vehicle speeds or dust palliatives. Vehicles transporting sand, cement, gravel or other materials creating a dust problem shall be covered, as directed by the Contracting Officer, or in accordance with local Laws, codes, and regulations.

1.8 NOT USED

1.9 NOT USED

1.10 DIGGING PERMITS

1.10.1 Requirements for Digging Permits

Prior to the start of any work activity that requires excavation within the current base, the Contractor shall obtain a digging permit. All dig permits must be submitted to the COMKAF Engineer or his disgnee located on installation. POC will be provided by Contracting Officer.

1.10.2 Requests for Digging Permits

Requests for Digging Permits shall be submitted to Contracting Officer a minimum of seven (7) days prior to the start of the work activity covered by the permit. The request for a Digging Permit shall include a narrative description of the work to be performed and a detailed map of the area of the excavation clearly marking the location of all known utilities or other

obstructions. If the work activity covered by the Digging Permit request also requires a utility outage, a separate request for the outage shall be submitted in accordance with the paragraph entitled CONNECTIONS TO EXISTING UTILITIES.

1.10.3 Preparation of Requests for Digging Permits

Prior to submitting a request for a Digging Permit, the Contractor shall carefully review the area to be excavated to determine the location of existing utilities and other obstructions. The Contractor will review available drawings and will conduct a visual inspection of the site. The Contractor will utilize underground utility detecting devices such as metal and cable detectors to determine the location of existing utilities. All utility lines found shall be clearly flagged or marked and the location of the utility shall be shown on the drawing to be submitted with the request for Digging Permit.

1.10.4 Existing Underground Utilities

The Contractor shall exercise utmost care in researching locations of existing utilities and reducing damage to existing utilities. Any utilities damaged by the Contractor shall be promptly repaired by the Contractor. The Contracting Officer will review and approve any proposed repairs. Any damage to existing utilities will be immediately reported to the Contracting Officer and the Base Commander.

1.11 CONNECTIONS TO EXISTING UTILITIES

1.11.1 General

Any outage of any utility service shall be requested in writing at least ten (10) days in advance of the date requested for the commencement of the outage. The Contractor shall provide a request, detailing the type of outage needed (water, sewer, electrical, steam, etc.), the time needed to perform the work, the reason for the outage, and the known affected facilities. The Contracting Officer shall be contacted prior to the outage to confirm the time and date. If the Contractor fails to initiate work at the approved time, the Contracting Officer may cancel the approved outage and may direct the Contractor to resubmit a new request. No part of the time lost due to the Contractors failure to properly schedule an outage shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

1.11.1.1 Performance of Work During Non-Standard Hours

To minimize outage impact to the mission of the installation, all outages shall be scheduled on weekends or from 2100 - 0530 hours on duty days. The period proposed for performance of the outage shall include sufficient contingencies to preclude impact to the peak working hours 0530 - 1800 hours during the workweek.

1.11.1.2 Exterior Night Lighting

Exterior night lighting shall be provided in conformance with EM-385-1-1 entitled Safety and Health Requirements Manual and must meet COMKAF's force protection requirements.

1.11.2 Existing Underground Utilities

The Contractor is provided notice that existing utilities may be present in the construction area. The Contractor shall exercise the utmost care in researching locations of existing utility lines by implementing control measures to eliminate, or reduce to a level acceptable to the Contracting Officer, the chance of damaging or destroying existing utilities.

1.11.2.1 Use of Underground Utility Detecting Device

Prior to any excavation, a metal and/or cable-detecting device shall be used along the route of the excavation. All underground utilities discovered by this method will be flagged a minimum distance of one-half (1/2) meter on each side of the location.

1.11.2.2 Hand Excavation

Hand excavation methods and special supervisory care shall be used between any flagged markers, in areas of known or suspected hazards, and in areas known or suspected to have multiple and/or concentrated utility lines or connections.

1.11.3 Repair of Damaged Utilities

The Contractor shall be responsible to repair any utilities damaged by him. The method of repair and schedule for performance of the repair shall be coordinated with, and subject to the approval of, the Contracting Officer. The repair work and any temporary work required to keep the system operational while repairs are being completed, shall be performed at no cost to the Government.

1.12 WATER

It is the Contractor's responsibility to provide water distribution within the confines of the assigned LSA parcel.

1.13 NOT USED

1.14 ELECTRICITY (CONTRACTOR PROVIDED)

Electrical service may or may not be available for use under this contract; therefore all electric current required by the Contractor shall be the responsibility of the Contractor, furnished at his own expense. The Contractor shall provide diesel generators to meet his demand requirements. Electricity required for final testing systems will be furnished by the Government. The Government will provide permanent high voltage electricity to a point indicated by the Contracting Officer for use by the Contractor in the performance of final testing of systems. The means of doing so, such as by temporary distribution systems, shall be the responsibility of the Contractor. All temporary connections for electricity shall be subject to the approval of the Contracting Officer and shall comply with Corps of Engineers manual EM 385-1-1 entitled Safety and Health Requirements Manual. All temporary lines shall be furnished, installed, connected and maintained by the Contractor in a workmanlike manner satisfactory to the Contracting Officer. Before final acceptance of systems, or facilities, all temporary connections installed by the Contractor shall be removed at his expense in a manner satisfactory to the Contracting Officer.

1.15 NOT USED

1.16 NOT USED

1.17 NOT USED

1.18 WORK OUTSIDE REGULAR HOURS

If the Contractor desires to carry on work outside regular base duty hours, or on holidays (including the following U.S. holidays: New Year's Day, Martin Luther King Jr's Birthday, George Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving and Christmas), he shall submit an application to the Contracting Officer. The Contractor shall allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night, exterior lighting shall be provided in conformance with EM-385-1-1 entitled "Safety and Health Requirements Manual".

1.19 SCHEDULING OF WORK IN EXISTING FACILITIES

As soon as practicable, but in any event not later than thirty (30) calendar days after award of this contract, the Contractor shall meet in conference with the Contracting Officer, or his duly authorized representatives, to discuss and develop mutual understanding relative to the scheduling of work in and access to the existing facilities where work has to be performed under this contract, so that the Contractor's proposed construction schedule is coordinated with the operating and security requirements of the installation.

1.20 NOT USED

1.21 NOT USED

1.22 NOT USED

1.23 NOT USED

1.24 RESIDENT MANAGEMENT SYSTEM (RMS)

1.24.1 General

The requirements contained herein are in addition to and supplement the requirements mandated by Section 01 45 02.00 10 QUALITY CONTROL SYSTEM (QCS). The Resident Management System is an automated quality management and contract administration system that provides an efficient method to plan, accomplish, and control project management by integrating job specific requirements, corporate technical knowledge, and management policies. RMS controls the following activities:

a. Project Planning.

b. Milestone Events.

c. Contract Administration.

d. Progress Payments.

e. Correspondence.

f. Contract Schedule.

g. Quality Control.

h. Submittal Register.

i. Accident Prevention.

j. Management Reporting.

1.24.2 Computer Software to be Furnished by the Government

The software program modules required for the Contractor shall be downloaded from the RMS web site located at the following: http://www.rmssupport.com/rmswebhome.aspx . No login or password is required. For assistance with the QCS program, the Contractor may contact the RMS Help Desk Coordinator. Contact information is provided within the Contacts portion of the aforementioned website. New versions of the Contractor's Module may be down loaded from the RMS web site during the course of the contract, and the contractor shall use the new modules when available. It is the sole responsibility of the Contractor to ensure that the data files are converted to the new modules.

1.24.3 RMS User Guides and Support

The RMS Center is maintained to assist the Contractor's field engineers and office personnel perform their duties by providing expertise to plan, accomplish, and control the daily technical and administrative functions of construction projects managed by the U.S. Army Corps of Engineers. Points of contact, available guides, software updates and assistance with the associated Quality Control System (QCS) program may be obtained from the RMS home page located at the following http://www.rmssupport.com/rmswebhome.aspx . No login or password is required.

1.24.4 Contractor Responsibility

The Contractor is responsible for establishing, maintaining and updating the provided Contractors Programming. The RMS shall be prepared and maintained at the work site. The Contractor shall utilize a Government furnished Contractor Quality Control System (QCS) Program. The Program includes a QC Daily Reports form which must also be used. This form may be in addition to other Contractor desired reporting forms. However, all other such reporting forms shall be consolidated into this one Government specified QC Daily Reports Form.

1.24.4.1 Government-Furnished Module Elements

The Contractor shall also be required to complete Government-Furnished Module elements which include, but are not limited to, subcontractor codes, planned cumulative progress earnings, subcontractor information showing trade, name, address, point-of-contact, and insurance expiration dates, definable features of work, pay activity and activity information, required Quality Control tests tied to individual activities, planned Customer/User Training tied to specific specification paragraphs and Contractor activities, Installed Property Listing, Transfer Property Listing and Submittal information relating to specification section, description, activity number, review period and expected procurement period. The sum of all activity values shall equal the contract amount (inclusive of all modifications), and all Proposal Schedule Items, Options and Additives shall be separately identified, in accordance with Section 00010 entitled SUPPLIES OR SERVICES AND PRICES/COSTS. Proposal Schedule items may include multiple activities, but activities may only be assigned to one such Proposal Schedule item.

1.24.4.2 Quality Assurance Comments

During the course of the contract, the Contractor will receive various quality assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. The Contractor shall acknowledge receipt of these comments by a specific sequential number reference on his QC Daily Report. The Contractors QC daily reports shall also reflect the scheduled and actual dates when these items are completed or corrected to permit Government verification.

1.24.4.3 Project Schedule

The Project Schedule provided by the Contractor in compliance with Section 01 32 17.00 20 NETWORK ANALYSIS SCHEDULES (NAS), of the Technical Provisions, shall be fully compatible with the RMS System. The RMS system is compatible with the Standard Data Exchange Format(SDEF)scheduling systems. It is recommended that one of the following software programs be utilized: Approach (PPMS 30,000), AlderGraf Systems (AlderGraf), Pinnell-Busch (PMS-80), Primavera Systems, Welcome Technologies (Open Plan). The Contractor's schedule system shall include, as specific and separate activities, all three (3) Phase Inspection meetings, all Operation and Maintenance (O&M) Manuals, instructions and training for operation and maintenance, Contractor furnished spare parts, submittals, all test plans of electrical and mechanical equipment or systems that require validation testing or instructions to Government Representatives, and all CQC completion inspections.

1.24.5 Payment

Separate payment will not be made for maintaining and updating the RMS System, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Proposal Schedule. Submission of all required modules shall be completed to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, Insurance and/or Mobilization, as approved by the Contracting Officer) and shall be updated as required. The Contracting Officer may elect to withhold any and all partial payments until the submissions are satisfactory.

1.24.6 RMS Implementation Plan

The Contractor shall furnish for review and acceptance by the Government, not later than twenty (20)calender days after receipt of Notice To Proceed, the plan for implementation of the RMS System.

1.24.6.1 Quality Control (QC)/Quality Assurance (QA) Mutual Understanding Meeting

The Contractor shall prepare in outline form, a proposed RMS implementation plan which shall be discussed at the pre-construction conference. Detailed discussions including the Contractor's approved RMS implementation plan shall be made a supplemental part of the Quality Control (QC)/Quality Assurance (QA) mutual understanding meeting. During this supplemental meeting the Government will provide an overview of the RMS system. At a minimum, Contractor personnel responsible for the following shall be in attendance: Contractor Quality Control, Project Schedule, Submittals, Partial Payment Estimates, Subcontracting, Operation and Maintenance Training, and installed property and equipment.

1.24.6.2 RMS Implementation Plan

At a minimum, the RMS plan shall include the following:

a. A description of the RMS team, including a chart showing lines of authority, duties, and responsibilities.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a RMS function.

c. Procedures for joint Government/Contractor review and verification of proposed input. This shall include certification from the Contractor that the submitted input is accurate, current, and in strict conformance to all contract requirements.

d. Proposed procedures to ensure compatibility of the existing Government system with the Contractors proposed Hardware and Software.

e. Proposed controls, instructions and procedures to ensure smooth and effective transfer of electronic data.

f. Proposed reporting procedures, including reporting formats, techniques and equipment.

1.24.6.3 Acceptance of Plan

Approval of the Contractor's proposed plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his RMS Plan and operations including but not necessarily limited to modifications to hardware, software, and removal of personnel, as necessary, to obtain the quality and efficiency as specified.

1.24.6.4 Notification of Changes

After acceptance of the RMS plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

1.24.7 Personnel Requirements

The requirements for the RMS organization are a RMS System Manager and sufficient number of additional qualified personnel to ensure contract compliance.

1.24.7.1 RMS Manager

The Contractor shall identify as RMS Manager an individual within the onsite work organization who shall be responsible for overall management of RMS and have the authority to act in all RMS matters for the Contractor. The RMS Manager shall be a graduate engineer, with a minimum of 10 years construction experience. This RMS Manager shall be physically located on-site and shall be employed by the prime Contractor. The RMS Manager shall be assigned as RMS Manager but may have other duties. An alternate for the RMS Manager shall be identified in the plan to serve in the event of the RMS Manager's absence. The requirements for the alternate shall be the same as for the designated RMS Manager.

1.24.7.2 RMS Staff

The Contractor's RMS staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The RMS staff shall be subject to acceptance by the Contracting Officer.

1.24.7.3 RMS Office Facilities and Equipment

The Contractor shall provide adequate office space, computers, and other resources as necessary to maintain an effective and fully functional RMS organization.

1.24.8 Hardware and Software

The Contractor shall submit all of the RMS input data and updates required by the Contractor's Quality Control Module of the Government's Resident Management System (RMS).

For QCS System Hardware and software Requirements, RMS Server Minimum Requirements, and RMS Workstation Minimum Requirements contractor shall obtain information from web site: http://www.rmssupport.com/rmswebhome.aspx

State of the Art Anti-Virus Software: The Contractor's computer software system shall be protected by a State-of-the-Art Anti-Virus protection system which shall be maintained and upgraded with all issued manufacturer's updates throughout the life of the contract period.

1.24.9 Notification of Noncompliance

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this clause. 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. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

1.24.10 Contractor Partial Payment Estimates

The RMS System shall be used for preparing, approving, and printing the Contractors partial payment estimate.

1.24.10.1 Monthly Coordination Meeting

The RMS System shall be completely updated at least monthly. Specific calendar dates for submission of same shall be determined by the Contracting Officer. Prior to submitting a partial payment estimate, the Contractor shall schedule a coordination meeting with the Government to verify the status of activities proposed for payment. This meeting shall evaluate at a minimum the following:

a. Activities proposed for payment.

b. Total dollar value and previous earnings of each activity proposed for payment.

c. Percent or quantity proposed for payment by the Contractor.

d. Percent or quantity approved for payment by the Government.

e. Verification of activities started, on-going, or completed.

f. Verification that required "Three Phase-Inspections" have been conducted satisfactorily.

g. Verification that all Accident Prevention/Safety and Construction deficiencies have been noted and corrected to the satisfaction of the Contracting Officer.

h. Verification that there are no outstanding submittals.

i. Verification that CQC testing has been performed.

j. Verification that a daily record of as-built conditions is being maintained.

k. Verification that salvage material has been turned over.

l. Verification that Government furnished property has been transferred.

m. Verification that Contractor Requests for Information (RFI's) have been submitted.

n. Verification that installed property and equipment information is current in RMS. The RMS database shall include all information on the property and equipment at the time of installation of each item.

o. Verification of other required items as noted on the approved RMS Implementation Plan.

1.24.10.2 Re-submission of Partial Payment Estimates

Prior to requesting a partial payment estimate, the Contractor is required to submit and receive approval, for all elements of the RMS that require updating. In the event that any data is missing, unavailable, incorrect, or determined by the Contracting Officer to portray unrealistic parameters or misrepresent actual conditions, the Contracting Officer may require the Contractor to correct, revise and resubmit the required RMS input or status information, prior to accepting any partial payment estimate for evaluation. Any payment amount previously paid on the basis of inaccurate or incorrect information submitted by the Contractor, may be adjusted by the Contracting Officer in subsequent payment estimates. If the Contractor fails to submit the required updates, or transfers the information in a fragmented or piecemeal fashion, the Contracting Officer may, in addition to other remedies provided under this contract, withhold approval of all or any portion of the partial payment estimate until a complete RMS update has been provided and approved.

1.25 PREPARATION OF AS-BUILT DRAWINGS (CONTRACTOR)

1.25.1 General

Upon completion of each facility under this contract, the Contractor shall prepare and furnish both as-built drawings and Geospatial shapefiles to the Contracting Officer. The as-built drawings shall be a record of the construction as installed and completed by the Contractor. They shall include

all the information shown on the contract set of drawings, and all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, including all additional work not appearing on the contract drawings, and all changes which are made after any final inspection of the contract work. In the event the Contractor accomplished additional work which changes the as-built conditions of the facility after submission of the final as-built drawings, the Contractor shall furnish revised and/or additional drawings and drawing files as required to depict final as-built conditions. The requirements for these additional drawings shall be the same as for the as-built drawings specified in this paragraph. Additionally all site improvements shown on the site drawings and site utilities shall be provided in ESRI ArcGIS 9.2 Geospatial shape files using Universal Transverse Mercator (UTM) coordinate system.

1.25.2 Daily Record of As-Built Conditions

1.25.2.1 General

The Contractor shall maintain a full size set of contract drawings for depicting a daily record of as-built conditions. These drawings shall be maintained in a current, reproducible condition at all times during the entire contract period and shall be readily available for review by the Contracting Officer's Representative at all times. The as-built drawings shall be updated daily by the Contractor showing all changes from the contract plans which are made in the work, or additional information which might be uncovered in the course of construction. This information shall be recorded on the prints accurately and neatly by means of details and notes. Changes and additional information marked on the contract plans should be made in red or green color for highlighting purposes.

1.25.2.3 Daily Record of As-Builts

The daily record of As-Built conditions shall include but not necessarily be limited to the following:

a. All necessary information for As-Built conditions including proprietary materials, equipment, system, and patented processes, shall be transferred from the appropriate shop drawings and digitally incorporated into the As-Built drawings in the Computer Assisted Design and Drafting (CADD) format specified by this clause. Under NO circumstances will shop drawings and submittals approved by the Government be used to supplant and/or supplement the requirements of this clause. As-Built drawings that substitute shop drawings/submittals for original CADD files will be returned for resubmission.

b. The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.

c. The location and dimensions of any changes within the building or structure, and the accurate location and dimension of all underground utilities and facilities.

d. Correct grade or alignment of roads, structures, or utilities if any changes were made from contract plans.

e. Correct elevations if changes were made in site grading.

f. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor

including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

g. The topography and grades of all drainage installed or affected as part of the project construction.

h. All changes or modifications of the original design including those which result from the final inspection.

i. Where contract drawings or specifications allow options, only the option actually used in the construction shall be shown on the as-built drawings. The option not used shall be deleted.

1.25.3 Computer Assisted Design and Drafting (CADD) Software

Digital As-Built drawing files shall be prepared in the format native to the latest version in common use of AutoCad COMPUTER ASSISTED DESIGN AND DRAFTING (CADD) software. Geospatial shape files shall be provided using ESRI ArcGIS 9.2. The shape files shall be compliant with the Spatial Data Standards for Facilities, Infrastructure and Environment (SDFSIE) Release 2.600. The standards are available at http://www.sdsfie.org/SDSFIEHome/tabid/36/Default.aspx.

1.25.4 Translated or Converted Files - Drawing Files

Under NO circumstances shall the Contractor translate (or convert) the digital As-Built files from one CADD software program to another (e.g., from Bently MicroStation to Autocad). As-Built drawings that show signs of translation or conversion will be returned for resubmission.

1.25.5 Geospatial Shape Files and Data

All geospatial data shall overlay on the as-built drawings. The contractor shall utilize a topology build and clean routine and assure the following:

a. No erroneous overshoots, undershoots, dangles or intersections in the line work.

b. Lines should all be continuous, i.e. do not create dashed lines with many small line segments.

c. Point features should be digitized as points, not graticules, symbols or icons

d. No sliver polygons.

e. All polygons completely close and have a single unique centroid

f. Digital representation of the common boundaries for all graphic features must be coincident, regardless of feature layer.

g. Feature Attributes: The contractor shall identify the classification, type, location, ID number, and any other necessary attributes (specified by the Government) for all features.

h. Metadata: The contractor shall complete all metadata elements marked mandatory and mandatory-if-applicable as defined by the FGDC Content Standards for Digital Geospatial Metadata for each feature layer collected. This

standards document can be found at:
http://www.fgdc.gov/standards/standards_publications.

1.25.6 Preliminary As-Built Drawings Submission

Two (2) copies of the preliminary as-built marked prints and prints of the Geospatial shape files shall be delivered to the Contracting Officer at the time of final inspection of each facility for review and approval. Changes and additional information marked on the contract plans should be made in red or green color for highlighting purposes. If upon review of the preliminary as-built drawings and Geospatial shape files, errors or omissions are found, the drawings will be returned to the Contractor for corrections. The Contractor shall complete the corrections in red or green color, and return the as-built marked prints and Geospatial shape files marked prints to the Contracting Officer within ten (10) calendar days.

1.25.7 Final As-Built Drawings Submission

The Contractor shall update the digital contract drawing files and Geospatial shape files to reflect the approved final as-built conditions and shall furnish those updated drawing files and plots of the final as-built drawings and Geospatial shape files to the Contracting Officer.

a. Only personnel proficient in the use of Computer Assisted Design and Drafting (CADD) for the preparation of drawings shall be employed to modify the contract drawing files or prepare new drawing files. Only personnel proficient in the use of ESRI ArcGIS 9.2 and the standards listed in SDFSIE shall be employed to create or modify the Geospatial shape files.

b. Existing digital drawing files shall be updated to reflect as-built conditions. Independent drawing files containing only as-built information are not acceptable. The modifications shall be made by additions and deletions to the original drawing files, and where additional drawings are necessary, they shall be developed in individual digital files for each new drawing. All additions and corrections to the contract drawing files shall be clear and legible, and shall match the adjacent existing line work and text in type, size, weight, and style. New or revised information placed into the design files shall be placed on the levels and in the colors used for placement of the corresponding initial data. Similarly, the drawing size, title block, and general format of new drawings shall be consistent with the format established by the original drawings.

c. In the preparation of as-built drawings, the Contractor shall remove "Bubbles" used by the Government to highlight drawing changes made during design/construction. Triangles associated with those earlier drawing changes shall be left on the drawings and the Contractor shall not add triangles to designate modifications associated with representation of the as-built condition. The revision block identification of the drawing modifications shall be left intact and the date of completion and the words "REVISED AS-BUILT" shall be placed in the revision block above the latest existing notation. Each drawing shall have the words "DRAWING OF WORK AS-BUILT" in letters 4.5 mm (3/16") high placed below the drawing title portion of the drawing title block; between the border and the trim line.

d. The Contractor shall check all final as-built drawing files for accuracy, conformance to the initial drawing scheme and the above instructions. The Contracting Officer will review the drawings and drawing files for conformance to these standards.

e. Digital drawing files shall be furnished to the Contracting Officer on CD-ROM or other media and format as approved by the Contracting Officer. A transmittal sheet containing the name of the files, the date of creation, the CD-ROM number, and a short description of the contents, shall accompany the CD-ROM.

f. A sample drawing drawing of the as-builts and Geospatial shape files shall be furnished to the Contracting Officer before delivery of final as-built drawings as a test to demonstrate compliance with the above instructions and file format compatibility with the described CADD and Geospatial software and the standards listed in SDFSIE.

g. Five (5) complete sets of both the updated final Record Copy digital drawing files and Geospatial shape files and three (3) paper plots or copies of both the final Record drawings and Geospatial shape files prints shall be delivered to the Contracting Officer within 30 calendar days of approval of the preliminary as-built drawings and Geospatial shape files prints. If upon review of the final as-built drawings and Geospatial shape files, errors or omissions are found, the drawings, Geospatial shape files and drawing files will be returned to the Contractor for corrections. The Contractor shall complete the corrections and return both the digital files and Geospatial shape files and both the as-built prints and Geospatial shape files prints to the Contracting Officer within ten (10) calendar days.

1.26 NOT USED

1.27 CERTIFICATES OF COMPLIANCE

Any certificates required for demonstrating proof of compliance of materials with specification requirements shall be executed in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN/BUILD PROJECTS. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturing company involved and shall contain the name and address of the Contractor, the project name and location, description and the quantity of the items involved, and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material.

1.28 ACCIDENT PREVENTION

The Contractor shall comply with all applicable Host Country laws and with such additional measures as the Contracting Officer may find necessary in accordance with CONTRACT CLAUSE 52.236-13 entitled ACCIDENT PREVENTION (NOV1991)-ALTERNATE 1 (APR 1984). Applicable provisions of the Corps of Engineers manual entitled Safety and Health Requirements Manual EM 385-1-1 will be applied to all work under this contract. The referenced manual may be obtained from the Contracting Officer at the jobsite or from the Afghanistan Engineer District at Kabul, Afghanistan.

1.28.1 Accident Prevention Program

Within fifteen (15) days after award of this contract, and at least ten (10) days prior to the accident prevention pre-work conference, four (4) copies of the Accident Prevention Plan required by the CONTRACT CLAUSE 52.236-13 entitled ACCIDENT PREVENTION (NOV 1991)- ALTERNATE I shall be submitted for review by the Contracting Officer. The Contractor shall not commence physical

work at the site until the Accident Prevention Plan (APP) has been reviewed and accepted by the Contracting Officer. The APP shall meet the requirements listed in Appendix "A" of EM385-1-1. The program shall include the following: TAC Form 61 " Accident Prevention Program Hazard Analysis (Activity Hazard Analysis)" fully completed and signed by an executive officer of the company in block No. 13. The Activity Hazard Analysis is a method in which those hazards likely to cause a serious injury or fatality are analyzed for each phase of operations. Corrective action is planned in advance, which will eliminate the hazards. An analysis is required for each new phase of work. On large or complex jobs the first phase may be presented in detail with the submittal of the Accident Prevention Plan rather than presenting the complete analysis. If the plan is to be presented in phases, a proposed outline for future phases must be submitted as a part of the initial Accident Prevention Plan submittal. Accident Prevention Plans will be reviewed for timeliness and adequacy at least monthly with a signature sheet signed and dated documenting that these reviews took place. Copy of company policy statement of Accident Prevention and any other guidance as required by EM 385-1-1, Appendix A.

1.28.2 Ground Fault Circuit Interrupter (GFCI) Requirement - Overseas Construction

The Corps of Engineers Health and Safety Manual, EM 385-1-1, section 11.C.05.a. states: "The GFCI device shall be calibrated to trip within the threshold values of 5 ma +/- 1 ma as specified in Underwriters Laboratory (UL) Standard 943." A variance from USACE has been granted allowing 10 ma, in lieu of 5 ma, for overseas activities that use 220 Volts (V)/50 hertz (Hz) electrical power.

1.28.3 Temporary Power - Electrical Distribution Boxes

EM 385-1-1 section 11.A.01.a. states, "All electrical wiring and equipment shall be a type listed by a nationally recognized testing laboratory for the specific application for which it is to be used." This includes temporary electrical distribution boxes. Locally manufactured electrical boxes will not be allowed. Only manufactured electrical distribution boxes that meet the European CE requirements, with 10 ma CE type GFCIs installed shall be allowed.

Contractors shall:

a. Make no modifications that might void any CE or manufacturer certification.

b. Test the installed systems to demonstrate that they operate properly and provide the 10 ma earth leakage protection.

c. Ensure GFCIs will have an integral push-to-test function. The testing shall be performed on a regular basis.

d. Check that proper grounding is checked regularly and flexible cords, connectors, and sockets inspected before each use.

1.29 HAZARDOUS MATERIALS

Should the Contractor encounter asbestos or other hazardous materials, during the construction period of this contract, he shall immediately stop all work activities in the area where the hazardous material is discovered. The Contractor shall then notify the Contracting Officer; identify the area of danger; and not proceed with work in that area until given approval from the Contracting Officer to continue work activities. Hazardous material is considered to be asbestos, explosive devices, toxic waste, or material

hazardous to health and safety. The Contractor shall secure the area from daily traffic until it is safe to resume normal activities.

1.30 NOT USED

1.31 NOT USED

1.32 NOT USED

1.33 OPERATION AND MAINTENANCE (O&M) DATA

1.33.1 General

The requirements contained herein are in addition to all shop drawings submission requirements stated in other sections of the specifications. The Contractor shall include the provisions for all items required under this clause in all purchase orders and sub-contract agreements. Submittals required hereinafter will not relieve the Contractor of any responsibilities under the Warranty of Construction Provisions of this contract or under the various Guarantee Clauses of the Technical Provisions.

1.33.2 Submittals

The Contractor shall submit all items requiring submission of O&M data under this and other sections of these specifications in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN/BUILD PROJECT of the specifications.

1.33.3 Operation and Maintenance (O&M) Data

The Contractor shall furnish operation and maintenance manuals for all facilities constructed under this contract. The manuals shall be loose leaf, indexed and shall consist of manufacturer's brochures, manufacturer's operation and maintenance manuals, service and repair manuals, catalogs, service bulletins, instruction charts, diagrams, other information as necessary to support the operation and maintenance of the end items of equipment, assemblies and systems. Each type of facility (housing, barracks, mosque, etc.) shall be covered by a separate manual (or manuals) consisting of all data pertaining to the equipment and/or systems within that facility. Identical equipment within a single major system shall require only one submittal of data. The Contractor shall furnish all O&M manuals to the Contracting Officer not less than thirty (30) calendar days prior to contract completion. Required number of submittals (number of sets) shall be as specified in Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN/BUILD PROJECT.

1.33.4 Recommend Spare Parts List

The Contractor shall furnish a recommended spare parts list containing equipment manufacturers' recommendations for five (5) years; two (2) years and one (1) year spare parts stock levels in Afghanistan. Current unit price and effective date, lead time, shelf life for each individual part, and total cost of all recommended parts shall be furnished.

1.33.5 Supplemental Submittals of Data

After initial submittal of O&M manuals and until final acceptance of all equipment, the Contractor shall prepare and deliver to the Contracting Officer supplemental technical data as previously described for all changes,

modifications, revisions and substitutions to equipment and components. For equipment or systems introduced into the contract under change order, or modified by change order, supplemental data shall be furnished within forty-five (45) calendar days after issuance of the change order. The supplemental data furnished shall be properly prepared and identified for insertion into the O&M manuals.

1.33.6 Framed Instructions for Systems

Approved wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed under glass or in approved laminated plastic, shall be posted, where applicable, in all mechanical equipment rooms. In addition, detailed operating instructions explaining safe starting and stopping procedures for all systems shall be prepared in typed form along with the inspections required to insure normal safe operations. The instructions shall be framed as specified above for the wiring and control diagrams and posted beside the diagram. Proposed diagrams, instructions, and other sheets shall be submitted for approval prior to posting. Operating instructions shall be posted before acceptance testing of the systems and verified during acceptance testing.

1.33.7 Additional Submittals/Resubmittals

The Contracting Officer reserves the right to determine whether the above specified information, as furnished by the Contractor, is adequate and complete and to require such additional submittals by the Contractor as necessary to insure that adequate information has been furnished to provide the satisfactory operation and maintenance of the various items of equipment and to fulfill the intent of the specifications. Additional submittals or resubmittals supplementing incorrect or incomplete data shall be made within thirty (30) calendar days after receiving notice by the Contracting Officer. All costs arising from these resubmissions shall be borne by the Contractor.

1.34 NOT USED

1.35 NOT USED

1.36 INSTRUCTIONS AND TRAINING FOR OPERATION AND MAINTENANCE

1.36.1 General

The Contractor shall be responsible for the instruction and training of operating and maintenance personnel as specified below and in the Technical Provisions of the specifications. Unless otherwise indicated in the Technical Provisions, operating and maintenance instructions shall be given for a minimum period as follows:

Title	Duration of Training
Electrical Systems	10 Days

1.36.2 Operation and Maintenance Training

The Contractor shall provide competent instructors for training of personnel designated by the Contracting Officer to operate mechanical and electrical building systems and equipment, perform the required preventive maintenance to minimize breakdown, and to perform necessary repairs when malfunction or breakdown of equipment occurs. Such training shall consist of classroom and on-the-equipment training for the period specified, which shall be completed

prior to acceptance of a system or equipment, as applicable. The instructor(s) shall have no other duties during the period of training. Classroom instruction shall not exceed fifty percent (50%) of the total training time, with the balance devoted to on-the-equipment demonstration and familiarization. Emphasis will be given to both electrical and mechanical features, in accordance with approved training plans.

1.36.3 Arrangements

The training shall be for not less than the periods of time specified, five (5) days per week, and eight (8) hours per day, subject to review and approval by the Contracting Officer. Each individual training session shall be presented one time only, shall be video taped in a television system compatible with the local area, and be scheduled in a manner acceptable to the Contracting Officer. At the completion of training, the videotapes shall become the property of the Government. In addition to the Contractor's requirements to video tape each training section, the Government reserves the right to record, in any manner, the subject training material, or training sessions given by the Contractor, without additional cost to the Government. Recordings obtained will be used in future training by the Government. The operating and maintenance manual data, as specified to be furnished in these Special Clauses, shall be used as the base material for training.

1.36.4 Scheduling

The Contractor shall contact the Contracting Officer for the purpose of preliminary planning, scheduling, and coordination of training, to maximize effectiveness of the training program for available operating and maintenance personnel. The Contractor shall initiate and make arrangements for such contact within thirty (30) calendar days after receipt of notification of award of contract; and shall include all significant times in scheduling and completing training in his PROJECT SCHEDULE. The Contractor shall provide a draft outline of training outline in sufficient detail to provide a broad indication of the type of scope of training to be given. It shall include but not be limited to; (a) a list of subjects to be presented; (b) estimated amounts of classroom and on-the-equipment instruction for each subject; (c) a list of minimum qualifications for instructors; and (d) discussions concerning the types and amounts of visual aids, reference materials, tools and test equipment, mock-up and other training materials that will be employed during training.

1.36.5 Preliminary Plan

The Contractor shall submit seven (7) copies of an outline of his proposed training plan to the Contracting Officer for review and approval not later than 60 calendar days after award of this contract. The plan will be reviewed and coordinated with the content of the O&M manuals.

1.36.6 Plan

The Contractor shall submit seven (7) copies of his proposed training plan to the Contracting Officer for approval not later than ninety (90) calendar days prior to start of any training. The plan shall include the following; (a) a weekly outline showing overall form and design of training presentation; (b) a day-by-day schedule showing time intervals, the major and subordinate subjects to be covered in each, the name of the instructor(s) and qualification summary of each, and identification of related handouts; (c) summary of the number of hours of classroom and on-the-equipment training; (d) a list of reference materials to be provided by the Contractor to the trainees; and (e) a list and

description of the training materials to be used, such as text, visual aids, mock-up, tools, etc. The Contractor shall be responsible for furnishing all training materials except the following: The Government will provide space, chairs, and tables for classroom training, and three (3) sets of the five (5) sets of O&M Manuals required by the Contractor per Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN/BUILD PROJECT of the specifications. Provision of these manuals is solely for reference purposes, and in no way relieves the Contractor from providing all instruction and materials necessary for training personnel designated by the Government. All costs for resubmission of training plans, training materials, etc., as requested by the Contracting Officer shall be borne by the Contractor. Resubmittals shall be made within twenty (20) days of notice from the Contracting Officer.

1.36.7 Attendance Roster/TAC Form 356

The Contractor shall develop an attendance roster or a similar document indicating each student's attendance, prior to the start of each class, subject and/or topic. This includes both "Hands-On" and classroom training. It is strongly recommended that each student trained be required to sign this document at the beginning of each class day for each and every class, subject and/or topic taught on that day. The Contractor's failure to have student attendance verified in writing may be cause for the Government to order the Contractor to repeat schooling where evidence of attendance cannot be verified. No part of the time lost due to such repeat instruction shall be made the subject of claim for extension of time or for excess costs or damage by the Contractor. Within ten (10) working days after completion of Operation and Maintenance Training conducted in accordance with this clause and/or applicable Technical Provision section, the Contractor shall complete and submit TAC Form 356 "Operation and Maintenance Training Validation Certificate". The attendance roster shall be included as an attachment to TAC Form 356.

1.37 NOT USED

1.38 NOT USED

1.39 NOT USED

1.40 CONTRACTOR FURNISHED EQUIPMENT LISTS

The Contractor shall furnish a list of all items, other than integral construction type items, furnished under the contract. Items such as furniture, drapes, rugs, vehicles, office machines, appliances, etc., shall fall under this category. The Contractor's list shall describe the item; give the unit price and total quantities of each. Model and serial numbers for equipment shall be provided when applicable. The Contractor shall keep an up-to-date register of all covered items and make this information available to the Contracting Officer at all times. Prior to acceptance, the Contractor shall submit the complete register to the Contracting Officer.

1.41 NOT USED

1.42 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

1.42.1 General

This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the Contract Clause 52.249-10 entitled DEFAULT (FIXED-PRICE CONSTRUCTION) APR 1984. The listing below

defines the anticipated monthly unusually severe weather for the contract period and is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the geographic location of the project. The schedule of anticipated unusually severe weather will constitute the baseline for determining monthly weather time evaluations. Upon award of this contract and continuing throughout the contract each month, actual unusually severe weather days will be recorded on a calendar day basis (including weekends and holidays) and compared to the monthly anticipated unusually severe weather in the schedule below. The term "actual unusually severe weather days" shall include days actually impacted by unusually severe weather. The Contractor's schedule must reflect the anticipated unusually severe weather days on all weather dependent activities.

MONTHLY ANTICIPATED UNUSUALLY SEVERE WEATHER CALENDAR DAYS

January	2 Days
February	2 Days
March	2 Days
April thru December	0 Days

1.42.2 Time Extensions

The number of actual unusually severe weather days shall be calculated chronologically from the first to the last day in each month. Unusually severe weather days must prevent work for fifty percent (50%) or more of the Contractor's workday and delay work critical to the timely completion of the project. If the number of actual unusually severe weather days exceeds the number of days anticipated in the paragraph above, the Contracting Officer will determine whether the Contractor is entitled to a time extension. The Contracting Officer will convert any qualifying delays to calendar days and issue a modification in accordance with the Contract Clause 52.249-10 entitled DEFAULT (FIXED-PRICE CONSTRUCTION) APR 1984.

1.43 NOT USED

1.44 STANDARDIZATION

Where two or more items of the same type or class of product, system or equipment furnished in this project are required, the units shall be products of the same manufacturer and shall be interchangeable when of the same size, capacity, performance characteristics, and rating. The only exception to this requirement is where the items are interchangeable due to conformance with industry standards (valves, fittings, etc.); they need not be by the same manufacturer. This requirement applies to all manufactured items in the project that normally require repair or replacement during the life of the equipment.

1.45 NOT USED

1.46 NOT USED

1.47 NOT USED

1.48 NOT USED

1.49 COMPLIANCE WITH HOST COUNTRY RULES AND CUSTOMS

The laws of Host Country may prohibit access to certain areas of the country that are under military control. The Contractor shall furnish the Contracting Officer the names of personnel, type, and amounts of equipment, dates and length of time required at the site, and the purpose of entering the host country. It is understood that areas to which rights of entry are provided by the Host Government are to be used only for work carried out under the contract and no destruction or damages shall be caused, except through normal usage, without concurrence of the Host Government.

1.49.1 Contractor's Responsibilities

The following items are the sole responsibility of the Contractor to investigate, estimate as to cost, and assume the risk, as normally encountered by Contractors. The Contractor shall be responsible for determining the effect of the following on his own cost of performance of the contract and for including sufficient amount in the contract price:

a. Official language and type of accounts required to satisfy the officials of the Local Government.

b. Entry and exit visas, residence permits, and residence laws applicable to aliens. This includes any special requirements of the Host Government, including those required by local Labor Offices, which the Contractor may have to fulfill before an application for a regular block of visas will be accepted.

c. Passports, health and immunization certificates, and quarantine clearance.

d. Compliance with local labor and insurance laws, including payment of employer's share of contribution, collecting balance from employee and paying into insurance funds.

e. Strikes, demonstrations and work stoppage.

f. Collection through withholding and payment to local Government, of any Host Country income tax on employees subject to tax.

g. Arranging to perform work in the Host Country, to import personnel, to employ non-indigenous labor, to receive payments and to remove such funds from the country.

h. Operating under local laws, practices, customs and controls, and with local unions, in connection with hiring and firing, mandatory wage scales, vacation pay, severance pay, overtime, holiday pay, 7th day of rest, legal notice or pay in lieu thereof for dismissal of employees, slowdown and curtailed schedules during religious holidays and ratio of local labor employed in comparison to others.

i. Possibility of claims in local bureaus, litigation in local courts, or attachment of local bank accounts.

j. Compliance with workmen's compensation laws and contributions into funds. Provisions of necessary medical service for Contractor employees.

k. Special license required by the local Government for setting up and operating any manufacturing plant in the Host Country, e.g. concrete batching, precast concrete, concrete blocks, etc.

l. Sales within the host country of Contractor-owned materials, and equipment.

m. Special licenses for physicians, mechanics, tradesmen, drivers, etc.

n. Identification and/or registration with local police of imported personnel.

o. Stamp tax on documents, payments and payrolls.

p. Base passes for permanent staff, day laborers, motor vehicles, etc.

q. Compliance with all customs and import rules, regulations and restrictions, including, but not limited to, local purchase requirements.

1.50 NOT USED

1.51 NOT USED

1.52 NOT USED

1.53 IDENTIFICATION OF EMPLOYEE'S PERSONNEL AND VEHICULAR ACCESS TO THE PROJECT SITES

See Appendix A for updated requirements and information pertaining to escorting and badging for Kandahar Airfield (KAF).

The Base Security maintains the ultimate authority for establishing, monitoring, and enforcing security requirements for the Base Security Office. All contractor, subcontractor, or vendor personnel and vehicles at any tier working at any location on the Base are subject to a thorough search upon entering, departing, or at any time deemed necessary by the Base Security Personnel. The Contractor shall be responsible for compliance with all the Base security requirements. The Government reserves the right to deny access or to require the contractor to remove any personnel or equipment deemed to be a threat to the security of the Base Security Office or the Base personnel. The Contractor shall work through the Contracting Officer to ensure that the Base Security Regulations are followed.

1.53.1 Employee Identification

The Contractor shall be responsible for furnishing to each employee and for requiring each employee engaged on the work, to display identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.53.1.1 Preparation of Identification Badges

The Contractor shall be required to prepare a written application inclusive color photographs and provide all materials and labor necessary to prepare an identification badge, laminated in plastic, containing the employee's name, badge number, color photo, height and weight, the name of the Contractor's organization and for requiring each employee engaged on the work to display this identification as directed by the Contracting Officer. The Contractor shall submit each application and draft badge through the Contracting Officer to the Base Security Office. A minimum of thirty-five workdays shall be allowed for Government review and certification of badges. The Base Security Office will certify each draft badge by signature, stamp, seal or any

combination thereof. Upon certification by the Base Security Office, the badges will be returned to the Contractor for final preparation, lamination, and issuance. Badges shall not be taken out of country during periods of travel or absence. During such periods, the Contractor may be permitted to issue temporary identification badges.

1.53.1.2 Employee Background and Historical Information

The Contractor shall be required to prepare and maintain personal background and historical information forms on each employee. These forms may be reviewed by the Base Security Office. The required information shall include but not necessarily be limited to the following:

a. Full name.

b. Place and date of birth.

c. Three (3) current color photographs.

d. Copy of Citizenship/Nationality identification.

e. Copy of Passport.

f. Copy of driver's license.

g. Police Background Check.

h. Work History.

i. Personal background information.

j. Copy of Work Permit and/or Visa.

k. Permanent home of record and in-country address.

l. Other information mandated by local law, the Base Security Regulations or that may be required to coordinate and process the necessary documentation with the government offices responsible for the approval.

m. Registration, insurance company, policy number and expiration date for each vehicle.

1.53.2 Identification of Contractor Vehicles

The Contractor shall be responsible for requiring each vehicle engaged in the work to display permanent vehicular identification as approved and directed by the Contracting Officer. If acceptable to the Base Security Office and approved by the Contracting Officer, the Contractor may institute a system of non-permanent temporary identification for one-time delivery and transit vehicles. Each Contractor vehicle, machine, piece of equipment, or towed trailers, shall show the Contractor's name such that it is clearly visible on both front doors of the vehicle and both sides of a towed trailer. A valid license plate shall be displayed at all times. Contractor vehicles operated on Government property shall be maintained in a good state of repair, shall be insured, and shall be registered in accordance with Afghan Law.

1.53.3 Security Plan

The Contractor shall submit to the Contracting Officer, within ten (10) calendar days after award of this contract, his proposed personnel and vehicular access plan. This plan shall cover all elements for issuance of the access passes, safeguarding of unissued passes, construction security operations, lost passes, temporary vehicle passes, and collection of passes for employee's and vehicles on 1)- temporary absence; 2)- termination or release; and 3)- termination or completion of contract. The plan shall address in detail the contractors proposed procedures, and organization necessary to produce and maintain effective security within the contract limits twenty-four (24) hours a day seven (7) days a week.

1.54 NOT USED

1.55 RADIO TRANSMITTER RESTRICTIONS

To preclude accidental actuation of sensitive electronic equipment, the Contractor shall not use radio-transmitting equipment without prior approval of the Contracting Officer.

1.56 ON-BASE PHOTOGRAPHY PROHIBITION

The Contractor shall not engage in any form of photography without prior written approval from the Contracting Officer.

1.57 PUBLIC RELEASE OF INFORMATION

1.57.1 Prohibition

There shall be no public release of information or photographs concerning any aspect of the materials or services relating to this bid, contract, purchase order, or other documents resulting there from without the prior written approval of the Contracting Officer.

1.57.2 Subcontract and Purchase Orders

The Contractor agrees to insert the substance of this clause in all purchase orders and subcontract agreements issued under this contract.

1.58 PROCEDURES FOR BRINGING MATERIAL ONTO BASE

1. The Contractor needs to provide the Corps with the following information prior to bringing materials onto base:

a. Date materials / tools / equipment are to be delivered to base

b. A precise list of materials / tools / equipment the Contractor is delivering to base

c. Driver name(s) of delivery trucks / equipment

d. Information on delivery trucks / equipment, i.e. make, model, license plate, number, picture, etc …

e. Tazkera numbers of driver(s)

2. Once this information is provided to the Corps, preferably three days in advance, Commander Davis, COMKAF Security Officer, has to sign off on it. Once it has been approved, four copies will be made. Keep the original one on-file.

3. If the Contractor plans on bringing in materials / tools / equipment for an extended time-period, i.e. one or two weeks, a letter can cover the time-period as long as, all materials / tools / equipment and associated dates are known, the driver(s) do not change and the delivery vehicles do not change.

4. The ECP-3 commander can sign off on letters if the Contractor plans on hand-carrying in samples, tools, etc …

5. Before Contractor plans on bringing in materials / tools / equipment through ECP-3, either via hand-carrying or delivery truck, they need to have one of the signed, original letters in their possession.

6. Every time a Contractor wants to bring materials / tools / equipment on-base, they need a letter.

7. When a Contractor wants to bring materials / tools / equipment off-base, they will also need a letter, which follows the same procedures above.

1.59 NOT USED

1.60 NOT USED

1.61 NOT USED

1.62 NOT USED

1.63 NOT USED

1.64 NOT USED

1.65 NOT USED

1.66 ATTACHMENTS

APPENDIX A - Escorts and Badging Requirements

TAC FORM 356 - Operation and Maintenance Training Validation Certificate

-- End of Section --

0132170020 - NETWORK ANALYSIS

SECTION 01 32 17.00 20
NETWORK ANALYSIS SCHEDULES (NAS)

PART 1 GENERAL

1.1 DESCRIPTION

The network analysis system shall consist of the network analysis schedule (diagram) and associated reports. The scheduling of all design and construction shall be the responsibility of the Contractor. All design and construction increments will be interrelated on a single schedule that represents the entire project duration from Contract Award to the Contract Completion Date. Schedule updates will build upon each other and will include all design and construction increments as they are detailed, submitted and accepted. Submission of progress and revision data will be

used to measure work progress, aid in the evaluation for requests for time extensions, and to provide the basis of all progress payments. The Critical Path Method (CPM) of network calculation shall be used to generate the project schedule and will utilize the Precedence Diagram Method (PDM) to satisfy both time and cost applications. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities.

For consistency, when scheduling software terminology is used in this specification, the terms in Primavera's scheduling programs are used. Primavera Project Planner, P3, Primavera Project Manager, SureTrak and PrimeContract are registered trademarks or service marks of Primavera Systems, Inc. Adobe and Acrobat are registered trademarks of Adobe Systems Incorporated.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-01 Preconstruction Submittals

Qualifications; G RE
Standard Activity ID Dictionary; G RE
Baseline Network Analysis Schedule; G RE

SD-07 Certificates

Monthly Network Analysis Updates; G RE
Summary Network; G RE

SD-11 Closeout Submittals

As-Built Schedule; G RE

1.3 SCHEDULE ACCEPTANCE

Review comments made by the Government on the Contractor's schedule(s) will not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for scheduling, sequencing, and prosecuting the Work to comply with the requirements of the Contract Documents. Government acceptance extends only to the activities of the Contractor's schedule that the Government has been assigned responsibility and agrees it is responsible. The Government will also review for contract imposed schedule constraints and conformance, and cost loading of the CPM activities. Comments offered on other parts of the schedule, which the Contractor is assigned responsibility, are offered as a courtesy and are not conditions of Government acceptance; but are for the general conformance with established industry schedule concepts.

1.3.1 Schedule Acceptance Prior to Start of Work

The Baseline Network Analysis Schedule described in the paragraph entitled "Baseline Network Analysis Schedule" must be submitted and accepted by the Government before the Contractor will be allowed to start work on the construction stage(s) of the contract. Examples of construction stages are,

but not limited to; demolition, site work, temporary work for construction, etc.

1.3.2 Acceptance

a. After the "Baseline Network Analysis Schedule" is submitted and accepted by the Contracting Officer, it will then be used by the Contractor for planning, organizing, and directing the work; reporting progress; and requesting payment for work accomplished. The schedule will be updated monthly by the Contractor and submitted monthly with the progress pay request to reflect the current status of the work. Submittal and acceptance of the Baseline Network Analysis Schedule and accurate updated schedules accompanying the pay requests are both conditions precedent to processing pay requests. Only bonds will be paid prior to acceptance of the Baseline Schedule.

b. Submittal of the Baseline Network Analysis Schedule, and subsequent schedule updates, will be understood to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor's plan on how the work will be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built schedule logic).

1.4 SOFTWARE

The scheduling software that will be utilized by the Government on this project is Primavera Project Planner (P3) by Primavera Systems, Inc.. Notwithstanding any other provision in the contract, schedules submitted for this project must be prepared using either Primavera P3 or Primavera SureTrak (files saved in Concentric P3 format). The Contractor shall provide electronic files saved in a format that is compatible with the Contracting Officer's current software version. Submission of data from another software system where data conversion techniques or software is used to import into Primavera's scheduling software is not acceptable and will be cause for rejection of the submitted schedule.

1.5 QUALIFICATIONS

The Contractor shall designate a part time Scheduler that will be responsible for the development, preparation, and maintenance of an accurate, computerized Network Analysis Schedule. Part time is defined as the Scheduler performing on-site coordination, attending project meetings, and updates for (16) hours per work week. The Scheduler shall have previously developed, created and maintained at least (2) previous computerized schedules of similar size and complexity of this contract. A resume outlining the qualifications of the Scheduler and their P3 or SureTrak training certificate from an authorized Primavera trainer shall be submitted for acceptance to the Contracting Officer. If at a later date, the Contracting Officer considers the Contractor's Scheduler to be incompetent or objectionable, the Contractor will propose a new Scheduler, meeting the qualification requirements. Payments will not be processed until an acceptable Scheduler is provided.

1.6 NETWORK SYSTEM FORMAT

The system shall consist of time scaled logic diagrams and specified reports.

1.6.1 Diagrams

Show the order and interdependence of activities and the sequence in which the work is planned to be accomplished. The basic concept of the network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and how its completion restricts or restrains the start of following activities. Activity durations shall not be resource-driven, activities shall start according to network logic and finish when its duration has elapsed. Diagrams shall be organized by Work Phase, sorted by Early Start Date and will show a continuous flow from left to right with no logic (relationship lines) from right to left. With the exception of the Contract Award, Start Project and End Project milestone activities, no activities will be open-ended; each activity will have predecessor and successor ties. The diagram shall clearly show the activities of the critical path and must be red in color. Once an activity exists on the schedule it may not be deleted or renamed, and must remain in the logic. No more than 20 percent of the activities may be critical or near critical. Critical will be defined as having zero days of Total Float. "Near critical" will be defined as having Total Float in the range of 1 to 14 calendar days. Show the following information on the diagrams for each activity:

a. Activity ID
b. Activity Description
c. Original Duration in Work Days
d. Remaining duration
e. Actual Duration in Work Days
f. Early Start Date
g. Early Finish Date
h. Total Float

Provide network diagrams on tabloid (11X17)sheets. Updated diagrams shall show the date of the latest revision.

1.6.2 Schedule Activity Properties and Level of Detail

Numbering shall be assigned so that, in general, predecessor activity numbers are smaller numerically than the successor activity numbers. Skip numbering shall be used on the network to allow insertion of additional activities for contract modifications and logic changes. The minimum number of activities in the final network diagram shall be 250. Activity categories included in the schedule are specified below.

1.6.2.1 Activity Categories

a. Design and Permit Activities: Requirements for the activities related to design shall be included as separate activities in the project schedule. Design activities shall include, but are not limited to; the Design Notice to Proceed, Contractor's design cost for each facility, Contractor's various stages of design, application for and receipt of permits required, Contractor's constructability reviews, submittal of design packages to Government, Government's design review periods, specified design meetings, transition periods prior to Construction Notice to Proceed, (including Notice to Proceed for each Fast-Track Phased Design as indicated in Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN/BUILD PROJECT and as directed by the Contracting Officer). The Government review period shall be from the time the design is received by the Government to the time it is sent back to the Contractor; mail time will not be included in the Government review period. Design activities will be linked to their associated Procurement and/or Construction activities.

If the Government's action on any submittal requires resubmission or does not clear the design for construction, a new series of Design Activities will be inserted into the schedule. Predecessor for the new design preparation activity will be the original approval activity and the successor of the new activity will be the next design step (in-progress or final) activity.

b. Procurement Activities: Tasks related to the procurement of material or equipment shall be included as separate activities in the project schedule. Examples of procurement activities include, but are not limited to; Material/equipment submittal preparation, submittal and approval of material/equipment; delivery of O&M manuals; material/equipment fabrication and delivery, delivery of extra parts, extra stock, special tools, notification of Government Furnished Material/Equipment delivery requirement, etc. As a minimum, separate procurement activities will be provided for every specification section. If the Contractor intends on using Just-In-Time (JIT) delivery methods, the schedule will show each JIT delivery with relationship tie to the Construction Activity specifically for the JIT delivery. Material and equipment for which payment will be requested in advance of installation shall be cost-loaded with the procurement costs (e.g.; the delivery milestone(s)). All activities within a procurement process/cycle will have a unique identifier in the activity code to show their relationships and will extend to the related construction activities (i.e., CSI Code).

If the Government's action on any submittal is "Disapproved" or "Revise and Resubmit", a new series of Procurement Activities will be inserted into the schedule. Predecessor for the new submittal preparation activity will be the original approval activity and the successor of the new approval activity will be the fabrication/deliver activity for the equipment or material.

c. Government Activities: Government and other agency activities that could impact progress shall be clearly identified. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted inspections/tests, environmental permit approvals by State regulators, utility outages, Notice(s) to Proceed (including Notices to Proceed for each Fast-Track Phase as indicated in other sections of this specification and as directed by the Contracting Officer) and delivery of Government Furnished Material/Equipment. Show activities indicating Government furnished materials and equipment utilizing delivery dates indicated in "FAR 52.245-2, Government Property (Fixed-Price Contracts)." Government activities will be driven by calendars that reflect all Saturdays, Sundays and all Federal Holidays as non-work days.

d. Construction Quality Management (CQM) Activities: CQM Activities will identify the Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan. These activities will be added to each 3-Week Look Ahead Schedule referenced in the paragraph entitled "THREE-WEEK LOOK AHEAD SCHEDULE" and will also be included in each monthly update referenced in the paragraph entitled "Monthly Network Analysis Updates". The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.

e. Construction Activities: Construction activities shall include, but are not limited to: Tasks related to mobilization or demobilization; the installation of temporary or permanent work by tradesman; testing and inspections of installed work by technicians, inspectors or engineers; start-up and testing of equipment; commissioning of building and related systems; scheduling of specified manufacture's representatives; Punch Out Inspection; Pre-Final Inspection, Final Acceptance Inspection; final clean-up; training to be provided; and administrative tasks necessary to start, proceed with, accomplish or finalize the contract. No onsite construction activity shall have a duration in excess of 20 working days. Contractor activities will be driven by calendars that reflect all non-work days.

f. Hammock (Summary) Activities: The Contractor shall include special activities that are a summary of a chain of activities. The start of the activity will be the start date of the first activity in the chain and the finish date will be the finish date of the last activity in the chain. Generalized work sequences, Area Codes and Phase Codes will be summarized.

1.6.2.2 Project Milestones

Dates shall be shown on the diagram for the start of the project, any contract required interim start and completion dates, contract completion date and other significant milestones.

a. Project Start Date Milestones: The schedule shall start no earlier than the Contract Award Date and the project duration (Day 1) will start on the Notice-to-Proceed (NTP) date. The Contractor shall include as the first milestone in the schedule, an activity named "Contract Award". Another milestone shall be included that will be named "Start Project". The Contract Award and Project Start milestones shall have mandatory start constraint dates equal to the Contract Award and NTP dates, respectively.

b. Constraint of Last Activity Milestone: The Contractor shall include as the last activity in the project schedule, an activity named "End Project". The "End Project" activity shall have a mandatory finish constraint equal to the contract completion date for the project. Calculation of project updates shall be such that if the finish of the last activity falls after the contract completion date, then the float calculation shall reflect negative float on the critical path and if the finish of the last activity falls before the contract completion date, the float calculation shall reflect positive float on the critical path.

c. Early Project Completion: In the event the Contractor's project schedule shows completion of the project prior to the contract completion date, the Contractor shall include an activity named "Contractor Early Completion". The activity shall be a milestone with an unconstrained date representing the Contractor's Early Completion date. The only successor activity to this activity will be the "End Project" milestone.

d. Substantial Completion: If the Contractor elects to include an activity for Substantial Completion, then it is agreed that Substantial Completion will be the point in time that the Government considers the project is complete and ready for its intended use. The activity will be named "Substantial Completion". The activity shall be a milestone with an unconstrained date representing the Contractor's Substantial

Completion date. The only successor activity to this activity will be the "End Project" milestone.

e. Phase Start Milestone: The Contractor shall include as the first activity for a project phase, an activity named "Start Phase X", where "X" identifies the phase of work. The "Start Phase X" activity shall have an unconstrained start date equal to the date of the Phase NTP. This unconstrained start date is not a release from contractually required start dates, but is left unconstrained to allow the schedule logic to calculate without hindrance.

f. End Phase Milestone: The Contractor shall include as the last activity in a project phase, an activity named "End Phase X" where "X" identifies the phase of work. The "End Phase X" activity shall have an unconstrained late finish date equal to the contract phase completion date. This unconstrained completion date is not a release from contractually required finish dates, but is left unconstrained to allow the schedule logic to calculate without hindrance.

g. Early Phase Completion: If the Contractor expects to finish prior to the contract phase completion date, the milestone will show an early finish date equal to the Contractor's early finish date. The name of the activity will be "Early Phase Completion" and will have an unconstrained date representing the Contractor's early phase completion date.

1.6.2.3 Critical Activities

The following activities, when applicable, shall be listed as separate line activities on the Contractor's project schedule:

a. Submission and approval of mechanical / electrical layout drawings.
b. Submission and approval of O&M manuals.
c. Submission and approval of as-built drawings.
d. Submission and approval of 1354 data and installed equipment lists.
e. Submission and approval of testing and air balance (TAB).
f. Submission of TAB specialist design review support.
g. Submission and approval of fire protection specialist.
h. Submission and approval of testing and balancing of HVAC plus commissioning plans and data.
i. Air and water balance dates.
j. HVAC commissioning dates.
k. Controls testing plans.
l. Controls testing.
m. Performance Verification testing.
n. Other systems testing, if required
o. Pre-final Inspection
p. Correction of Punch List from Pre-final Inspection
q. Final Inspection

1.6.2.4 Activity Identification (ID) and Description

a. Standard Activity ID Dictionary: The Contractor shall submit the alphanumeric coding scheme for Schedule Activity Numbers that shall be used throughout the project. The coding scheme submitted shall list the values for each activity code and translate those values into project specific designations. Code length shall not exceed ten (10) characters. Once accepted, the coding scheme will be used for the duration of the project.

b. Activity Description: Each activity shall have a narrative description consisting of a Verb or work function (e.g.; form, pour, excavate), an Object (e.g.; slab, footing, under floor plumbing), and Area (e.g.; 3rd floor, northeast quadrant, basement).

1.6.2.5 Activity Code Dictionary and Values

The Contractor shall use the activity coding structure defined in the Standard Data Exchange Formant (SDEF) in ER-1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. The codes will have values assigned that will allow the scheduling program to sort, select, group and organize the activities in the schedule.

Data Disks Two (2) data disks containing the project schedule shall be provided. Data on the disks shall adhere to the SDEF format specified in the ER-1-1-11, Appendix A.

1.6.2.6 Cost and Resource Loading

a. Cost Loading Activities: Equipment costs will be assigned to their respective Procurement Activities (i.e., the delivery milestone activity). Costs for installation of the material/equipment (labor, construction equipment, and temporary materials) will be assigned to their respective Construction Activities. Cost is not to be assigned to Hammock (Summary) activities. The value of inspection/testing activities will not be less than five (5) percent of the total costs for Procurement and Construction Activities. Evenly disperse overhead and profit to each activity over the duration of the project. The total of all cost loaded activities; including costs for material and equipment delivered for installation on the project, and labor and construction equipment loaded construction activities, shall total to 100 percent of the value of the contract.

b. Quantities and Units of Measure: Each cost loaded activity will have a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, etc.

c. Labor Resource Loading: As part of the Baseline Schedule development each construction activity shall have an estimate of the number of workers per day by trade, hours per day by trade and total expected hours used by trade during the execution of the activity. If no workers are required for an activity, then the activity shall be identified as using zero workers per day. All labor resources loaded into the schedule shall be non-driving and will not be used to calculate activity cost or duration. Resource leveling shall not be used. Actual labor resource expended on an activity will be recorded in the monthly updated schedules and will coincide with entries made in the Daily Reports.

d. Equipment Resource loading: As part of the Baseline Schedule development each construction activity shall have an estimate of the equipment used per day, number of units per day and total expected hours for each piece of equipment used during the duration of the activity. Include a description of the major items of construction equipment planned for each construction activity on the project. The description shall include the year, make, model, and capacity. If no equipment is required for an activity, then the activity shall be identified as using zero equipment per day. All equipment resources loaded into the

schedule shall be non-driving and will not be used to calculate activity cost or duration. Resource leveling shall not be used. Actual equipment resource expended on an activity will be recorded in the monthly updated schedules and will coincide with entries made in the Daily Reports.

1.6.2.7 Anticipated Weather Delays

Schedule activity duration(s) shall be formulated with allowance for normal adverse weather conditions as shown in Section 01 31 13.12 10 SPECIAL CLAUSES, SC 1.42. Any activity duration, which could be impacted by normally anticipated adverse weather (precipitation, high or low temperature, wind, etc.), due to the time period that the Contractor has scheduled the work, shall include an adjustment to include the anticipated weather delay. The number of anticipated adverse weather delays allocated to an activity will be reflected in the activity's calendar. A lost workday, due to weather conditions, is defined as a day in which the Contractor's workforce cannot work 50 percent or more of the day on the impacted activity(s). The Contractor shall immediately notify the Contracting Officer when a lost day has occurred due to weather, will record on the Daily Reports the occurrence of adverse weather and resultant impact to the normally scheduled work. If the number of actual adverse weather delay days exceeds the number of days anticipated, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days and issue a modification in accordance with the contract clauses.

1.6.2.8 Schedule Software Settings and Restrictions

a. Activity Constraints: Date/time constraint(s), other than those required by the contract, will not be allowed unless accepted by the Contracting Officer. Contractor will identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.

b. Lags: Lags will not be used when the creation of an activity will perform the same function (e.g., concrete cure time). Lag durations contained in the project schedule shall not have a negative value. Contractor will identify any lag proposed and provide an explanation for the purpose of the lag in the Narrative Report.

c. Default Progress Data Disallowed: Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates on the CPM schedule shall match the dates provided from Contractor Quality Control and Production Reports. These reports will be the sole basis for updating the schedule. Work activities will be updated by actual work progression rather than being cash flow driven. Actual labor and equipment hours used on activities will be derived from the Daily Reports.

d. Software Settings: If the contractor chooses to use Primavera's SureTrak software, the Autocost Rules shall be set to:

1) Uncheck - Link Remaining Duration and Schedule Percent Complete;
2) Check - Use Updated Percent Complete Against Budget to Estimate Actual to Date;
3) Check - Freeze Resource Units per Hour When Quantities Change;

4) Check - Update Cost and Revenue Information; and,
5) Set Resource Data to "Two decimal places".

If the contractor chooses to use Primavera's P3 software, the AutoCost rules shall be set as shown below, all others shall be deactivated (i.e.; check boxes and radio buttons not filled in):

1) Use the update percent complete against budget to estimate: Actual cost to date.
2) Link budget and EAC for non-progressed activities: Budget-EAC.
3) Perform these calculations during each schedule computation: Apply these rules when moving from one Resource to another.

Schedule calculations (if applicable) shall be handled through Retained Logic, not Progress Override. All activity durations and float values will be shown in days, time will not be shown in the duration display. Activity progress will be shown using Remaining Duration. Date format will be DDMMMYY (i.e., 11DEC02). Default activity type will be set to "Task".

e. Out-of-Sequence Progress: Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case approval of the Contracting Officer. The Contractor shall propose logic corrections to eliminate all out-of-sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule.

1.6.3 Required Tabular Reports

The following reports will be based on the information in the paragraph entitled "Diagrams" and included with the schedule submittals and in each updated schedule submission provided on disk by the Contractor:

a. Earned Value Report: Listing all activities having a budget amount and cost. A compilation of total earnings on the project from the notice to proceed to the most recent monthly progress payment request and the difference between the previous request amount and the current payment request amount. Sort report first by resource and then by activity.

b. Log Report: With each updated schedule submission, provide a computer generated Log Report using a recognized schedule comparison software listing all changes made between the previous schedule and current updated schedule. Identify the name of the previous schedule and name of the current schedule being compared. This report will as a minimum show changes for: Added & Deleted Activities, Original Durations, Remaining Durations, Activity Percent Complete, Total Float, Free Float, Calendars, Descriptions, Constraints (added, deleted or changed), Actual Starts/Finishes, Added/Deleted Resources, Resource Quantities, Costs, Resource Percents, Added/Deleted Relations, Changed Relation Lags, Changed Driving Relations, and Changed Critical Status.

c. Activity ID Report: By activity number in ascending order showing the current status of all activities.

d. Total Float Report: List of all activities by total float in ascending order and then in order of early start date.

e. Early Start Report: By earliest allowable start dates and then in order of activity number.

f. 30-Day Look Ahead: Activities in progress or scheduled to start or finish within the next 30 calendar days of the project Data Date or is continuing through the 30 day period.

g. Predecessor/Successor Report: By activity number from lowest to highest, showing preceding and succeeding activity numbers for each activity and showing the current status of each activity.

h. Labor Staffing Report and Histogram: With each Baseline Network Analysis Schedule submittal and each updated schedule, a planned early and planned late versus actual labor resource report and histogram will be provided. The report and histogram shall be based upon and shall be in agreement with, the number of shifts and crew sizes by craft, in the Baseline Network Analysis Schedule (planned) and the Monthly Network Update (actual). Included in the report will be a tabular listing of each trade that worked on the activities during the construction period.

i. Equipment Usage Report and Histogram: With each Baseline Network Analysis Schedule submittal and each updated schedule, a planned early and planned late versus actual equipment resource report and histogram will be provided. The report and histogram shall be based upon and shall be in agreement with the equipment allocation in the Baseline Network Analysis Schedule (planned) and the Monthly Network Update (actual). Included in the report will be a tabular listing of equipment (by year, make and model) that worked on the activities during the construction period.

1.7 SUBMISSION AND ACCEPTANCE

1.7.1 Preliminary Meeting

Prior to the preparation of the Baseline Network Analysis Schedule for acceptance; the Contracting Officer, Contractor and the scheduler shall participate in a preliminary meeting to discuss the proposed schedule and requirements of this section prior to submission of the network.

1.7.2 Baseline Network Analysis Schedule

Once review comments are resolved and the Contracting Officer has accepted the Baseline Network Analysis Schedule, the contractor shall within 5 calendar days furnish:

a. Two (2) copies of the network diagrams.

b. Two (2) copies of the reports listed in the paragraph entitled "Required Tabular Reports".

c. Two (2) copies of the Cash Flow S-Curve indicating the cash flow based upon both the projected early and late finish dates.

d. Two (2) sets of data disks containing the project schedule shall be provided for the initial submission and every periodic project update. The project schedule will also be posted in the format specified as the Adobe PDF file with no relationship lines displayed in the graphic. Data shall be submitted on electronic media that is acceptable to the

Contracting Officer. A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Baseline, Update, Recovery, Change, etc.), full contract number, Project Name used to identify project in scheduling software, contract name & location, data status date, diskette number with total number of diskettes in set, software name and version used to run the schedule, and the name and telephone number of person responsible for the schedule.

For major revisions, updates, or changes to the network diagram, once accepted by the Contracting Officer, the Contractor shall submit these same diagrams and reports.

1.7.3 Monthly Network Analysis Updates

At monthly intervals the Contractor and Government representatives will meet to jointly update the project schedule and agree on percentages of payment for each activity progressed during the update period. The purpose of the meeting is to determine progress payment amounts for each activity, allow all parties to evaluate project status at the data date, provide a complete and accurate update of procurement and construction progress, create an historical record of the project and establish prediction of completion date(s) based upon current status. The contractor is responsible to gather all supporting documentation, present the update data for the schedule and record the meeting minutes. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities. Submit at monthly intervals a report of the actual construction progress by updating the required reports and the time scaled logic diagram. Meeting to update the schedule and the submission of an error free, acceptable updated schedule to the Government is a condition precedent to the processing of the Contractor's pay request. As a minimum, the following actions will be accomplished during the meeting:

a. Identify activities started and completed during the previous period and enter the Actual Start and Actual Finish dates. It will be understood that Actual Start is defined as the date that work begins on an activity with the intent to pursue the work represented by the activity to substantial completion, and Actual Finish is defined as the date that the activity's work is substantially complete to the point that its successor activity(s) may begin.

b. Show estimated duration (in workdays) to complete each activity started but not completed (remaining duration).

c. Indicate percentage of cost payable and percent of work complete as separate and independent entries for each activity. The assignment of an Actual Finish date to an activity does not imply that the activity's percent of payment will be statused to 100%.

d. Reflect changes in the network diagram. All changes (i.e., remaining duration changes, logic changes, new logic, conformed change orders, new activities, changes due to Conformed Modifications, changes in work sequence, entry of as-built relationship logic, etc.) shall be recorded and a note added to the activity log field. The log shall include as a minimum, the date and reason for the change, and description of the change.

e. Submit two (2) copies of a Narrative Report describing: 1) Progress made in each area of the project; 2) Changes in the following: activities, original durations, logic interdependencies, milestones,

planned sequence of operations, critical path, and resource and loading; 3) Pending items and status thereof, including permits, change orders, and time extensions; 4) Status of Contract Completion Date and interim milestones; 5) Current and anticipated delays (describe cause of the delay and corrective action(s)); 6) Description of current and future schedule problem areas. Each entry in the narrative report will cite the respective Activity ID and Activity Description.

f. Submit two (2) copies of the reports listed in the paragraph entitled "Required Tabular Reports".
g. Submit Two (2) hard copies of the network diagrams and two (2) sets of data disks.

h. Submit Two (2) copies of the Update Meeting minutes.

1.7.4 Summary Network

A summary network shall have the same network format as the Baseline Network Analysis Schedule. The summary network will contain a minimal number of activities that represent the general approach of work sequence. The summary will be a time-scaled logical sequence by Phase Code. The Contractor shall submit a summary network diagram along with the Baseline Network Analysis Schedule. A summary network update shall be submitted every three (3) months during the contract duration and immediately following acceptance of each major schedule change. Submit the following:

a. Two (2) copies of the summary network diagram.
b. Two (2) copies of the Activity ID Report.
c. Two (2) copies of the Total Float Report.
d. Two (2) copies of the Earned Value Report indicating the actual cash flow for the current updated (not summary) network based upon both the early and late start schedules.

1.7.5 AS-BUILT SCHEDULE

As a condition precedent to the release of retention and making final payment, the Contractor shall submit an "As-Built Schedule", which is the last schedule update. The As-Built Schedule shall reflect the exact manner in which the project was actually constructed (including actual start and finish dates, activities, sequences, and logic) and shall be certified by the Contractor's Project Manager and Construction Scheduler as being a true reflection of the way the project was actually constructed. If more than one person filled the position(s) during the course of the project, each person will provide certification for the period of time they were responsible.

1.8 CONTRACT MODIFICATION

When a contract modification to the work is required, submit proposed revisions to the network with a fragnet and a cost proposal for each proposed change. All modifications shall be incorporated into the network analysis system as separately identifiable activities broken down and inserted appropriately on the first update following issuance of a directive to proceed with the change. Submit two (2) copies of the Total Float Report, Log Report and a copy of the proposed Time Impact Analysis on disk, with the cost proposal. Unless the Contracting Officer requests otherwise, only conformed contract modification fragnets will be added into the subsequent monthly updates. All revisions to the current baseline schedule activities that are necessary to further refine the schedule so that the

changed work activities can be logically tied to the schedule shall be made. Financial data shall not be incorporated into the schedule until the Contracting Officer signs the contract modification.

1.8.1 Time Impact Analysis:

The Time Impact Analysis method shall be used by the Contracting Officer and the Contractor in determining if a time extension or reduction to the contract milestone date(s) is justified. The Contractor shall provide a Time Impact Analysis to the Contracting Officer for any proposed contract change or as support for a Value Engineering Proposal, Variance Request, Claim or Request for Equitable Adjustment by the Contractor. Submit the Time Impact Analysis schedule, reports, etc. on disk and a printed / plotted hardcopy.

a. The Contractor shall submit a Time Impact Analysis (TIA) illustrating the influence of each change or delay on the Contract Completion Date or milestones. Unless the Contracting Officer requests an interim update to the schedule, the current monthly updated schedule accepted by the Government shall be used to display the impacts of the change. Unless requested by the Contracting Officer, no other non-conformed changes will be incorporated into the schedule being used to justify the change impact.

b. Each TIA shall include a Fragmentary Network (fragnet) demonstrating how the contractor proposes to incorporate the impact into the project schedule. A fragnet is defined as the sequence of new activities and/or activity revisions, logic relationships and resource changes that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Contractor shall provide a hardcopy printout of the fragnet activities and relationships being added and also insert the fragnet into the most current, accepted Monthly Network Analysis Update, run the schedule calculations and submit the impacted schedule with the proposal, claim, etc. Include a narrative report describing the effects of new activities and relationships to interim and contract completion dates, with each TIA. Submit tie extension requests with a Time Impact Analysis and three hardcopies of the fragnet, impacted schedule (with fragnet loaded), Total Float Report, Narrative Report and Log Report.

c. Following the Contractor's receipt of a contract modification on a Standard Form 30 signed by the Government; all changes in the fragnet used to determine impacts, shall be incorporated into the schedule. Changes will occur during the next monthly schedule update meeting.

1.8.2 No Reservation-Of-Rights

All direct costs, indirect costs, and time extensions will be negotiated and made full, equitable and final at the time of modification issuance.

1.9 CHANGES TO THE NETWORK ANALYSIS SCHEDULE

If changes in the method of operating and scheduling are desired, the Contracting Officer shall be notified in writing stating the reasons for the change. If the Contracting Officer considers these changes to be of a major nature, the Contractor may be required to revise and submit for acceptance, without additional costs to the Government, the network diagrams and required

reports. A change may be considered of a major nature if the estimated time required or actually used for an activity or the network logic has varied from the original plan to a degree that there is a reasonable doubt as to the effect on the contract completion date(s). Changes that affect activities with adequate float time shall be considered a major change when their cumulative effect would extend the contract completion date.

1.10 FLOAT

Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to Government caused delay), lag logic restraints, zero total or free float constraints, extended activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

1.10.1 Definition of Float

Free Float is the length of time the start of an activity can be delayed without delaying the start of a successor activity. Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the project completion date. Project Float is the length of time between the Contractor's Early Completion (or Substantial Completion or similar activity) and the Contract Completion Date.

1.10.2 Ownership of Float

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Government or the Contractor. During the course of the contract execution, any float generated due to the efficiencies or either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather with a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the reserve of float. A schedule showing work completing in less time than the contract time, and accepted by the Government, will be considered to have Project Float. Project Float will be a resource available to both the Government and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the Project's critical path, consumes all available float or contingency time, and extends the work beyond the Contract Completion Date.

1.10.3 Negative Float

Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the paragraphs entitled "CONTRACT MODIFICATION". Scheduled completion date(s) that extend beyond the contract or phase completion date(s) (evidenced by negative float) may be used in computations for assessment of payment withholdings. The use of this computation is not to be construed as a means of acceleration.

1.11 THREE-WEEK LOOK AHEAD SCHEDULE

To provide a more detailed day-to-day planning of upcoming construction work, the Contractor shall prepare and issue detailed work plans that coordinates with and supplement the above defined network analysis. The work plans shall

be keyed to the CPM activity numbers and shall be submitted each week and shall show the project activities that will occur during the current and following two-week interval. Additionally, the critical path activities are to be identified on the 3-Week Look Ahead Schedule. The schedule will be a bar chart type schedule prepared by the Contractor in sufficient detail to define the work to be accomplished, the crews, construction tools and equipment to be used during the current and next two-week interval. The bar charts shall be formatted to allow reproduction on 8 ½ by 11 sheets. Three copies of the bar chart schedules shall be delivered to the Contracting Officer not less that 3 work hours prior to the start of the weekly coordination meeting.

1.12 WEEKLY COORDINATION MEETING

In conjunction with the receipt of the 3-Week Look Ahead Schedule, a coordination meeting will be held each week on-site to discuss the work schedule. The Contractor shall make a presentation of the previously submitted and current 3-Week Look Ahead Schedules to the Contracting Officer so as to provide an overview of the project's schedule and provide an opportunity to discuss items of coordination. Consideration of materials, crews, and equipment shall be addressed to ascertain their respective adherence to the 3-Week Look Ahead Schedule and the overall network for the project defined above. The Contractor will take meeting minutes. All meeting minute entries will be keyed to the schedule activity numbers) being addressed. Within one day of the meeting, the Contractor will provide a draft copy of the meeting minutes to the Contracting Officer for review and comment. Final copies of the minutes containing the comments provided by the Contracting Officer will be issued within 3 days of the meeting.

1.13 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs, etc.) shall reference the Schedule Activity Number(s) that are being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure, etc.) shall reference the Schedule Activity Number(s) that are being addressed.

-- End of Section --

013300 - SUBMITTALS PROCEDURE

SECTION 01 33 00
SUBMITTAL PROCEDURES
02/09

PART 1 GENERAL

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations samples remaining upon completion of the work.

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to a notice to proceed commencing work on site. Submittals required prior to the start of the next major phase of the construction on a multi-phase contract. Schedules or tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work, submitted prior to contract notice to proceed or next major phase of construction.

Certificates of insurance
Surety bonds
List of proposed subcontractors
List of proposed products
Construction Progress Schedule
Network Analysis Schedule (NAS)
Submittal register
Schedule of prices
Health and safety plan
Work plan
Quality control(QC) plan
Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

Design submittals, design substantiation submittals and extensions of design submittals.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.1.2 Approving Authority

Office or designated person authorized to approve submittal.

1.1.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor QC approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal register[; G][; G, [_____]]

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Designer of Record Approved (DA)

Designer of Record (DOR) approval is required for extensions of design, critical materials, any deviations from the solicitation, the accepted proposal, or the completed design, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings." Contractor to provide the Government with the number of copies designated hereinafter of all DOR approved submittals. The Government may review any or all Designer of Record approved submittals for conformance to the Solicitation, Accepted Proposal and the completed design. The Government will review all submittals designated as deviating from the

Solicitation or Accepted Proposal, as described below. Design submittals to be in accordance with Section [_____] DESIGN AFTER AWARD. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.3.2 Government Approved

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.3.3 Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section [_____] DESIGN AFTER AWARD covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section [_____] DESIGN AFTER AWARD. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.3.4 Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.4.1 Deviations to the Accepted Design

Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if deemed necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.3.4.2 Substitutions

Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal.

1.3.5 Designer of Record Approved/Government Approved (DA/GA)

In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is authorized to proceed with material acquisition or installation for any proposed deviation to the contract (the solicitation and/or the accepted proposal), which constitutes a change to the contract terms. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Government reserves the right to accept or reject any such proposed deviation at its discretion.

1.3.6 Information Only

Submittals not requiring Government approval will be for information only. For Design-build construction all submittals not requiring Designer of Record or Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.4 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

1.4.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward to the [Commander, NAVFAC Atlantic, Code CI4A1, 6506 Hampton Boulevard, Norfolk, Virginia, 23508-1278] [Architect-Engineer: [_____],]submittals required in the technical sections of this specification, including shop drawings, product data and samples. One copy of the transmittal form for all submittals shall be forwarded to the Resident Officer in Charge of Construction.

[The Architect-Engineer for this project] [NAVFAC Atlantic] will review and approve for the Contracting Officer those submittals reserved for Contracting Officer approval to verify submittals comply with the contract requirements.

1.4.1.1 O&M Data

[The Architect-Engineer for this project] [NAVFAC Atlantic] will review and approve for the Contracting Officer O&M Data to verify the submittals comply with the contract requirements; submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

a. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.4.1.2 Submittals Reserved for NAVFAC Atlantic Approval

As an exception to the standard submittal procedure specified above, submit the following to the Commander, NAVFAC Atlantic, Code CI4A1, 6506 Hampton Blvd, Norfolk, VA 23508-1278:

[a. Section [_____], "[_____]": Pile driving records]

[b. Section [_____], "[_____]": All fire protection system submittals]

[c. Section [_____], "[_____]": All fire alarm system submittals]

[d. Section 23 09 53.00 20 SPACE TEMPERATURE CONTROL SYSTEMS: SD-06 field test report submittals]

[e. Section 23 09 23.13 20 BACnet DIRECT DIGITAL CONTROL SYSTEMS FOR HVAC: SD-06 field test report submittals]

[f. Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC: All submittals]

[g. Section 23 08 01.00 20 TESTING INDUSTRIAL VENTILATION SYSTEMS: All submittals]

[h. Section 26 12 19.10 THREE-PHASE PAD-MOUNTED TRANSFORMERS: All submittals]

[i. Section 26 12 19.20 SINGLE-PHASE PAD-MOUNTED TRANSFORMERS: All submittals]

[j. Section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION: Transformer submittals]

[k. Section 26 11 16 SECONDARY UNIT SUBSTATIONS: Transformer submittals]

[l. Section 26 11 13.00 20 PRIMARY UNIT SUBSTATION: Transformer submittals]

1.4.1.3 Overseas Shop Drawing Submittals

All submittals shall be sent via overnight express mail service. All costs associated with the overnight express mail service shall be borne by the construction Contractor. Costs associated with the overnight express mail of submittals related to proposed submittal variances of resubmittals necessary as a result of noncompliant or incomplete Contractor submittals shall be the responsibility of the Contractor.

1.5 PREPARATION

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to office of [approving authority]. Transmit submittals with transmittal form prescribed by Contracting [Officer] [Administrator] and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample[s] [installations] [panels].

[Use the attached sample transmittal form (ENG Form 4025) for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms [will be furnished to the Contractor][are included in the QCS software that the Contractor is required to use for this contract]. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.]

1.5.2 Identifying Submittals

When submittals are provided by a Subcontractor, the Prime Contractor is to prepare, review and stamp with Contractor's approval all specified submittals prior to submitting for Government approval.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Date of the drawings and revisions.

d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other subcontractor associated with the submittal.

e. Section number of the specification section by which submittal is required.

f. Submittal description (SD) number of each component of submittal.

g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.

h. Product identification and location in project.

1.5.3 Format for SD-02 Shop Drawings

a. Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

b. Present A4 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."

d. Number drawings in a logical sequence. [Contractors may use their own number system.] Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

e. Reserve a blank space, no smaller than [_____]inches on the right hand side of each sheet for the Government disposition stamp.

f. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

g. Include the nameplate data, size and capacity on drawings. Also include applicable federal, military, industry and technical society publication references.

1.5.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.

d. Provide product data in metric dimensions. Where product data are included in preprinted catalogs with English units only, submit metric dimensions on separate sheet.

e. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, submit as specified for SD-07 Certificates.

f. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

g. Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will [not] be accepted for expedition of construction effort.

h. Submit manufacturer's instructions prior to installation.

1.5.5 Format of SD-04 Samples

a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

(1) Sample of Equipment or Device: Full size.

(2) Sample of Materials Less Than 2 by 3 inches: Built up to A4 8 1/2 by 11 inches.

(3) Sample of Materials Exceeding A4 8 1/2 by 11 inches: Cut down to A4 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

(4) Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

(5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: 100 square feet.

b. Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at time of use.

d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.5.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.5.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

a. Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.

b. Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

1.5.8 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.5.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

b. Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with English units only, submit metric dimensions on separate sheet.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit [six] [_____] copies of submittals of shop drawings requiring review and approval only by QC organization and [seven] [_____] copies of shop drawings requiring review and approval by Contracting Officer.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Samples SD-04 Samples

a. Submit [two] [_____] samples, or [two] [_____] sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.6.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.6.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.6.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit [Five][three][_____] copies of O&M Data to the Contracting Officer for review and approval.

1.6.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit [two][three] sets of administrative submittals.

1.7 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. For design-build construction the Government will retain [_____] copies of information only submittals.

1.8 VARIATIONS / SUBSTITUTION REQUESTS

Variations from contract requirements require Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.8.1 Considering Variations

Discussion with Contracting Officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.8.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.8.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.8.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of [10] [_____] working days will be allowed for consideration by the Government of submittals with variations.

1.9 SUBMITTAL REGISTER [AND DATABASE]

Prepare and maintain submittal register, as the work progresses. [Use electronic submittal register program furnished by the Government or any other format.] Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 01.10 USACE QUALITY CONTROL SYSTEM (QCS). [The Government will provide the initial submittal register][in electronic format][with the following fields completed, to the extent that will be required by the Government during subsequent usage.]

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal.

The database and submittal management program will be furnished to Contractor on a Writable Compact Disk (CD-R), for operation on Windows based personal computer.

[Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.]

The Designer of Record shall develop a complete list of submittals during design and identify required submittals in the specifications, and use the list to prepare the Submittal Register. The list may not be all inclusive and additional submittals may be required by other parts of the contract.

The Contractor is required to complete the submittal register and submit it to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. Coordinate the submit dates and need dates with dates in the Contractor prepared progress schedule. Submit monthly or until all submittals have been satisfactorily completed, updates to the submittal register showing the Contractor action codes and actual dates with Government action codes. Revise the submittal register when the progress schedule is revised and submit both for approval.

1.9.1 Use of Submittal Register

Submit submittal register[as an electronic database, using submittals management program furnished to Contractor]. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register [database] submitted with the QC plan and the project schedule:

[Column (a) Activity Number: Activity number from the project schedule.]

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

[Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.]

[Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.]

1.9.2 Contractor Use of Submittal Register

Update the following fields[in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor] with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.9.3 Approving Authority Use of Submittal Register

Update the following fields[in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor].

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p)List Date related to review actions.

Column (q) List date returned to Contractor.

1.9.4 Contractor Action Code and Action Code

Entries for columns (j) and (o), are to be used are as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.9.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request. [Deliver in electronic format, unless a paper copy is requested by Contracting Officer.]

1.10 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. An additional [_____] calendar days will be allowed and shown on the register for review and approval of submittals for [food service equipment] [and] [refrigeration and HVAC control systems].

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A".

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

e. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least [15] [_____] working days for submittals for QC Manager approval and [20] [_____] working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer

approval begins when Government receives submittal from QC organization.

f. For submittals requiring review by fire protection engineer, allow review period, beginning when Government receives submittal from QC organization, of [30][_____] working days for return of submittal to the Contractor.

g. Period of review for each resubmittal is the same as for initial submittal.

Within 30 calendar days of notice to proceed, provide, for approval by the Contracting Officer, the following schedule of submittals:

a. A schedule of shop drawings and technical submittals required by the specifications and drawings. Indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; the "SD" number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.

b. A separate schedule of other submittals required under the contract but not listed in the specifications or drawings. Schedule will indicate the contract requirement reference; the type or title of the submittal; the Contractor's anticipated submission date and the approved need date (if approval is required).

1.10.1 Reviewing, Certifying, Approving Authority

The QC organization is responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC Manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates Contracting Officer is approving authority for that submittal item.

1.10.2 Constraints

a. Conform to provisions of this section, unless explicitly stated otherwise for submittals listed or specified in this contract.

b. Submit complete submittals for each definable feature of work. Submit at the same time components of definable feature interrelated as a system.

c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.10.3 QC Organization Responsibilities

a. Note date on which submittal was received from Contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

d. Act on submittals, determining appropriate action based on QC organization's review of submittal.

(1) When QC Manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."

(2) When Contracting Officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

e. Ensure that material is clearly legible.

f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is Contracting Officer, QC organization will certify submittals forwarded to Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

(2) When approving authority is QC Manager, QC Manager will use the following approval statement when returning submittals to Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

g. Sign certifying statement or approval statement. The QC organization member designated in the approved QC plan is the person signing certifying statements. The use of original ink for signatures is required. Stamped signatures are not acceptable.

h. Update submittal register [database]as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Contracting Officer.

i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

<TAI OPT="DESIGN-BUILD">1.10.4 Government Reviewed Design

The Government will review all [[_____] percent] and [[____] percent] design submittals for conformance with the technical requirements of the solicitation. Section [_____] DESIGN AFTER AWARD covers the design submittal and review process in detail. Government review is required for deviation from the completed design. Review will be only for conformance with the contract requirements. Included are only those construction submittals for which the Designer of Record design documents do not include enough detail to ascertain contract compliance. The Government may, but is not required, to review extensions of design such as structural steel or reinforcement shop drawings.

1.11 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received from QC Manager.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph entitled "Review Notations" and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date approved submittals. [_____]copies of the approved submittal will be retained by the Contracting Officer and [_____] copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.11.1 Review Notations

Contracting Officer review will be completed within [_____] calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted" "or approved except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required , does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.12 DISAPPROVED[OR REJECTED] SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes" is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED[/ACCEPTED] SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not be construed as a complete check, and indicates only that<TAI OPT="CONSTRUCTION"> the general method of construction, materials, detailing and other information are satisfactory<TAI OPT="DESIGN-BUILD"> design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for [dimensions, the design of adequate connections and details, and the satisfactory construction of all work][design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work]. After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for Materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapproved any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.15 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.16 PROGRESS SCHEDULE

1.16.1 Bar Chart

[a. Submit the progress chart, for approval by the Contracting Officer, at the Preconstruction Conference in one reproducible and 4 copies.

b. Prepare the progress chart in the form of a bar chart utilizing form "Construction Progress Chart" or comparable format acceptable to the Contracting Officer.

c. Include no less than the following information on the progress chart:

(1) Break out by major headings for primary work activity.

(2) A line item break out under each major heading sufficient to track the progress of the work.

(3) A line item showing contract finalization task which includes punch list, clean-up and demolition, and final construction drawings.

(4) A materials bar and a separate labor bar for each line item. Both bars will show the scheduled percentage complete for any given date within the contract performance period. Labor bar will also

show the number of men (man-load) expected to be working on any given date within the contract performance period.

(5) The estimated cost and percentage weight of total contract cost for each materials and labor bar on the chart.

(6) Separate line items for mobilization and drawing submittal and approval. (These items are to show no associated costs.)

d. Update the progress schedule in one reproduction and 4 copies every 30 calendar days throughout the contract performance period.]

1.16.2 Project Network Analysis

[Submit the initial progress schedule within 21 calendar days of notice to proceed. Schedule is to be updated and resubmitted monthly beginning 7 calendar days after return of the approved initial schedule. Updating to entail complete revision of the graphic and data displays incorporating changes in scheduled dates and performance periods. Redlined updates will only be acceptable for use as weekly status reviews.

Contractor to provide a single point contact from his on-site organization as his Schedule Specialist. Schedule Specialist is to have the responsibility of updating and coordinating the schedule with actual job conditions. Schedule Specialist to participate in weekly status meetings and present current information on the status of purchase orders, shop drawings, off-site fabrication, materials deliveries, Subcontractor activities, anticipated needs for Government furnished equipment, and any problem which may impact the contract performance period.

Include the following in the project network analysis:

a. Graphically display with the standard network or arrow diagram capable of illustrating the required data. Drafting to be computer generated on standard 24 by 36 inch (nominal size) drafting sheets or on small (11 by 17 inch minimum) sheets with separate overview and detail breakouts. Provide a project network analysis that is legible with a clear, consistent method for continuations and detail referencing. Clearly delineate the critical path on the display. Clearly indicate the contract milestone date on the project network analysis graphic display.

b. Data is to be presented as a separate printout on paper or, where feasible, may be printed on the same sheet as the graphic display. Data is to be organized in a logical coherent display capable of periodic updating.

c. Include within the data verbal activity descriptions with a numerical ordering system cross referenced to the graphic display. Additionally, costs (broken down into separate materials and costs), duration, early start date, early finish date, late start date, late finish date, and float are to be detailed for each activity. A running total of the percent completion based on completed activity costs versus total contract cost is to be indicated. A system for indicating scheduled versus actual activity dates and durations is also to be provided.

d. Sufficient detail to facilitate the Contractor's control of the job and to allow the Contracting Officer to readily follow progress for portions of the work should be shown within the schedule.]

1.17 STATUS REPORT ON MATERIALS ORDERS

Within [_____] calendar days after notice to proceed, submit, for approval by the Contracting Officer, an initial material status report on all materials orders. This report will be updated and re-submitted every [_____] calendar days as the status on material orders changes.

Report to include list, in chronological order by need date, materials orders necessary for completion of the contract. The following information will be required for each material order listed:

a. Material name, supplier, and invoice number.

b. Bar chart line item or CPM activity number affected by the order.

c. Delivery date needed to allow directly and indirectly related work to be completed within the contract performance period.

d. Current delivery date agreed on by supplier.

e. When item d exceeds item c, the effect that delayed delivery date will have on contract completion date.

f. When item d exceeds item c, a summary of efforts made by the Contractor to expedite the delayed delivery date to bring it in line with the needed delivery date, including efforts made to place the order (or subcontract) with other suppliers.

1.18 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

```
 ____________________________________________________________________________
|                                CONTRACTOR                                  |
|                                                                            |
|                                (Firm Name)                                 |
|                                                                            |
|                                                                            |
|                                                                            |
| _____ Approved                                                             |
|                                                                            |
|                                                                            |
| _____ Approved with corrections as noted on submittal data and/or          |
| attached sheets(s)                                                         |
|                                                                            |
|                                                                            |
|                                                                            |
| SIGNATURE:  ______________________________________________________________ |
|                                                                            |
| TITLE:  ___________________________________________________________________ |
|                                                                            |
| DATE:  ____________________________________________________________________ |
|                                                                            |
|____________________________________________________________________________|
```

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record are to stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

013529 - SAFETY & OCCUPATIONAL

SECTION 01 35 29
SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z359.1	(1999) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards for General Industry
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926	Subpart J Welding & Cutting

U. S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008) Safety and Health Requirements Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 51B	(2003) Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2008) National Electrical Code

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01335 SUBMITTAL PROCEDURES FOR DESIGN BUILD PROJECT:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP)
Activity Hazard Analysis (AHA)
Crane Critical Lift Plan
Crane Work Plan
Proof of Qualification for Crane Operators

SD-06 Test Reports

Accident Reports
Monthly Exposure Reports (including economic report)
Regulatory Citations and Violations
Crane Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

SD-07 Certificates

Confined Space Entry Permit

1.3 DEFINITIONS

a. Competent Person for Fall Protection. A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.

b. High Visibility Accident. Any mishap which may generate publicity and/or high visibility.

c. Low-slope roof. A roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

d. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

e. Multi-Employer Work Site (MEWS). A multi-employer work site, as defined by OSHA, is one in which many employers occupy the same site. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors.

f. Operating Envelope. The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

g. Qualified Person for Fall Protection. A person with a recognized degree or professional certificate, extensive knowledge, training and experience in the field of fall protection who is capable of performing design, analysis, and evaluation of fall protection systems and equipment.

h. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

(1) Death, regardless of the time between the injury and death, or the length of the illness;

(2) Days away from work;

(3) Restricted work;

(4) Transfer to another job;

(5) Medical treatment beyond first aid;

(6) Loss of consciousness; or

(7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

i. Site Safety and Health Officer (SSHO). The superintendent or other qualified or competent person who is responsible for the on-site safety and health required for the project. The Contractor quality control (QC) person cannot be the SSHO, even though the QC has safety inspection responsibilities as part of the QC duties.

j. Steep roof. A roof having a slope greater than 4 in 12 (vertical to horizontal).

k. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.

1.4 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, work performed shall comply with USACE EM 385-1-1 through the provisions of the Safety Phasing Plan (see appendix), and the applicable host nation laws, ordinances, criteria, rules and regulations. Matters of interpretation of standards shall be resolved in the preconstruction meeting during a safety partnering forum with affected contractor, subcontractor, and USACE personnel before starting work on the contract and each major phase of work. When strict compliance with the standards cannot be achieved, this meeting will develop procedures and guidelines for work to progress in a manner that provides a comparable degree of safety, as agreed by the partners. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.5 DRUG PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employee uses illegal drugs or consumes alcohol during work hours. Ensure there are no employees under the influence of drugs or alcohol during work hours.

1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

The Contractor shall provide a Site Safety and Health Officer (SSHO) at each work site at all times work is being done to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The SSHO may not be designated to perform other duties. The SSHO shall meet the following requirements:

An Associate Safety Professional (ASP), Certified Safety Trained Supervisor (STS) and/or Construction Health & Safety Technician (CHST). A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects. 30-hour OSHA construction safety class or equivalent within the last 5 years. An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following five (5) areas of competency: Excavation; Scaffolding; Fall protection; Confined space; and Personal protective equipment and clothing to include selection, use and maintenance.

The contractor shall require all subcontractors to provide an equally-qualified, designated SSHO (may be collateral duty) if they are involved in any of the high hazard activities listed in the appendix to this clause.

1.6.1.2 Safety Program Manager

Each major contractor shall also have, in-country and immediately accessible to the SSHOs, a Safety Program Manager (SPM)that meets the following requirements (SPM may also act as a SSHO):

A minimum of 5 years safety work on similar projects. 30-hour OSHA construction safety class or equivalent within the last 5 years. An average of at least 24 hours of formal safety training each year for the past 5 years. Competent person training as needed for the project operations.

1.6.1.3 Competent Person for Confined Space Entry

Provide a competent person meeting the requirements of EM 385-1-1 who is assigned in writing by the Designated Authority to assess confined spaces and who possesses demonstrated knowledge, skill and ability to:

a. Identify the structure, location, and designation of confined and permit-required confined spaces where work is done;

b. Calibrate and use testing equipment including but not limited to, oxygen indicators, combustible gas indicators, carbon monoxide indicators, and carbon dioxide indicators, and to interpret accurately the test results of that equipment;

c. Perform all required tests and inspections specified in EM 385-1-1 Section 06.I

d. Assess hazardous conditions including atmospheric hazards in confined space and adjacent spaces and specify the necessary protection and precautions to be taken;

e. Determine ventilation requirements for confined space entries and operations;

f. Assess hazards associated with hot work in confined and adjacent space and determine fire watch requirements; and,

g. Maintain records required

1.6.1.4 Competent Person for the Health Hazard Control and Respiratory Protection Program

When operations will include potential exposure to hazardous atmospheres, provide a competent person meeting the requirements of EM 385-1-1 who is in-country and immediately accessible to the site safety and health officers and is:

a. Capable by education, specialized training and/or experience of anticipating, recognizing, and evaluating employee exposure to hazardous chemical, physical and biological agents in accordance with USACE EM 385-1-1, Section 6.

b. Capable of specifying necessary controls and protective actions to ensure worker health.

1.6.1.5 Crane Operators

Crane operators shall meet the requirements in USACE EM 385-1-1, Section 16 and Appendix G, as modified during the safety partnering forum.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)/ Superintendent

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors' daily quality control report.

b. Conduct mishap investigations and complete required reports. Maintain the Deficiency accident/ injury log for prime and sub-contractors.

c. Maintain applicable safety reference material on the job site.

d. Attend the pre-construction conference, pre-work meetings including safety partnering forum, preparatory inspection meeting, and periodic in-progress meetings.

e. Implement and enforce accepted APPS and AHAs.

f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. A list of unresolved safety and health deficiencies shall be posted on the safety bulletin board.

g. Ensure sub-contractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

1.6.2.2 Safety Program Manager

a. Perform safety and occupational health management, surveillance, inspections, and safety enforcement for the program.

b. Perform as the safety and occupational health "competent person" as defined by USACE EM 385-1-1.

c. Be on-site at least monthly whenever work or testing is being performed.

d. Conduct and document safety inspections.

e. Shall have no other duties other than safety and occupational health management, inspections, and enforcement on this contract.

If the SPM is appointed as an SSHO all duties of that position shall also be performed.

1.6.3 Meetings

1.6.3.1 Preconstruction Conference

a. The Contractor will be informed, in writing, of the date of the preconstruction conference. The purpose of the preconstruction conference is for the Contractor and the Contracting Officer's representatives to become acquainted and explain the functions and operating procedures of their respective organizations and to reach mutual understanding relative to the administration of the overall project's Accident Prevention Plan (APP) before the initiation of work.

b. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

c. The Contractor shall discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, a schedule for the preparation, submittal, review, and acceptance of AHAs shall be established to preclude project delays.

d. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Work shall not begin until there is an accepted APP.

e. The functions of a Preconstruction conference may take place at the Post-Award Kickoff meeting for Design Build Contracts.

1.6.3.2 Weekly Safety Meetings

Safety Meetings shall be conducted and documented as required by EM 385-1-1. Minutes showing contract title, signatures of attendees and a list of topics discussed shall be attached to the Contractors' daily quality control report.

1.6.3.3 Work Phase Meetings

The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection. The analysis should be used during daily inspections to ensure the implementation and effectiveness of safety and health controls.

1.7 TRAINING

1.7.1 New Employee Indoctrination

New employees (prime and sub-contractor) will be informed of specific site hazards before they begin work. Documentation of this orientation shall be kept on file at the project site.

1.7.2 Periodic Training

Provide Safety and Health Training in accordance with USACE EM 385-1-1 and the accepted APP meeting the guidelines of the applicable phase of the attached Safety Phasing plan. Ensure all required training has been accomplished for all onsite employees.

1.7.3 Training on Activity Hazard Analysis (AHA)

Prior to beginning a new phase, training will be provided to all affected employees to include a review of the AHA to be implemented.

1.8 ACCIDENT PREVENTION PLAN (APP)

The Contractor shall use a qualified person to prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of USACE EM 385-1-1 and as supplemented herein. Cover all paragraph and subparagraph elements in USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan". Specific requirements for some of the APP elements are described below. The APP shall be job-specific and shall address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Any portions of the Contractor's overall safety and health program referenced in the APP shall be included in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer and any designated CSP and/or CIH.

Submit the APP to the Contracting Officer 30 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted plan.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any hazard become evident, stop work in the area, secure the area, and develop a plan to remove the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, all necessary action shall be taken to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ANSI/ASSE A10.34) and the environment.

Copies of the accepted plan will be maintained at the Contracting Officer's office, Resident engineer's office and at the job site. The APP shall be continuously reviewed and amended, as necessary, throughout the life of the contract. Unusual or high-hazard activities not identified in the original APP shall be incorporated in the plan as they are discovered.

1.8.1 EM 385-1-1 Contents

In addition to the requirements outlines in Appendix A of USACE EM 385-1-1, the following is required:

a. Names and qualifications (resumes including education, training, experience and certifications) of all site safety and health personnel designated to perform work on this project to include the designated site safety and health officer and other competent and qualified personnel to be used such as the SPM. The duties of each position shall be specified.

b. Qualifications of competent and of qualified persons. As a minimum, competent persons shall be designated and qualifications submitted for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; personal protective equipment and clothing to include selection, use and maintenance.

c. Confined Space Entry Plan. Develop a confined space entry plan in accordance with USACE EM 385-1-1, and the procedures outlined in OSHA standard 29 CFR 1910. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

d. Health Hazard Control Program. The Contractor shall designate a competent and qualified person to establish and oversee a Health Hazard Control Program in accordance with USACE EM 385-1-1, Section 6. The program shall ensure that employees, on-site Government representatives, and others, are not adversely exposed to chemical, physical and biological agents and that necessary controls and protective actions are instituted to ensure health.

e. Alcohol and Drug Abuse Plan

(1) Description of the on-site prevention program

f. Fall Protection and Prevention (FP&P) Plan. The plan shall be site specific and address all fall hazards in the work place and during different phases of construction. It shall address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 1.8 m (6 feet). A qualified person for fall protection shall prepare and sign the plan. The plan shall include fall protection and prevention systems, equipment and methods employed for every phase of work, responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Fall Protection and Prevention Plan shall be revised at each Safety Phase for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. The accepted Fall Protection and Prevention Plan shall be kept and maintained at the job site for the duration of the project. The Fall Protection and Prevention Plan shall be included in the Accident Prevention Plan (APP).

g. Training Records and Requirements. List of mandatory training and certifications which are applicable to this project;list of requirements for periodic retraining/certification; outline requirements for supervisory and employee safety meetings.

h. Occupant Protection Plan (as applicable). The safety and health aspects of lead-based paint removal.

i. Lead Compliance Plan (as applicable). The safety and health aspects of lead work.

j. Asbestos Hazard Abatement Plan (as applicable). The safety and health aspects of asbestos work.

l. Site Safety and Health Plan (as applicable).

m. PCB Plan (as applicable). The safety and health aspects of Polychlorinated Biphenyls work.

n. Site Demolition Plan (as applicable).

o. Excavation Plan (as applicable).

p. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. The plan shall be submitted 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.C.18. and the following:

(1) For lifts of personnel, the plan shall demonstrate compliance with the requirements of 29 CFR 1926.

(2) For barge mounted mobile cranes, barge stability calculations identifying barge list and trim based on anticipated

loading; and load charts based on calculated list and trim. The amount of list and trim shall be within the crane manufacturer's requirements.

1.9 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) shall be in accordance with USACE EM 385-1-1. Submit the AHA for review at least 15 calendar days prior to the start of each work phase. Format subsequent AHA as amendments to the APP. An AHA will be developed by the Contractor for every operation involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or subcontractor is to perform work. The analysis must identify and evaluate hazards and outline the proposed methods and techniques for the safe completion of each phase of work. At a minimum, define activity being performed, sequence of work, specific safety and health hazards anticipated, control measures (to include personal protective equipment) to eliminate or reduce each hazard to acceptable levels, equipment to be used, inspection requirements, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall protection methods used. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include requirements for safeguarding excavations. An activity requiring an AHA shall not proceed until the AHA has been accepted by the Contracting Officer's representative and a meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activity, including on-site Government representatives. The Contractor shall document meeting attendance at the preparatory, initial, and follow-up phases of quality control inspection. The AHA shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

Activity hazard analyses shall be updated as necessary to provide an effective response to changing work conditions and activities. The on-site superintendent, site safety and health officer and competent persons used to develop the AHAs, including updates, shall sign and date the AHAs before they are implemented.

1.10 DISPLAY OF SAFETY INFORMATION

Within 5 calendar days after commencement of work, erect a safety bulletin board at the job site. The following information shall be displayed on the safety bulletin board in clear view of the on-site construction personnel, maintained current, and protected against the elements and unauthorized removal:

a. Map denoting the route to the nearest emergency care facility.

b. Emergency communication procedures.

c. Copy of the most up-to-date APP.

d. Current AHA(s).

e. A sign indicating the number of hours worked since last lost workday accident.

f. Safety and Health Warning Posters.

1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project. Maintain applicable equipment manufacturer's manuals or if not available, general safety procedures for the type of equipment.

1.12 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government will assist as possible to arrange emergency medical treatment.

1.13 REPORTS

1.13.1 Accident Reports

For recordable injuries and illnesses, and property damage accidents resulting in at least $2,000 in damages, the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the USACE Accident Report Form 3394 and provide the report to the Contracting Officer within 5 calendar days of the accident. The Contracting Officer will provide copies of any required or special forms.

1.13.2 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than eight hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Information shall include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted.

1.13.3 Monthly Exposure Reports

Monthly exposure reporting to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms.

1.13.4 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix H and as specified herein with Daily Reports of Inspections.

The Contractor shall provide a Certificate of Compliance for each crane entering an activity under this contract. Certificate shall state that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance shall comply with 29 CFR 1926 and USACE EM 385-1-1 section 16 and Appendix H. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. The Contractor shall also certify that all of its crane operators have been trained in the proper use of all safety devices (e.g., anti-two block devices). These certifications shall be posted on the crane.

1.13.5 Hot Work

Prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, a written permit shall be requested from the designated SSHO. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

When starting work, Contractors shall require their personnel to familiarize themselves with the location of the nearest fire alarm boxes. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE SSHO IMMEDIATELY.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

The Contractor shall provide permanent signs integral to or securely attached to access covers for new permit-required confined spaces. Signs wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER -" in bold letters a minimum of 25 mm (one inch) in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" shall be red and readable from 1.52 m (5 feet). Signage shall in English and in the language(s) of the work force.

2.2 FALL PROTECTION ANCHORAGE

Fall protection anchorage, conforming to ANSI Z359.1, installed under the supervision of a qualified person in fall protection, shall be left in place for continued customer use and so identified by signage stating the capacity of the anchorage (strength and number of persons who may be tied-off to it at any one time).

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

The Contractor shall comply with USACE EM 385-1-1, as allowed under the Safety Phasing Plan.

3.1.1 Hazardous Material Use

Any work or storage involving hazardous chemicals or materials must be done in a manner that will not expose Government or Contractor employees to any unsafe or unhealthful conditions. Adequate protective measures must be taken to prevent Government or Contractor employees from being exposed to any hazardous condition that could result from the work or storage. The Prime Contractor shall keep a complete inventory of hazardous materials brought onto the work-site.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) are prohibited. Materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited unless a comparable substitute is not available. The Contractor must submit written requests for exception to the Contracting Officer and receive acceptance before use of these materials or products containing them.

3.1.3 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos. If material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting with the Contracting Officer to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

The Contractor shall establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. The program shall include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and escape procedures.

3.3.1 Training

The Contractor shall institute a fall protection training program. As part

of the Fall Hazard Protection and Prevention Program, the Contractor shall provide training for each employee who might be exposed to fall hazards. A competent person for fall protection shall provide the training. Training requirements shall be in accordance with USACE EM 385-1-1, section 21.A.16 and/or the applicable Safety Phase Plan section.

3.3.2 Fall Protection Equipment

The Contractor shall enforce use of the fall protection equipment designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is on a surface 1.8 m(6 feet) or more above lower levels. Fall protection systems such as guardrails, personnel fall arrest system, safety nets, etc., are required when working within 1.8m (6 feet) of any leading edge. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, paragraphs 05.I. and 05.J. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with USACE EM 385-1-1.

3.3.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet the performance criteria of ANSI Z359.1. The maximum free fall distance when using fall arrest equipment shall not exceed 1.8 m (6 feet). The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.3.3 Fall Protection for Roofing Work

Fall protection controls shall be implemented based on the type of roof being constructed and work being performed. The roof area to be accessed shall be evaluated for its structural integrity including weight-bearing capabilities for the projected loading.

3.3.4 Existing Anchorage

Existing anchorages, to be used for attachment of personal fall arrest equipment, shall be selected by a qualified person for fall protection in accordance with ANSI Z359.1. Exiting horizontal lifeline anchorages shall be certified (or re-certified) by a professional engineer with experience in designing horizontal lifeline systems.

3.3.5 Horizontal Lifelines

Horizontal lifelines shall be designed, installed, certified and used under the supervision of a qualified person for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926).

3.3.6 Guardrails and Safety Nets

Guardrails and safety nets shall be designed, installed and used in accordance with EM 385-1-1 and 29 CFR 1926 Subpart M.

3.3.7 Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. A Rescue and Evacuation Plan shall be prepared by the contractor and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. The Rescue and Evacuation Plan shall be included in the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.4 SCAFFOLDING

Employees shall be provided with a safe means of access to the work area on the scaffold. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Special care shall be given to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Work platforms shall be placed on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.5 EXCAVATIONS

The competent person for excavations performed as a result of contract work shall be on-site when excavation work is being performed, and shall inspect, and document the excavations daily prior to entry by workers. The competent person must evaluate all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly. The competent person shall perform soil classification.

3.5.1 Utility Locations

All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.

3.5.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within 0.061 m (2 feet) of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 30.5 m (100 feet) if parallel within 1.5 m (5 feet) of the excavation.

3.5.3 Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding shall have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

3.5.4 Trenching Machinery

Trenching machines with digging chain drives shall be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers shall be provided training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Documentation of the training shall be kept on file at the project site.

3.6 ELECTRICAL

3.6.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Station Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In addition, provide electrical arc flash protection for personnel as required. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

3.6.2 Portable Extension Cords

Portable extension cords shall be sized in accordance with manufacturer ratings for the tool to be powered and protected from damage. All damaged extension cords shall be immediately removed from service.

3.7 WORK IN CONFINED SPACES

The Contractor shall comply with the requirements in Section 06.I of USACE EM 385-1-1. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.05 of USACE EM 385-1-1 and the appropriate Safety Phase Plan for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all Permit-required confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Ensure the use of rescue and retrieval devices in confined spaces greater than 1.5 m (5 feet) in depth. Conform to Sections 06.I.09, 06.I.10 and 06.I.11 of USACE EM 385-1-1.

d. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

e. Include training information for employees who will be involved as entrants and attendants for the work. Conform to Section 06.I.06 of USACE EM 385-1-1.

f. Daily Entry Permit/ marking system. Post the permit in a conspicuous place close to the confined space entrance.

3.8 CRYSTALLINE SILICA

Grinding, abrasive blasting, and foundry operations of construction materials containing crystalline silica, shall comply with USACE EM 385-1-1, Appendix C. The Contractor shall develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and personal protective equipment.

3.9 HOUSEKEEPING

3.9.1 Clean-Up

All debris in work areas shall be cleaned up daily or more frequently if necessary. Construction debris may be temporarily located in an approved location, however garbage accumulation must be removed each day.

3.9.2 Falling Object Protection

All areas must be barricaded to safeguard employees. When working overhead, Barricade the area below to prevent entry by unauthorized employees. Construction warning tape and signs shall be posted so they are clearly visible from all possible access points. When employees are working overhead all tools and equipment shall be secured so that they will not fall. When using guardrail as falling object protection, all openings shall be small enough to prevent passage of potential falling objects.

-- End of Section --

0145020010 - QCS

SECTION 01 45 02.00 10
QUALITY CONTROL SYSTEM (QCS)

PART 1 GENERAL

1.1 CONTRACT ADMINISTRATION

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause 52.236-15 "Schedules for Construction Contracts", Contract Clause 52.232-5 "Payments", Section 01 32 17.00 20 NETWORK ANALYSIS SCHEDULES (NAS), Section 01 33 00 SUBMITTAL PROCEDURES, and Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website located at http://www.rmssupport.com/qcs/default.aspx. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.3 RELATED INFORMATION

1.3.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.3.2 Contractor Quality Control(CQC) Training

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.4 CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the Government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.5 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Submit data updates to the Government (e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc.) using the Government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, e-mail or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically shall include current data on the following items:

1.5.1 Administration

1.5.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, deliver Contractor administrative data in electronic format.

1.5.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subContractors. A subcontractor must be listed separately for each trade to be performed. Assign each subcontractor/trade a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, deliver subcontractor administrative data in electronic format.

1.5.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office

with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.5.1.4 Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.5.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.5.1.6 Request For Information (RFI)

Exchange all Requests For Information (RFI) using the Built-in RFI generator and tracker in QCS.

1.5.2 Finances

1.5.2.1 Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Group pay activities Contract Line Item Number (CLIN); the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.5.2.2 Payment Requests

Prepare all progress payment requests using QCS. Complete the payment request worksheet, prompt payment certification, and payment invoice in QCS. Update the work completed under the contract, measured as percent or as specific quantities, at least monthly. After the update, generate a payment request report using QCS. Submit the payment request, prompt payment certification, and payment invoice with supporting data using the Government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, e-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which will govern in the event of discrepancy with the electronic version.

1.5.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements. Maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. Provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.5.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Summarize data from any supplemental reports by the Contractor and consolidate onto the QCS-generated Daily CQC Report. Submit daily CQC Reports as required by Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Electronically submit reports to the Government within 24 hours after the date covered by the report. Also provide the Government a signed, printed copy of the daily CQC report.

1.5.3.2 Deficiency Tracking.

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.5.3.3 QC Requirements

Develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. Update all data on these QC requirements as work progresses, and promptly provide this information to the Government via QCS.

1.5.3.4 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.5.3.5 Labor and Equipment Hours

Log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

1.5.3.6 Accident/Safety Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. Regularly update the correction status of the safety comments. In addition, utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 300.

1.5.3.7 Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.5.3.8 Hazard Analysis

Use QCS to develop a hazard analysis for each feature of work included in the CQC Plan. The hazard analysis shall address any hazards, or potential hazards, that may be associated with the work

1.5.4 Submittal Management

The Contractor is responsible for developing a submittal register (ENG Form 4288) for this contract in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update shall be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.5.5 Schedule

Develop a construction schedule consisting of pay activities, in accordance with Section 01 32 17.00 20 NETWORK ANALYSIS SCHEDULES (NAS). This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 17.00 20 NETWORK ANALYSIS SCHEDULES (NAS). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.5.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

1.6 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.7 DATA SUBMISSION VIA CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the Government's SFTP repository built into QCS export function. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Export data onto CDs using the QCS built-in export function. If used, submit CD-ROMs in accordance with the following:

1.7.1 File Medium

Submit required data on CD-ROM. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.7.2 CD-ROM Labels

Affix a permanent exterior label to each CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name,

project location, data date, name and telephone number of person responsible for the data.

1.7.3 File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software shall not be altered in any way by the Contractor.

1.8 MONTHLY COORDINATION MEETING

Update the QCS database each workday. At least daily/weekly or subject to agreement with the Contracting Officer, generate and submit an export file to the Government with schedule update, submittals, QC reports, RFI's and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, meet with the Government representative to review the planned progress payment data submission for errors and omissions.

Make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.9 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

014504.0010 - CQC

SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3740	(2004a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2005b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than fourteen (14) days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first thirty (30) days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by

subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system (see paragraph 3.6 "Control" for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECTS.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer shall be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Postaward Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of five (5) calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation shall be promptly furnished to the CQC organization by the Contractor. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a construction person with a minimum of five (5) years in related work. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following area: civil and submittals. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
b.	Submittals	Submittal Clerk with 1 yr experience

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the five (5) day course entitled "Construction Quality Management For Contractors". This course is periodically offered at the Construction Trades Training Cener (CTTC) in Jalalabad. For enrollment, contact the following:

Mhd. Haris
mharis@afghanreconstruction.org
0700 08 0602

or

Pervaiz
adpzmuj@yahoo.com
0700 61 3133

Classes are currently offered twice per month but for current schedules, the Contractor is advised to contact CTTC for enrollment.

3.4.5 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECTS. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 23 08 00.00 10 COMMISSIONING OF HVAC SYSTEMS are included in the contract, the submittals required by those sections shall be coordinated with Section 01 33 00.12 10 to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 72 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 72 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the

deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $3,000.00 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Contract Clause 52.211-10, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance

inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The

original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 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. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

018000.1210 - TECHNICAL REQUIR

SECTION 01 80 00.12 10
TECHNICAL REQUIREMENTS

PART 1 GENERAL

1.1 Contractor's Design and Construction

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.

1.1.1 Design and Product Requirements

These design and product requirements are minimum requisites. Variations shall be submitted in accordance with Section 01 33 00.12 10 entitled SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT. All variations must be approved by the Contracting Officer. Unless otherwise specified, all of the materials and equipment to be installed in this project shall comply with a recognized standard for the intended use. The Unified Master Reference List for ASTM, ASME, etc., located at www.ccb.org/docs/ufgshome/ufgstoc.htm identifies the titles and approval dates.

1.1.2 Asbestos Containing Materials

Asbestos containing material (ACM) will 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.

1.1.3 Subcontractors

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

1.2 Specifications

All specifications except for those included in this RFP shall be developed by the Contractor in accordance with Section 01 80 00.12 10 and Section 01 33 00.12 10. The specifications included in this RFP shall be used verbatim and not edited by the Design-Build Contractor.

1.3 Site Conditons

(a) Site Location: Kandahar Airfield, Kandahar, Afghanistan.
(b) Site Elevation: 1010 Meters, Above Sea Level.
(c) Ambient Temperatures: Summer 43.3 degree C; winter -5.0 degree C.
(d) Maximum 43.3 degrees C dry bulb, 23.9 degrees C wet bulb.
(e) Atmospheric Conditions: Dry and Dust-laden.

2. CIVIL AND SITE DEVELOPMENT

2.1 General.

The contractor shall perform design and construction services as required to provide a complete and usable site at the location shown on the drawings. The site requires some demolition, access roads, connection of utilities, and a fire suppression system with water capacities as indicated in the following sections.

The civil site development includes the following items of work:

a. Topographic Survey

b. Environmental Protection

c. Demolition

d. Utility Infrastructure - Design & Construct

e. Grading and Drainage - Design & Construct

f. Pavements and Siting - Design & Construct

2.2 Drawings.

The RFP drawings include a general site plan, mobilization yard, demolition, pavement design and required utility details. The site plan provided in the RFP indicates approximate existing conditions and shall be verified by the contractor with a complete topographic survey of the site prior to starting design.

Existing and proposed utility locations are subject to verification by the Contractor and approval of the CO.

2.3 Design Criteria.

Transatlantic Program Center Design Instructions Manual, Sep 2000

24-hour Precipitation, Extreme Value Analysis for Kandahar Air Base Afghanistan by Air Force Combat Climatology Center. https://www2.afccc.af.mil/forms_mil/html/sarform.html

Pavement-Transportation Computer Assisted Structural Engineering (PCASE) Program, v2.08. http://www.pcase.com

UNIFIED FACILITIES CRITERIA (UFC)

Uniform Facility Criteria (UFC) documents are available on the Internet at http://www.hnd.usace.army.mil/techinfo/engpubs.htm

UFC 3-210-01A Area Planning, Site Planning, and Design

UFC 3-210-06A Site Planning and Design, Jan 06

UFC 3-230-01 Surface Drainage Design, Aug 06 (FAA AC150/5320-5C)

UFC 3-230-06A Subsurface Drainage Design, Jan 04

UFC 3-210-02 POV Site Circulation and Parking, Jan 04

UFC 3-250-01FA Pavement Design for Roads, Streets, Walks and Open Storage Areas, Jan 04

UFC 3-250-3 Standard Practice Manual for Flexible Pavements, May 01

UFC 3-250-04FA Standard Practice Manual for Concrete Pavements, Jan 04

UFC 3-250-07 Standard Practice for Pavement Recycling, Jan 04

UFC 3-250-08FA Standard Practice for Sealing Joints and Cracks in Rigid and Flexible Pavements, Jan 04

UFC 3-250-11 Soil Stabilization for Pavements, Jan 04

UFC 3-250-18FA General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas, Jan 04

UFC 3-260-01 Airfield and Heliport Planning and Design, Nov 08

UFC 3-260-02 Pavement Design for Airfields, Jun 01

UFC 3-260-05A Marking of Army Airfield-Heliport O&M Facilities, Jan 04

UFC 3-600-01 Fire Protection Engineering for Facilities, Sept 06

ARMY CORPS ENGINEERING AND CONSTRUCTION BULLETIN (ECB)

ECB 2008-11 Marking of Airfield-Heliport O&M Facilities, Mar 08

AIR FORCE ENGINEERING TECHNICAL LETTER (ETL)

ETL 01-20 Guidelines for Airfield Frangibility Zones, Nov 01

ETL 02-15 Fire Protection Engineering Criteria Letter New Aircraft Facilities, Dec 02

ETL 04-02 Standard Airfield Pavement Marking Schemes, Jul 04

AIR FORCE TECHNICAL LETTER (TL)

TL 04-4-1 Trenchless Technology (TT) for Crossing Air Force Pavements, Mar 04

AIR FORCE TECHNICAL INSTRUCTION (AFI)

AFI 32-1042 Standards for Marking Airfield, Oct 05

ARMY TECHNICAL INSTRUCTION (TI)

TI 8-222-08 Standard Practice Manual for Flexible Pavements, May 99

ARMY FIELD MANUAL (FM)

FM 5-430-00-2 Planning and Design of roads, airfields and Heliports in the Theater of Operations - Airfield and Heliport Design, Jan 06

ARMY ENGINEERING TECHNICAL LETTER (ETL)

ETL 1110-3-394 Aircraft Characteristics for Airfield-Heliport Design and Evaluation, Sept 91

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318 Building Code Requirements for Structural Concrete, 2005

ACI 305R Hot Weather Concrete, 1999

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 Minimum Design Loads for Buildings and Other Structures, 2005

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, 2008

ASTM A 185 Steel Welded Wire Fabric, Plain for Concrete Reinforcement, 2007

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325 Steel Construction Manual, 13th Edition

INTERNATIONAL CODE COUNCIL INCORPORATED

IBC International Building Code, 2006

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 415 Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways, 2008

USCENTCOM FORCE PROTECTION STANDARDS

OPORD 05-01 Force Protection Construction Standards (Appendix V)

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

AASHTO HS20-44 LRFD, Specifications for Highway Bridges, 2008

2.4 Studies Supporting the Final Design

To accomplish the work contained in this RFP, the contractor is required to publish design studies to document the existing site conditions before proceeding with the design and construction of the facilities and pavements. Included in this work are a topographic survey, a geotechnical survey and a hydrologic study. Report formats are listed in Section 01 33 00 12.10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT.

2.4.1 Site Survey.

Following the criteria in Appendix "A" of this section and submitted in accordance with Section 01 33 00 12.10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD and attachments to Appendix "A" of this section, a survey shall be produced of the project site. A listing of known benchmarks is contained in Attachment 3 of Appendix "A".

Upon completion of the construction, the original survey shall be updated with an as-built survey of the site as constructed. The as-built survey shall be submitted to the COR for approval.

The original and as-built survey shall include location and elevation of all relevant existing site features within the project limits. This includes the elevation and location of buildings (new and existing), roadways, pads, other structures, drainage systems, and utilities (subsurface and overhead) within 5 meters of the project sites.

2.4.2 Hydrologic Study

The Contractor shall investigate and assess the adequacy of the existing drainage systems to handle the runoff from the drainage areas that surround the project sites.

The contractor shall use the provided topographic data and hydrologic reports to model stream channels with USACE HEC I&II software. 24-hour Precipitation values are provided in Appendix "B".

The Contractor shall analyze the 10-year and 100-year storm event and determine the ponding volumes, areas and elevations. The Contractor shall calculate in tabular form the hydraulic grade line (HGL) as described in UFC 3-230-101 section 6-4. If the 100-year storm event results in ponding in excess of criteria, storm water detention shall be provided as necessary to meet pending criteria. Detention shall be located away from the airfield to the extent possible.

2.4.3 Geotechnical Study

The Contractor shall produce a detailed geotechnical report containing the field exploration and testing results, laboratory testing results, evaluations, recommendations, calculations and descriptive supporting text.

Information in the report shall include, but not be limited to: existing geotechnical (e.g., surface and subsurface) conditions, location of subsurface exploration logs, exploration point, foundations selected, bearing capacity, pavement design criteria (e.g., CBR values, K Values), ground water levels, and construction materials (e.g., concrete cement, asphalt and aggregates). Two copies of the detailed geotechnical report shall be submitted to the Contracting Officer. Additional requirements are contained in paragraph 5.0 below.

2.5 Environmental Protection

2.5.1 Applicable Regulations

The Contractor shall comply with all laws, rules, regulations or standards concerning environmental pollution control and abatement at Kandahar Airfield.

2.5.2 Notification

The Contracting Officer will notify the Contractor in writing of any observed non-compliance with the paragraph entitled ENVIRONMENTAL PROTECTION. 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.

2.5.3 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.

2.5.4 Disposal

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

2.6 Hazardous Materials and Contamination

The Government does not anticipate that the Contractor will be required to remove or dispose of any hazardous materials or waste during the site preparation phase of this project.

2.7 Demolition and Removal.

The Contractor shall stake-out the project boundaries before starting work. Existing utilities that interfere with this project will be relocated. Any demolition debris shall be removed from the site. The COR will designate a site off base. At all times during demolition the integrity of the flight line perimeter shall be maintained through the use of suitable temporary protective measures in any areas where existing fence has been removed and new fence is not complete.

Rubbish and debris shall be removed daily, unless otherwise directed, to avoid accumulation at the demolition site, do not allow accumulations inside or outside the buildings.

In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible. Use of explosives will not be permitted.

Saw cut and remove concrete and asphaltic concrete paving and slabs including aggregate base as necessary. Provide neat saw cuts at limits of pavement removal as necessary. Pavements shall be removed in a manner such to ensure no damage to adjacent existing pavements that will remain in place. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas.

2.8 Excavation

Any hand digging, driving of pickets or excavation of any kind requires a Dig Permit. If work requires digging, the Contractor must obtain a digging permit from the Contracting Officer.

When digging must be done, backfill the resulting hole/trench with clean fill or material as described in the Government provided specification or Contractor provided specification as applicable, at the earliest opportunity. If digging is to be done manually, then the Contractor must submit Site Specific Safety and Health Plan (SSHP) which meets EM 385-1-1, Section 28.

2.9 New Site Design and Construction.

The concept site plan drawings present a suggested geometric layout for the Phase II site work. The Contractor shall design each of the site features shown on the Site Plan and otherwise specified in the RFP. This site plan includes the approximate location of the proposed apron and existing features that were to be constructed as part of the Phase I construction. This schematic design must be verified by the contractor.

The Contractor shall ensure the facilities are sited in compliance with the attached drawings and additional requirements stated herein.

Airfield pavement geometrics shall be in accordance with UFC 3-260-01, FM 5-430-00-2 and ETL 1110-3-394 and other manufacturer's manuals. Vehicle pavement geometrics shall be in accordance with UFC 3-210-02. The design aircraft for this site's geometric properties shall be the UH-60, AH-64, CH-47, CH-53 and CH-54 following ETL 1110-3-394.

The site plan prepared by the Contractor shall show geometric design of the site, including applicable dimensions of nearby facilities, taxi lanes, aprons, pavements, equipment shelters, set back lines, fences, etc.

At all times during construction the integrity of the flight line perimeter shall be maintained through the use of suitable temporary protective measures in any areas where existing fence has been removed and new fence is not complete.

2.10 Utilities.

There may be existing electric, communications and other utility lines on, around and under the project sites. It is the Contractor's responsibility to confirm the specific locations of the existing utilities and to design, adjust or protect utility services in the project sites. Coordination of all site work on the project, including utility work, is the responsibility of the

Contractor. Follow requirements of part 2.7 "Demolition and Removal", this section when adjusting utilities.

2.10.1 Water Distribution

Fire water in quantity and pressure shall be provided by extending an existing network supplied by the pump station and storage tanks included in Phase I of this project. Fire hydrant leads shall be designed to distribute from this network.

Fire water distribution and fire hydrants in the project site shall follow specification section 33 11 00 WATER DISTRIBUTION.

Fire hydrant placement and number shall be in compliance with ETL 02-15 and UFC 3-600-01. See paragraph 8.0 below for further specification of fire protection components.

2.10.2 Sanitary Sewer Collection

Not Applicable

2.10.3 Electrical Distribution

The Contractor shall bring electrical and communications distribution to service the facilities placed within this project. See paragraph 9 below and associated drawings for more details. Proposed above ground utility structures shall conform to airfield wing tip and imaginary surface clearance requirements of UFC 3-260-01.

2.11 Utility Trenches & Conduits.

Electric and communications line depth, bedding, and cover shall be designed as required by the UFC design criteria for line size, material, and vehicular loading. Utilities placed in traffic areas shall be designed for the greater of an AASHTO H20 vehicle loading or the wheel loading imposed by the design aircraft. Locater's tape shall be placed above the utility and 300mm below finished grade. Trench backfill shall be compacted to at least 95% maximum density.

Any adjustment to communication utilities shall be replaced with a minimum of four (4) concrete encased 110mm PVC. The conduits shall be in a 2x2 configuration with 52mm of space between the conduits and 100 mm concrete around the duct bank. The conduits shall be DB 60, DB 120 or Schedule 40. The minimum cover over the top of the concrete shall be 762mm. Conduit in no case shall interfere with planned gravity sewer systems. Cap empty conduit. Place conduit at other proposed pavement intersections on this site to provide crossing points for future communications wiring at the site. Extend conduit 1 meter beyond compacted subgrade toe on either side of road crossings.

All utility borings under existing pavements shall be accomplished by dry boring, auguring or jacking following Contractor's submitted specifications, and under guidance from Air Force Technical Letter (TL) 04-4-1. All other excavations shall be accomplished by methods approved by the Contracting Officer.

2.12 Earthwork, Site Grading and Off-site Drainage

2.12.1 Earthwork

Perform all earthwork necessary to provide apron pads and taxiways that meets UFC requirements for taxiway aprons and provides access from the surrounding airfield by design vehicles.

2.12.2 Site Grading.

Finished grade shall slope away from the project sites and provide positive drainage. Swales and cross-culverts shall be provided as required and have a minimum longitudinal gradient of 0.5% with an absolute minimum of 0.3%. Side slopes of swales within the infield shall follow UFC 3-260-01 criteria.

The finished grade adjacent to future facilities and equipment shelters shall be designed to slope away from the structure at a rate of 2%.

The apron shall be designed to match the elevation of the adjoining apron and taxiway along its entire length.

Plans shall show existing contours and new contours to indicate new grading, finished floor and pavement elevations, drainage swales, etc.

2.12.3 Storm Drainage

2.12.3.1 Storm Drainage.

The Contractor will provide necessary site grading and provide drainage structures to ensure adequate drainage, so that no water shall pond within 23 meter of any paved area or building resulting from a 10-year recurrence storm and no water shall pond within 8 meters of the runway resulting from a 100-year recurrence storm.

All storm drainage system designs shall be in accordance with references contained herein. Storm drainage system design shall consist of swales, side slopes, and culvert piping where necessary to provide adequate drainage for the project sites. All storm drainage piping located in traffic areas shall be rated to withstand wheel loading from the design vehicle.

Detention basins, if needed shall have side slopes not steeper than 4:1 (horizontal:vertical). Erosion control measures using rock, geotextiles, or other materials shall be included as required to stabilize erodible soil conditions. Provide aggregate blanket at the base and side slopes of detention ponds. The aggregate shall be crushed stone, 35 mm to 50 mm across, applied 50 mm deep. Detention sites located near subsurface utilities shall ensure they are protected from infiltration inflows with devices such as manhole seals and/or pond liners.

Design flows for storm sewers shall produce velocities suitable to flush collected dust and debris accumulation during storm events.

Minimum gravity storm sewer requirements are contained in specification Section 33 40 00.00 40 - STORM SEWERAGE. Unless otherwise directed by the CO, the contractor shall use reinforced concrete pipe exclusively.

2.12.3.2 Airfield Drainage

Aircraft parking apron shall have an interior system of inlets and storm water drains. The apron cross-section shall be designed such to minimize the amount of storm water draining through aircraft parking locations.

a) The storm water facilities for an apron that will experience fueling operations shall be designed and constructed in conformance with NFPA Standard 415. Storm sewers shall not have bituminous coatings and sewer joints shall be sealed with fuel resistant, water-tight neoprene or rubber sealants. The storm drain for a fueling apron shall be separate from airfield drainage and convey the flow through a fuel spill containment facility.

b) Aprons shall have a system of interior inlets. Provide trench drains and holding tank with float valve to capture 15 minute runoff from the Design Storm.

c) Aprons shall be sloped such that the maximum depth of ponding at an inlet shall be 225 mm before sheet flow of storm water off the apron occurs. Side slopes of swales within the infield shall follow UFC 3-260-01 criteria.

2.12.3.3 Non-Airfield Drainage

The topographic survey shall be used in designing the grading and drainage. The Contractor will provide all necessary site grading to ensure adequate drainage so that no utilities or manholes, facilities or pavements will be flooded due to a design rainfall. Drainage of the area should be compatible with the existing terrain.

2.14 Pavement Marking, Markers and Signage

2.14.1 Airfield Pavement Marking
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Pavement marking is required on all airfield pavements in conformance with the ETL 04-02, AFI 32-1042, UFC 3-260-05A, ECB 2008-11 and specification Section 32 17 24 PAVEMENT MARKINGS and as shown on the drawings. Runway thresholds shall be marked following ECB 2008-11. Stop blocks shall be painted at aircraft parking positions to indicate the intended location for the aircraft nose wheel when parked. Static ground points shall be marked per the drawings. All markings on concrete shall be outlined with black paint, which shall extend at least 150 mm beyond the outside edge of the markings.

2.15 Tiedown & Grounding Points

2.15.1 Tiedown Points

Tiedown points shall be constructed in accordance with UFC 3-260-01 Figure B11-14 and 15 and Specification 34 73 13 AIR FORCE TIEDOWN, ARMY MOORING AND GROUNDING POINTS FOR AIRCRAFT.

For maximum flexibility, they may be placed in 4.6-meter (15-foot), 6.1-meter (20-foot), or a 9.1-meter (30-foot) grids, or offset grids. At minimum, place tiedowns as indicated in aircraft Technical Orders.

2.15.2 Static Grounding Points

Static grounding points shall be constructed in accordance with UFC 3-260-01, and Specification 34 73 13 AIR FORCE TIEDOWN, ARMY MOORING AND GROUNDING POINTS FOR AIRCRAFT. Every static grounding point shall be interconnected to other static grounding points and other grounding systems, in addition to complying with the static grounding requirement. If tiedowns are intended to also be used as static grounds, it is required that a ground rod be installed. When a ground rod is included, bond it to the tiedown bar.

2.16 Airfield Pavement Design

Unless otherwise stated in the contract documents, all airfield pavements shall be designed in accordance with the references included in paragraph 2.3 Design Criteria and the geotechnical investigation required in paragraph 5.0 below, entitled "Geotechnical Investigation and Report". All airfield pavements shall be designed in accordance with the Pavement-Transportation Computer Assisted Structural Engineering (PCASE) program. The PCASE program can be found on the Internet at www.pcase.com. All airfield pavements except for the shoulders shall be designed as rigid (Plain Concrete Pavements) pavement with a minimum of 150 mm of graded crushed aggregate base course. The shoulders shall be design a flexible (asphalt) pavement with a minimum of 150 mm of graded crushed aggregate Base Course. All airfield pavements shall be designed for "Army Class II- Heliport (IFR)". The minimum airfield pavement thicknesses shall be as shown on the drawings. The material used for constructing the airfield pavements shall be in accordance with the specifications of this contract. These specifications shall be used verbatim and not edited by the Design-Build Contractor. The design of the pavements shall be submitted for review to the Contracting Officer prior to any construction. Rigid pavements shall be plain-jointed concrete pavement with compression joint seals in accordance with Specification 32 13 73 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS.

2.17 Airfield Blast Deflectors, Barrier Walls and Revetments

2.17.1 Barrier Walls

Barrier wall, if required, shall be constructed of a minimum of reinforced concrete traffic barrier of design equal or greater than shown in Appendix "C". Concrete and steel shall conform to paragraph 4.0 below. Barrier wall placement shall be designed following the requirements of UFC 3-260-01 Appendix B, Section 7.

2.17.2 Revetments

Revetment construction shall consist of earth-filled steel bins or non-woven polypropylene geo-textile earth-filled bags. Geometric and blast resistant properties of revetments shall conform to DOD 6055.9-STD and DAPAM 385-64.

Earth-filled steel bins shall conform to Armco Steel Bin Revetment types A-1, B-1 or equal. Non-woven polypropylene geo-textile earth-filled bags shall conform to HESCO Concertainer products or equal. Earth infill shall conform to satisfactory materials following specification 31 00 00 Earthwork.

The height of the revetments for the Rotary Wing Apron shall be dependent on a geometric calculation following DA PAM 385-64 Figure 8-2 and shall in no case be less than 2.2m.

3. ARCHITECTURAL - NOT USED

4. STRUCTURAL - NOT USED

5. GEOTECHNICAL INVESTIGATION AND REPORT

5.1 Site Specific Information

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

laboratory investigations and supporting calculations. However, as a minimum for structures, the contractor shall advance three (3) borings within the building footprint of any major structure and three (3) test pits within the building footprint of any minor structure. The depths of these explorations shall be sufficient to determine the subsurface conditions within the influence of the structures foundation system. For purposes of this paragraph, a major structure is any structure that meets any of the following criterion: a) reinforced concrete framed structures with a build footprint in excess of 1,000 sq.m., b) steel framed structures with a building footprint in excess of 3,000 sq.m., c) a structure that has a height equal to or greater than one and half stories, d) steel or concrete tanks is excess of 350 cubic meters. A minor structure is any structure that does not meet any of the four major structure criteria above. As a minimum for airfield pavements, the contractor shall excavate three (3) test pits for pavements less than or equal to 5,000 sq. m. and one (1) test pit for each additional 5,000 sq.m. of pavement or fraction thereof. As a minimum for all other pavements, except roads, the contractor shall excavate three (3) test pits for pavements less than or equal to 7,500 sq. m.and one (1) test pit for each additional 5,000 sq.m. of pavement or fraction thereof. As a minimum for roads, the contractor shall excavate three (3) test pit for pavements less than or equal to 200 linear meters and one (1) test pit for each additional 200 linear meters or fraction thereof.

5.2 Geotechnical Report

The Contractor shall produce a detailed geotechnical report containing the field exploration and testing results, laboratory testing results, evaluations, recommendations, calculations and descriptive supporting text. Information in the report shall include, but not be limited to: existing geotechnical (e.g., surface and subsurface) conditions, location of subsurface exploration logs, exploration point, foundations selected, bearing capacity, pavement design criteria (e.g., CBR values, K Values), ground water levels, and construction materials (e.g., concrete cement, asphalt and aggregates). Five (5) hard copies and two (2) soft copies (PDF Format) copies of the detailed geotechnical report shall be submitted to the Contracting Officer.

5.3 Geotechnical Qualifications

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

5.4 Design Certification

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

6. MECHANICAL - NOT USED

7. PLUMBING - NOT USED

8. FIRE PROTECTION

8.1 Fire Protection, Rotary Wing Ramp and Taxiway Phase 2, Kandahar, Afghanistan

8.1.1 General

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

Unified Facilities Criteria (UFC) 3-600-01, Fire Protection Engineering for Facilities. 26 September 2006

Engineering Technical Letters (ETL)

ETL 02-15 Fire Protection Engineering Criteria - New Aircraft Facilities.

Codes and Standards of the National Fire Protection Association (NFPA) 2007 edition (Individual standards may carry earlier edition dates.). These include, but are not limited to:

NFPA 10, Portable Fire Extinguishers, 2007 edition

NFPA 20, Installation of Stationary Pumps, 2007 edition

NFPA 22, Water Tanks for Private Fire Protection, 2003 edition

NFPA 24 Private Fire Service Mains and Their Appurtenances, 2007 edition

NFPA 70, National Electrical Code, 2005 edition

NFPA 101, Life Safety Code, 2006 edition

Factory Mutual (FM) Approval Guide, Fire Protection, 2007 edition

Underwriters Laboratories (UL) Fire Protection Equipment Directory, 2007 edition

8.1.2 Life Safety. Facilities features shall be provided in accordance with NFPA 101 to assure protection of occupants from fire or similar emergencies.

8.1.3 Fire Protection Equipment. All fire protection equipment shall be currently listed by Underwriters Laboratories (UL) or approved by Factory Mutual (FM); or equivalent subject to the approval of the Contract Officer.

8.1.4 Water Supply for Fire Protection. A system of water storage and distribution shall be provided to meet the maximum calculated fire demand for the duration required. The water system shall comply with UFC 3-600-01, ETL 02-15, and applicable NFPA standards. A Fire Flow of 1893 l/min (500 gpm) with a minimum 20 psi residual pressure shall be provided.

8.1.4.1 The quantity of water storage is based upon the assumption that there will be only one fire at a time. Size water storage tanks to provide flow duration as required. Provide 10% ullage. Tank capacity shall be the greater of 30,000 gallons each, or as required by hydraulic calculations.

8.1.4.2 The water distribution system shall include ductile iron underground distribution piping, sectional control valves, underground fire service piping to fire suppression and standpipe system. Installation shall comply with NFPA 24, Private Fire Service Mains.

8.1.4.3 A minimum of two fire water storage tanks with water distributed as equally as is practical shall be provided.

8.1.4.4 The water distribution system shall be protected from frost.

8.1.5 Fire Pumps. Fire pumps shall be installed in accordance with NFPA 20, Standard for the Installation of Centrifugal Fire Pumps. Vertical shaft turbine pumps shall be used where suction lift is required. Fire pumps shall be housed in a pump house.

8.1.5.1 Fire pump drivers shall be soft start electric motor.

8.1.5.2 A minimum of two fire water pumps shall be provided.

8.1.5.3 The maximum fire pump capacity rating shall be 2,500 gpm. Pump pressure ratings shall be selected so the maximum pressure maintained on the system does not exceed 1035 kPa (150 psi).

8.1.5.4 A pressure maintenance or jockey pump shall be provided to maintain pressure in the fire protection piping system as specified in NFPA 20.

8.1.5.5 Fire pumps shall be arranged for automatic starting upon pressure drop within the fire protection piping system. Fire pumps shall also start upon a manual start signal from the base fire dispatch center.

8.1.5.6 The Fire Pump building shall be a minimum of 11m x 7m x 4m high. Exhaust, cooling, ventilation, and air intake configuration shall be as determined by the fire pump and fire pump driver supplier.

8.1.6 Fire Hydrants.

Fire hydrants shall be located at 91 meter (300 foot) maximum intervals around the accessible side(s) of the apron.

8.1.7 Water Supply and Distribution System.

A water supply storage and distribution system which is part of Contract #W912ER-09-C-0014, Rotary Wing Phase I and Contract W912ER-09-C-0014, ISR Ramp may be able to supply the required water flow and pressure for fire protection on this project. It shall be the responsibility of the contractor to determine whether a new and dedicated system of water storage tanks and fire pumps, or the Phase I water supply and distribution system, or a combination thereof is the most advantageous and efficient method to supply the required fire protection water for this project.

8.1.8 Portable Fire Extinguishers

Wheeled extinguishers employing a minimum 100 lbs of potassium bicarbonate dry chemical shall be supplied for aprons for the maximum extinguishing capability of Classes B and C type fires.

9. ELECTRICAL

9.1 SCOPE OF WORK

The Contractor shall design, supply all electrical materials, and construct the Rotary Wing Ramp and Taxiway Phase II at the Kandahar Airfield, Afghanistan. This includes but is not limited to, all consumables, trade

tools, construction equipment and test equipment needed to result in a fully functional electrical system required for reliable operation of this project.

This project is an expansion and extension of Phase I and the Contractor shall fully integrate Phase I and Phase II electrical components.

The systems shall be designed and constructed by the Contractor in accordance with the applicable codes and standards listed herein and the standards referenced in the listed specifications.

The Contractor shall design, construct and procure all electrical facilities:

- in the bid documents, as described and/or listed in this Contract and, good engineering practices, to deliver fully functional electrical systems required for reliable operation of this project.

- in accordance with the applicable codes, standards and publications listed herein and the standards referenced in those listed documents.

Refer to the Civil Site Plans for the proposed layout and details for this site.

The contractor shall provide complete electrical design services which include, but are not limited to:
- calculations

- schematics and one lines

- construction drawings

- specifications for the electrical systems

The Contractor is responsible:

- for identifying and providing the electrical systems needed for a complete and operational facility to adequately support the Contract requirements.

- for providing facilities to support the expected electrical loads and functions of this project.

- for obtaining all construction permits from local and national agencies, needed to proceed with construction in a timely manner.

- for the design and selection of all materials and equipment being submitted to the Contracting Officer for prior approval before any work commences.

9.1.1 Scope Items Summary

The Contractor shall design, procure and install all items as follows but not limited to:

- Ramp and taxiway edge lighting

- High mast ramp flood lighting

- Grounding system including static grounding points/ aircraft tie-downs

- Secondary power distribution to support facilities

- Obstruction lighting (if required)

- Mechanical equipment power support

- Testing and commissioning

- Onsite training

9.2 GENERAL REQUIREMENTS

9.2.1 Applicable Standards and/or Codes

The publications listed below form a part of this Contract to the extent referenced or applicable. The Contractor shall be bound by the latest issued code or standard in effect at the time this Contract is issued for Construction. The publications are referred to by basic designation only.

The Contractor shall confirm and verify the standards and/or codes used, to include but not limited to:

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- National Fire Protection Association, NFPA 70 (National Electric Code (NEC)

- NFPA 77 Recommended Practice on Static Electricity

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

- National Fire Protection Association Standard for Installation of Lightning Protection systems, NFPA 780

FEDERAL AVIATION ADMINISTRATION (FAA) STANDARDS

- FAA Section AC 150/5345-43 Obstruction Lighting Equipment

OTHER

- Institute Of Electrical And Electronics Engineers (IEEE) IEEE C2 (National Electrical Safety Code (NESC)

9.2.2 Unified Facilities Criteria and Design Guides

Complete design of the airfield lighting system shall be in accordance with the most recent requirements of the United Facilities Criteria located here http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4 and other design guides as listed below (Contractor to use the latest published version available at the time of Contract award.) In every instance where the criteria is applicable, it shall become part of this Contract document. The following guides to be used include but are not limited to:

UFC 3-260-01 Airfield and Heliport Planning and Design

UFC 3-520-01 Design: Interior Electrical Systems

UFC 3-530-01 Design: Interior and Exterior Lighting and Controls

UFC 3-535-01, Visual Air Navigation Facilities

UFC 3-535-02, Design Drawings For Visual Air Navigation Facilities

UFC 3-550-03N Power Distribution Systems

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

UFC 3-560-01 Electrical Safety, O&M

ARMY TM 5-811-3 (AIR FORCEAFM 88-9 CHAP. 3) Electrical Design Lightning and Static Electricity Protection

U.S. Army Corps of Engineers, Transatlantic Programs Center, Design Instructions Manual.

Illuminating Engineering Society of North America (IESNA).

Design measurements shall be shown in metric units.

9.2.3 Guide Specifications

The Contractor shall utilize the Division 26-Electrical and 33-Utilities guide specifications and others, found on this website: http://www.wbdg.org/ccb/browse_org.php?o=70, in preparing their technical specifications.

Guide specifications may be found on the internet at Construction Criteria Base (CCB), available to the public at the following url: www.ccb.org. The Contractor shall edit applicable guide specifications and submit a completed version for approval as part of the submittal requirements of this Contract including:

UFGS 34 73 13 Mooring and Grounding Points for Aircraft

UFGS 26 56 20.00 10 Airfield and Heliport Lighting and Visual Navigation Aids.

UFGS 26 56 36.00 40 Floodlighting- to be used for the HID Metal Halide ramp floodlighting. The section on Series Circuit Transformers can be deleted.

UFGS 33 71 02.00 20 Underground Electrical Distribution

If a needed specification is not available on this site the Contractor can submit a proposed spec required in order to result in a complete set of specifications for this work.

Design measurements shall be shown in metric units

9.2.4 Construction Coordination

If not specified elsewhere in the Contract, the Contractor shall coordinate his construction schedule with and obtain approval of the Contracting Officer a minimum of 30days prior to any site construction activity or mobilization. The schedule shall minimize interference with base operations. The Contractor shall ensure that temporary and existing systems remain in operation as long as possible to allow a minimal disruption of airfield operational capabilities.

9.2.5 Electrical Site Survey

The contractor shall perform a site survey prior to design start and is responsible for obtaining all necessary information and performing all

calculations, measurements, and any other data pertinent to design and construction of this project.

The Contractor shall note all existing utilities, structures and enclosures that could possibly impact the electrical design and power supply for this project and provide a report to the Contracting officer. The report shall include findings and recommendations in how to utilize these facilities if possible or to integrate or utilize existing facilities into the final design.

9.2.6 Site power

Site power shall be supplied from the Rotary Wing Ramp and Taxiway high mast lighting manual transfer switch/generator/medium voltage transformer installed on Phase I.

Secondary three phase voltages shall be 480V or 208V 60 HZ.

Single phase shall be 277, 240 or120V 60HZ. Service and distribution shall generally be 3-phase, 4-wire 208/120V utilization power for convenience receptacles and small power loads.

9.2.7 Environmental Conditions

The design and selection of materials for exterior work shall be appropriate for the site environmental conditions as described in the Contract. The Contractor shall clearly indicate any de-rating factors applied to equipment or cabling.

Required design capacities including adequate spare capacity must be met after applying applicable de-rating factors to equipment and cabling. Where multiple feeder cables are run within close proximity, apply de-rating factors according to manufacturer's guidance and the NEC.

9.2.8 Material

- Material and equipment installed under this contract shall be for the appropriate application and shall have a minimum life expectancy of 25years in this project environment and use expected, unless specifically excepted elsewhere in this Contract.

- All airfield lighting system equipment shall be certified by the Federal Aviation Administration (FAA). All airfield lighting materials and equipment shall be manufactured to relevant FAA AC 150/ XXXX standards . The Contractor shall provide proof to the Contracting officer in the form of FAA Certificates, verifying that the suppliers of the airfield lighting equipment and materials is FAA Certified prior to any equipment installation. Material installed without this certification will be in violation of the Contract requirements and subject to penalties or withholding of payment for services until the problem is resolved to the Contracting officers satisfaction.

- Material and equipment shall be a standard product of an established manufacturer regularly engaged in the manufacturing business for at least 5 years and the product by that manufacturer shall essentially duplicate items that have been successfully utilized by industry and businesses for at least 2 years prior to bid opening.

- Equipment installed shall be capable of being serviced by an organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site if practical and feasible.

- Materials and equipment shall be installed in accordance with recommendations of the manufacturer. Major components of equipment shall have the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a non-corrosive and non-heat sensitive plate, securely attached to the equipment.

- All equipment delivered and placed in storage, prior to installation, shall be protected from the weather, humidity and temperature variation, dirt and dust, and any other contaminants.

- Equipment and materials shall be new unless indicated or specified otherwise.

- Enclosures for exterior and interior applications shall be NEMA Type 4 (IEC Classification IP54) and NEMA Type 1 (IEC Classification IP10), respectively unless noted otherwise.

9.2.9 Manholes/Handholes/Pullboxes

Contractor shall be responsible for providing handholes, manholes and/or pull boxes as required by the applicable referenced codes and publications.

All covers for all manholes/pullboxes and handholes shall be constructed:

- to meet ASTM (American Society for Testing and Materials) Specification A 48, Class 20. (9,090kg vertical load) and loading as per Section 2 -Utilities Trenches and Conduits

- in locations subject to aircraft traffic, to support not less than 34,000kg (75,000 lbs) single wheel load. The top surface of foundation should be 1 inch above grade per UFC 3-260-01 for runways (paragraph 3.9). See Air Force ETL 02-1 for heavy aircraft loading to determine the lateral loads on handholes/manholes. Structural calculations must be submitted for government approval prior to construction.

9.2.10 Grounding System:

This includes design, construction, all necessary labor, equipment, and material for a fully functional electrical system required for reliable operation of this project. The Contractor shall extend the grounding from the adjacent Phase I flood lighting system to integrate with the ramp floodlighting system for this project.

A complete grounding system shall be provided to comply with the requirements of the National Electric Code (NEC), 2008 Edition and UFC 3-535-01.

- All exposed non-current carrying metallic parts of electrical equipment in the electrical system shall be grounded/bonded.

- Insulated grounding conductor (separate from the electrical system neutral conductor) shall be installed in all feeder and branch circuit raceways per the NEC.

- Equipment safety grounding/bonding conductor shall be insulated green-colored per the NEC.

- Ground rods shall be copper-clad steel, 20mm (0.75 inch) round and 3 meter (10 feet) long, minimum.

- Below final grade, ground wires shall be no less than 2/0 CU stranded in size

- Ground resistance at any grounding point shall not exceed 25 ohms when measured less than 48 hours after rainfall. Additional ground rods will be installed as needed to ensure this value is not exceeded. Test results shall be submitted to the Contracting Officer by the Contractor documenting these results for all locations.

- Static grounding systems will be in accordance with UFC 3-520-01, NFPA 77 and MIL-HDBK-419A.

- Floodlighting poles must have two separate safety grounds. In addition to the circuit ground wire, safety grounding shall be provided for each flood lighting pole with as a minimum each pole solidly grounded with a ground lug at the base from the fixture to ground rod(s). An underground ground wire, minimum 35mm sq (#2AWG), can run from a separate system ground grid in lieu of a ground rod. If a ground rod(s) is used, the ground wire from the ground rod to the pole ground lug, will be a minimum of 35mm (#2) stranded copper. All ground wires shall be clamped together at the internal pole ground lug.

- Underground connections shall be exothermal welded utilizing molds and materials designed for that purpose by reputable established manufacturers.

- All above grade ground connections will use brass or stainless steel connectors designed specifically for grounding use and to minimize dissimilar metal corrosion issues.

9.2.10.1. Lightning Protection

Lightning protection design will follow NFPA 780.

A TVSS (Transient Voltage Surge Suppressor) unit shall be provided at all service entrances installed per the manufacturers recommendations. These TVSS units will meet or exceed the latest UL 1449 standard. As a minimum, metal oxide varistors (MOV) technology shall be used. A service entrance shall include all first power or lighting panels downstream from a generator or transformer.

9.2.10.2. Static Grounding Points/ Aircraft Tie-downs

Static grounding if required, shall be provided on ramps for aircraft parking in accordance with United Facilities Criteria (UFC) 3-260-01, Airfield and Heliport Planning and Design manual, attachment 11, Tiedowns, Mooring, and Grounding Points. Include specification section 34 73 13 Air Force Tiedowns, Army Mooring and Grounding Points for Aircraft.

9.2.10.3. Counterpoise Lightning Protection System

Provide a continuous counterpoise of number 25 sq mm minimum (#4 AWG) bare, stranded copper wire over the entire length of all primary circuits supplying airfield lighting per UFC 3-535-01.

9.2.11 Transformers- Dry Type (less than 600V)

Dry type transformers shall be general purpose, dry-type, self-cooled and ventilated, with exceptions if justified.

Indoors provide transformers in NEMA 1 enclosure, outdoors NEMA 3R.

Transformer shall have 220 degrees C insulation system for transformers 15 kVA and greater, and shall have 180 degrees C insulation for transformers rated 10 kVA and less, with temperature rise not exceeding 80 degrees C under full-rated load in maximum ambient of 45 degrees C.

Transformer of 80 degrees C temperature rise shall be capable of carrying continuously 130 percent of nameplate kVA without exceeding insulation rating.

Transformers shall be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.

All dry type transformers shall meet ANSI/IEEE or equivalent standards as follows:

ANSI C89.2/NEMA ST 20
ANSI C57.12.91
ANSI C57.96
UL 506
UL 1561

Acceptable suppliers of dry type transformers are Siemens, GE, Olsun Electrics Corp (http://www.olsun.com/gt.html), SQ D (Merlin Gerin) or acceptable equal.

9.2.12 Identification Nameplates

Major items of electrical equipment, such as the transformers, manholes (MH), pullboxes, hand holes, panel boards, street light poles, and load centers, etc, shall be provided with permanently installed engraved outdoor rated identification nameplates as per the specifications. These nameplates shall identify the equipment by type or function, ratings, configuration and specific unit number and be capable of resisting sunlight for 25 years if outdoors.

Contractor shall submit a schedule of name plates for all electrical equipment for approval of the Contracting Officer prior to ordering.

9.2.13 Warning Signs

In addition to standard warning signs required by the specifications, The Contractor shall perform an Arc Flash Hazard Analysis Study per the requirements of NFPA 70E or include existing published information for typical equipment similar to that to be used on this project, to determine Flash Hazard Boundaries and the Personal Protective Equipment (PPE) level needed.

Specific arc flash hazard sign requirements will be made based on the arc flash analysis of electrical equipment to be submitted by the Contractor. See Section 01 33 00.12 10 for more Electrical submittal requirements.

Provide durable permanent indoor or outdoor warning signs on switchboards, panelboards, industrial control panels or other energized electrical equipment as required per NEC Article 110.16. The warning signs shall include the Flash Hazard Boundary and the Personal Protective Equipment (PPE) required for working on equipment hot. (Reference NFPA 70 Article 110-16; NFPA 70E Article 130.3; and UFC 3-560-01 Electrical Safety, O & M).

9.2.14 Mechanical Equipment

Contractor shall design, provide and install circuits for all mechanical equipment that require power and make the final connections.

9.2.15 Seismic Requirements

All electrical equipment shall be installed to meet the seismic requirements as defined by the International Building Code, IBC 2003 and seismic response coefficients as identified in the Structural section.

9.2.16 Testing and Commissioning:

In addition to requirements in other sections of this Contract the Contractor shall adhere to the following as a minimum:

The Contractor shall provide all necessary temporary power and equipment to operate the systems for testing and shall provide all test equipment.

All test equipment performing any type of measurements or documenting field test values must have a recent valid certificate of calibration acceptable to the Contracting Officer.

After installation of all equipment, Contractor shall adjust that equipment as necessary and conduct checkout tests in accordance with the procedures contained in the equipment manufacturer’s instruction books or as per NETA (National Electrical Testing Association) whichever is more stringent. All systems shall be functionally checked and tested in the presence of the Contracting Officer for satisfactory operation prior to the commissioning the overall installed system.

After functionally checking individual systems or equipment the Contractor shall demonstrate, by operational tests, that the entire system will operate satisfactorily on remote and local control under all foreseeable operational scenarios. These scenarios will be determined by the Contractor and submitted to the Contracting Officer for approval and modification, if needed, prior to any system testing.

All tests will be thouroghly documented and witnessed by the Contracting officer or his designees. Contractor shall cooperate with, assist and train the appropriate Air Base personnel during the shakedown testing to exercise, test and evaluate the system in an operational environment to verify the system is ready for full operation. The operational testing and evaluation shall conform to applicable provisions of FAA Order 6750.53 FAA Category I Instrument Landing System (CAT I ILS) Project Implementation Plan.

Only after all testing and commssioning is completed will the Contracting officer will acknowledge substantial completion and acceptance of the Contract.

9.2.17 Onsite Training

The Contractor shall include all costs associated with providing a qualified manufacturers field representative to train base personnel in the operation of the newly installed upgrade to the existing airfield lighting systems. The costs for handouts, pamphlets, course material, manuals, etc shall be included in the training by the Contractor. The training period shall consist of a minimum total of 6 hours for up to 6 designated base personnel.

The Contractor shall provide an hourly rate in the case the Contracting Officer wants to provide additional training for the operational staff. The course instructions shall cover operation and maintenance of all aspects of the airfield lighting system and the interface with the existing airfield systems.

The Contractor shall submit information describing training to be provided, training aids to be used, duration, and schedules for Contracting Officer approval.

9.2.18 Warranty and Recommended Spare Parts

Contractor shall supply the equipment manufacturers' recommended testing equipment and tools, and the manufacturer's standard package of spare parts and spare circuit boards. The test equipment and spare parts shall be located as directed by the Contacting Officer and shall be sufficient for at least two years of normal operation.

The systems equipment and operation shall be warranted against manufacturer and installation defects after acceptance of the systems in accordance with other requirements of this Contract.

9.3 ELECTRICAL SYSTEMS

9.3.1 High Mast Ramp Floodlighting

High mast flood lighting for parking apron shall be installed as an extension from the adjacent Phase I ramp floodlighting.

The system shall include all fixtures, hardware, poles, cables, connectors, adapters and appurtenances needed to provide a fully functional flood lighting system. Lighting design shall be in compliance with the requirements of relevant ICAO, FAA and IES standards for active use during night time operations.

The key design elements of the system are as follows but not limited to:

- The Contractor shall integrate the Phase I and Phase II ramp floodlighting to be one ramp floodlighting power and control system.

- Normal light fixtures shall be metal halide (white light) mounted on poles located outside of the aircraft clear zone. The design shall also ensure no poles violate the runway or airspace obstruction clearance height requirements

- Each bank of lights shall include emergency lights (such as Halogen type) lighting to a lower lighting level that will come on immediately when switched and be turned off automatically after the main bank of lights is up to full output. (minimum wattage of the emergency lights in a bank of lights shall be between 20-30% of the total wattage of the normal lighting wattage in that bank.)

- Each bank of lights on a given pole shall be controlled by a hand-off-auto outdoor switch through a contactor. On auto the contactor shall be controlled by a photocell switch.

- The Contractor shall install the necessary control circuit or system to permit all Phase I and Phase II floodlights to be turned off remotely from the Main Airfield Control Tower control room with one command.

- Normal apron floodlighting shall meet a minimum intensity of not less than 0.5 footcandles (5.38 Lux), in the horizontal plane. The horizontal plane shall be considered 1 meter above the pavement. Horizontal illumination should have a uniformity ratio (average to minimum) of no more than 4:1 as much as practical. Upon completion, Contractor shall test the lighting system to verify it meets this criteria and make any required adjustments to the installation, if necessary.

- Maintenance on high mast lights shall be able to be performed at ground level as part of the system design.

- The height of poles and fixture configuration shall insure that, with proper adjustment of the floodlight, no glare or blinding light will affect the control tower or aircraft operating in the traffic pattern or on the runways and taxiways.

- Light fixtures shall be equipped with adjustable louvers to control up-light and unwanted glare.

- Provide dimensions from the edge of the full strength pavement to the flood light poles and the distance between poles on the apron flood lighting plan. Apron lighting shall be located so as not to extend into the runway height obstruction or aircraft rotor tip clearance requirements. (See UFC 3-535-01 paragraph 10-4.2.2, IES RP-14 figure 1 and UFC 3-260-01 for requirements.)

- A weatherproof switch operated duplex general-purpose 120V receptacle, mounted 1.5 meters above finished grade, shall be provided at each flood lighting pole. Location of the flood lighting controls (cabinet) for each pole shall be coordinated with the Contracting Officer. Flood lighting controls shall be provided inside a weather-proof pad lockable control cabinet, at each pole.

- Provide the exact manufacture and catalog number of the lighting fixture used for design, including the present manufacture's name, address and phone number and email address.

- - Provide a flood light pole foundation design, by a qualified structural engineer to include wind load calculations for the foundation used.

9.3.1.1. High Intensity Discharge Light Ballasts

Provide ballasts designed for metal halide lights manufactured for this purpose that will as a minimum:

- maintain correct lamp operation over a voltage-input range of plus or minus 10 percent of rated voltage.

- provide a power-factor lamp load of not less than 95 percent.

- conform to NEMA C82.4

- for a 1% voltage variation provide of .8% of wattage change or less.

- have voltage dip tolerance without extinguishing the light 25-60%

- starting current is lower than operating current

9.3.2 Secondary Power Distribution System

Contractor shall design, provide all material and install a complete electrical low voltage distribution system to provide low voltage power to all components of the airfield lighting system and the ramp area flood lighting.

- All electrical installation shall be in accordance with the applicable requirements of NFPA 70 (National Electric Code, 2008 Edition).

- Secondary circuits for high mast lighting do not require spare cables or conduits.

- The Contractor will procure, design and install all wiring and equipment to the terminals of the distribution panel(s).

- All low voltage circuits shall be designed and installed to ensure the worst case voltage drop on any circuit is less than 3% at any bus or light fixture from the main service panel or 5% maximum from the source and/or source transformer. High mast lighting voltage drop is an exception to this guideline as long as the lamp ballasts provide correct lamp operation for plus or minus 10% of rated voltage.

- All breaker coordination will be provided by the Contractor from the source to the panel breakers and other protective devices in the circuits.

9.3.2.1. Switchboards and Panelboards

The Contractor shall design, install and provide material for all lighting fixtures, cabling and equipment for the secondary distribution system to include but not necessarily limited to the following requirements:

- Three phase service entrance panelboards rated greater than 200A shall be provided with an ammeter/selector switch, voltmeter/selector switch and kilowatt hour meter. Selector switch shall be provided for reading individual phases.

- Main switchboards being the first switchboard downstream from the generator or transformer shall be UL listed for Service Entrance.

- All distribution shall be from circuit breaker switchboards or panelboards

All panels shall:

- be provided with a minimum of 20% spare breakers installed for each size/type used and all spare space shall be equipped and ready for future breaker installations.

- have a minimum of 25% spare KVA capacity for future load growth.

- be provided with a typed directory, in English and Farsi that clearly lists each specific load for each circuit. The directory shall be placed within a durable heavy duty clear holder on the inside of each power panel door readable without removing from the holder. It should be suitable for making changes by field personnel over time.

- have a complete single line diagram provided on the inside of the panel door along with the directory, showing all panels serviced from the panel power source.

All circuit breakers shall be:

- labeled with an identification number corresponding to the panel schedule and drawings.

- connected to bus bar(s) within the panel boards. Daisy chain (breaker-to-breaker) connection(s) shall not be acceptable. A 3-pole circuit breaker shall be a single unit and not made up of 3 single pole circuit breakers.

- “bolt-on” type and connected to all copper phase and neutral bus bar(s) within the panel boards. Daisy chain (breaker-to-breaker) connection(s) shall not be acceptable.

- rated at 20 amperes minimum for minimum branch circuit size.

9.3.2.2. Receptacles

- The final circuit breaker serving receptacle circuits shall be rated 20 ampere.

- All outdoor receptacles will be ground fault interrupter (GFCI) type.

9.3.2.3. Cables and Wires

- All exterior secondary AC voltage cables shall be rated for underground duct installation and shall be rated for either 600V for secondary voltages above 300V and 300V for AC voltages less than 300V.

- All conductors shall be copper.

- Underground installation can use direct buried armored cable for 4 conductor 3phase circuits or individual THHN cable in conduit.

- All wiring shall be copper, minimum 4 mm sq (# 12 AWG).

- Proper wire nuts/connectors shall be used for splicing wire. No twist-wire connections with electrical tape wrapped around it shall be acceptable.

- No secondary power cable splices are allowed except for lighting and receptacle circuits.

9.3.2.4. Secondary Raceways

This requirements shall include installation of secondary power distribution system (service entrances) in an underground cable system from the generator control panel(s) and secondary distribution centers, to the respective distribution panels.

- Only RGS (Rigid Galvanized Steel meeting ASTM (American Society for Testing and Materials) standards) will be used above grade to enclose all wiring per the NEC. They shall be surface mounted in unfinished areas.

- Exterior raceways (ductbanks, conduits) shall be installed at a slope towards a pullbox or hand-hole to avoid collection of water in the raceway.

- Maximum conduit fill will calculated be per the NEC requirements.

- All conduit stub outs below grade will be installed with a metal detectable marker at the stub out point and an above grade durable marker.

- For all conduit and ductbank, cable warning tape with magnetic strips suitable for detection by equipment designed for that purpose, shall be provided 450mm below final grade (18inches) directly above all underground cables and conduits. For cable raceway more than 30cm wide, more than one warning tape shall be required.

- Ductbanks designed for secondary voltage feeders shall consist of PVC Schedule 40 conduits, 53mm (2 inch) minimum internal diameter.

- Conduits shall be encased in concrete, when under paved areas or road crossings. Cables crossing roads within concrete encased pipe sleeves is also acceptable.

- All runway cable crossings shall be in concrete encased ductbanks.

- Each encased ductbank shall be provided with a minimum of one (1) spare conduit of same size for future use. If different size conduits are used in one ductbank run then each size will have at least one spare.

- Direct buried conduits may be used for apron / taxiway edge lighting system and shall not be less than 53mm (2 inches) internal diameter.

- All outdoor below grade cables or conduits shall be installed per NEC requirements but no less than 600mm below final grade.

- All conduits shall be cleaned with a wire mandrel prior to the installation of cables.

- Spare conduits shall be capped at both ends with a pull string in place.

- Secondary duct-bank system shall include pullboxes/hand-holes for secondary power as required.

- Conduits shall be securely and rigidly fastened in place as required by the NEC. No hardware, panels boxes or other electrical equipment will be supported by conduit.

- All non-metallic conduits shall be no smaller than 21mm internal diameter (3/4 inches).

9.4 NAVAIDS AND AIRFIELD LIGHTING SYSTEMS

9.4.1 Engineer and Installer Qualifications

The design of the airfield lighting systems shall be completed by qualified engineer(s) with a minimum of 5 years experience in designing airfield lighting systems. The Contractor shall provide a detailed resume and documented evidence of past performance for the engineer(s) designing these systems to the Contracting Officer for approval. The engineer(s) information shall indicate a thorough knowledge and experience with ICAO, FAA, military and other appropriate standards.

The engineer(s) shall work closely with the airfield lighting equipment manufacturer engineers to ensure that the systems are properly coordinated.

The Contractor shall employ qualified installers thoroughly familiar with airfield lighting equipment and systems installation. The Contractor shall submit written verification that the installers are experienced with the installation, testing, and maintenance of these systems. Information for

these individuals demonstrating their qualifications and experience shall be submitted to the Contracting Officer (CO) for approval.

If it is found the installers are not qualified at any time during the installation process, the Contracting Officer shall have the authority to reject the credentials of those personnel who will have to be replaced by personnel acceptable to the Contracting officer at the Contractors full expense and associated cost to the project, as a result of this replacement.

9.4.2 Airfield Lighting Systems Manufacturer Certification

All manufacturers of aviation and airfield lighting materials and equipment for this Contract shall be third party tested and listed in theFAA Advisory Circular (AC) 150/5345-53C, Airport Lighting Equipment Certification Program. Manufacturers shall be listed specifically for the material or equipment they are supplying. Manufacturers not listed as certified will not be acceptable.

Airfield Lighting System equipment (fixtures etc.) shall be sole source procured equipment to match existing installed equipment if practical and feasible while meeting the required standards of this scope.

9.4.3 Air Navigation Lighting

Contractor shall provide design and construct a complete and functional air navigation lighting system for the ramp and taxiway pavements interconnecting ducts, manholes, hand-holes, conduit, wiring, grounding counterpoise, and lighting fixtures.

The visual air navigation system shall be composed of the following components per Table 2.2 in UFC 3-535-01 for VMC Night No-Instrument with some adjustment as follows:

1. Taxiway edge lights

2. Apron edge lighting

3. Guidance signs

4. Obstruction lighting (if justified)

5. Additional Constant Current Regulators (CCR) and electrical distribution equipment and controls installed in the Airfield Lighting Enclosure (ALE2) built as part of the Rotary Wing and Taxiway Phase I, as required for the Phase II expansion.

6.The existing mimic panel, human machine interface (HMI) display or PC based display in the ATCT and existing ALE1 as part of the main runway lighting system, shall be modified and/or reprogrammed by the Contractor to the satisfaction of the Contracting Officer, as part of this contract, to reflect the Rotary Wing Ramp and Taxiway Ph II lights.

- Ramp edge lighting shall follow the same guidelines as that specified in the UFC for taxiway edge lighting

- Location of lights and appurtenant items shall conform to the referenced UFC.

- Heliport lighting shall follow UFC 3-535-01 and in particular, Chapter 8 for Heliport Lighting.

- Elevated taxiway edge lighting (non-interleaved) shall be provided for all new taxiways and ramps.

- Ramp edge lighting system shall be an extension of the taxiway or edge lighting circuit.

- Ramp Edge lights shall not be required behind shelters and other areas inaccessible to airworthy vehicles.

- Edge light fixtures and equipment shall be as specified herein but shall be the of the same type, kind and by the same manufacturer as those of other new or proposed site facilities or as designated by the Contracting officer.

- All necessary 'mandatory instructions' and 'information' signs, with fixed message, shall be provided for the new taxiway(s) and ramp. Signs shall be internally illuminated.

- Plastic cans and bolts shall not be used.

- All light fixtures recessed and elevated shall be height adjustable to allow for additional pavement or grading in the future.

9.4.3.1. Airfield Lighting Enclosure (ALE2)

An ALE was built to be built on Ph I referenced herein as ALE2. The ALE2 electrical equipment room will house any and all additional ramp/taxiway electrical equipment needed for Ph II. The Contractor shall supply all electrical electrical equipment needed for a complete and working airfield lighting control system for the Rotary Wing Ramp and Taxiway Ph II including all new power/control supply equipment needed for a complete CCR installation.

ALE2 should already be controlled from the main Air Traffic Control Tower (ATCT) with alternate local control within the main existing Airfield Lighting Enclosure (reference as ALE1). The local control in ALE2 should already be connected to the existing main ATCT through ALE1 to allow full control of all systems in ALE2 from ALE1 and/or the ATCT.

The existing mimic panel, HMI display or CPU based display in the Air Traffic Control Tower (ATCT) shall be modified as part of this contract to reflect the rotary wing ramp and taxiway edge lights added for Ph II.

9.4.3.2. Constant Current Regulator (CCR)

All taxiway and ramp Ph II edge lighting shall be connected to constant current regulator(s) (CCRs) installed in ALE2. Contractor shall provide properly sized CCR(s) for the proposed taxiway and ramp edge lighting system expansion if the existing Ramp and Taxiway Ph I edge lighting equipment, cabling and infrastructure cannot carry the new load within their design ratings and limits. One spare CCR shall be provided as part of the contract if the Contractor uses an existing spare.

Reference Chapter 15 in UFC 3-535-01 for CCR design criteria.

CCR(s) shall as a minimum:

- be provided as required inside ALE2. Taxiways, Ramps and runways will have independent CCR circuits as required by the relevant UFC guides.

- be dry type, ferro-resonant .

- be sized for the ramp lighting, the taxiway lighting as shown on the layout drawings and maintain a minimum of 20% spare capacity based on the Contractor's maximum design loads and CCR ratings.

- have a minimum rating of no less than 10KW each

- have a 48V DC control voltage for local control of the lights

- be FAA type L-829, Class 1, Style 2 with monitoring.

- be solid state type and be microprocessor assisted and have an output transformer for automatic current regulation under varying load and input variations.

- be capable of operating all functions locally.

- have true RMS output current digital ammeter.

- be capable of compensating for an input voltage variation of plus or minus 15%.

- be sized to have a minimum of 20% spare capacity based on the Contractor calculated design loads.

- be programmable with complete monitoring of regulator functions.

- have proper working and maintenance space provide around the CCR.

All airfield light fixtures shall be installed on appropriate FAA Type (aircraft loading or non-aircraft loading) light bases.

All airfield lighting circuits shall be provided with identification tags in each light base, hand-hole or manhole, showing CCR#, circuit# and ampacity rating for the respective circuit.

9.4.4 Obstruction Lights

LED based obstruction lights shall be provided on top of all high mast lighting poles or any other structures if required by UFC 3-535-01 Chapter 6, Standards For Obstruction Lighting for high mast lights. Lights shall be dual, minimum 100 watt lamp each; steady burning, color red and FAA approved per AC 150/5345-43. Provide the power source, panels and facilities to deliver a complete and working system.

The design submittals must show in the design analysis clearly if obstruction lighting is or is not required based on the Contract installed facility elevations and locations from affected runways and other landing or takeoff zones.

10. ATTACHMENTS

The following attachments form an integral part of this specification:

C-1	Project Location and Vicinity Plan
C-2	Overall Site Plan
C-3	Apron Site Plan
C-4	F.A.R.P.

C-5 Pavement Sections
C-6 Pavement Details
C-7 Pavement Marking Details
C-8 Pavement Details

Appendix A - Topographic Survey Scope of Work
Appendix B - 24-Hour Precipitation Extreme Value Analysis
Appendix C - Barrier Wall Details

-- End of Section --

024100 - DEMOLITION & CONSTRUC

SECTION 02 41 00
DEMOLITION AND DECONSTRUCTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 145	(1991; R 2004) Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
AASHTO T 180	(2001; R 2004) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6	(1990; R 1998) Safety Requirements for Demolition Operations

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(2002) Standard for Installation Specification of Commercial Carpet

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(Rev K; Change 1) Obstruction Marking and Lighting

1.2 GENERAL REQUIREMENTS

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. The work of this section is to be performed

in a manner that maximizes salvage and recycling of materials. Remove rubbish and debris from the station daily; do not allow accumulations inside or outside the buildings or on airfield pavements. The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-01 Preconstruction Submittals

Existing Conditions; G RE

SD-07 Certificates

Demolition Plan; G RE
Deconstruction Plan; G RE
Notifications; G RE
Notification of Demolition and Renovation forms; G RE

Proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started.

SD-11 Closeout Submittals

Receipts; G RE

Receipts or bills of laden, as specified.

Demolition or Deconstruction Completion; G RE

Written statement from the ase land Management office certifying completion of demolition or deconstruction plan for each area.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with base hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6.

1.4.1 Notifications

The Contracting Officer will notify the Contractor in writing of any observed non-compliance with the paragraph entitled ENVIRONMENTAL PROTECTION. 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.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris to occupied portions of the building abd on airfield pavements, and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where pedestrian, driver or aircraft safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind, jet or prop blast. Notify the Contracting Officer prior to beginning such work.

Contractor must provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet 30 meter above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer. Maintain the temporary services during the period of construction and remove only after permanent services have been installed and tested and are in operation.

1.6.2 Existing Conditions Documentation

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systes, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

1.6.3 Items to Remain in Place

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural

replacement require approval by the Contracting Officer prior to performing such work.

1.6.4 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.6.5 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.6.6 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place by the Contracting Officer, by a 6 foot high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.6.7 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor.

1.6.8 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.6.9 Protection of Personnel

Before, during and after the demolition and deconstruction work the Contractor shall continuously evaluate the condition of the structure being demolished and deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing,

shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.6.10 Foreign Object Damage (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade must include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

1.6.11 Use Of Explosives

Use of explosives will not be permitted.

1.6.12 Environmental Protection

Comply with the Environmental Protection requirements specified, with all Afghan Government laws, rules, regulations or standards concerning environmental pollution control and abatement, and the Department of Defense’s Overseas Environmental Baseline Guidance Document, version dated March 2000. Internet links to the Overseas Environmental Baseline Guidance Document is: https://www.denix.osd.mil/denix/Public/Library/Intl/OEBGD/oebgd.html

1.6.13 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.

1.7 DISPOSAL

Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., shall be subject to the approval of the Contracting Officer. The use of burning for the disposal of refuse and debris will be permitted on a case-by-case basis at the base landfill.

1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items as approved by the Contracting Officer.

1.9 REQUIRED DATA

Prepare a Demolition Plan or Deconstruction Plan for submittal to the Contracting Officer. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, and airfield lighting, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be removed. Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan. Include statements affirming

Contractor inspection of the existing roof deck and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Deconstruction plans shall be approved by Structural PE prior to work beginning.

PART 2 PRODUCTS

2.1 FILL MATERIAL

Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures. Fill material shall be waste products from demolition or deconstruction until all waste appropriate for this purpose is consumed.

Fill material must conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material must be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

Proposed fill material must be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	AASHTO M 145
Moisture-density relations	AASHTO T 180, Method B or D

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures on site for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse on site whenever possible.

3.1.1 Structures

a. Remove existing structures indicated to be removed to grade feet. Interior walls, other than retaining walls and partitions, shall be removed to 600 mm feet below grade. Break up basement slabs to permit drainage. Remove sidewalks, curbs, gutters and street light bases as indicated.

b. Demolish and deconstruct structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Contracting Officer.

c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 22 m 25 foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs to a depth of inches600 mm below new finish grade. Provide neat sawcuts at limits of pavement removal. Pavement and slabs designated to be recycled and utilized in this project shall be ground and stored in place as directed by the Contracting Officer. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.1.5 Temporary Roofing

Install temporary roofing and flashing as necessary to maintain a watertight condition throughout the course of the work. Remove temporary work prior to installation of permanent roof system materials unless approved otherwise by the Contracting Officer. Make provisions for worker safety during demolition, deconstruction, and installation of new materials as described in paragraphs entitled "Statements" and "Regulatory and Safety Requirements."

3.1.6 Masonry

Sawcut and remove masonry so as to prevent damage to surfaces to remain, and to facilitate the installation of new work. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as specified for the new work. Provide square, straight edges and corners

where existing masonry adjoins new work and other locations. Masonry removed in whole blocks shall be salvaged and stored for reuse.

3.1.7 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

3.1.8 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for reuse structural steel, steel joists, girders, angles, plates, columns and shapes. Do not use flame-cutting torches. Flame-cutting torches are only permitted when other methods of dismantling are not practical, and approved by the Contracing Officer. Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a designated area as directed by the Contracting Officer, stacked according to size, type of member and length, and stored off the ground, protected from the weather. Existing erection details shall be submitted in the form of as-built drawings and photos to Contracting Officer before deconstruction.

3.1.9 Miscellaneous Metal

Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Scrap metal shall become the Contractor's property.

3.1.10 Carpentry

Salvage for recycle lumber, millwork items, and finished boards, and sort by type and size. Recycle salvaged wood, except stained, painted, or treated wood. Salvage windows, doors, frames, and cabinets, and similar items as whole units, complete with trim and accessories. Salvage hardware attached to units for reuse. Brace the open end of door frames to prevent damage.

3.1.11 Locksets on Swinging Doors

The Contractor shall remove all locksets from all swinging doors indicated to be removed and disposed of. Deliver the locksets and related items to a designated location for receipt by the Contracting Officer after removal. Label each lockset as to location of removal. Bundle any matching key sets with each lockset.

3.1.12 Carpet

Remove existing carpet for reclamation in accordance with manufacturer recommendations and as follows. Remove used carpet in large pieces, roll tightly, and pack neatly in a container. Remove adhesive according to recommendations of the Carpet and Rug Institute (CRI). Adhesive removal solvents shall comply with CRI 104. Recycle removed carpet cushion.

3.1.13 Acoustic Ceiling Tile

Remove, neatly stack, protect, and recycle acoustic ceiling tiles.

3.1.14 Airfield Lighting

Remove existing airfield lighting as indicated and terminate in a manner satisfactory to the Contracting Officer. Remove edge lights, and associated transformers as indicated and deliver to a location on the station in accordance with instructions of the Contracting Officer..

3.1.15 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

a. Concrete and Masonry: Completely fill holes and depressions, left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

b. Where existing partitions have been removed leaving damaged or missing resilient tile flooring, patch to match the existing floor tile.

c. Patch acoustic lay-in ceiling where partitions have been removed. The transition between the different ceiling heights shall be effected by continuing the higher ceiling level over to the first runner on the lower ceiling and closing the vertical opening with a painted sheet metal strip.

3.1.16 Air Conditioning Equipment

Protect or separate all air conditioning, refrigeration, and other equipment containing refrigerants without releasing chlorofluorocarbon refrigerants to the atmosphere until properly evacuated in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)".

3.1.17 Cylinders and Canisters

Protect or separate all fire suppression system cylinders and canisters without releasing charges to the atmosphere until properly evacuated in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)".

3.1.18 Mechanical Equipment and Fixtures

Disconnect mechanical hardware at the nearest connection to existing services to remain, unless otherwise noted. Mechanical equipment and fixtures must be disconnected at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal

operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated storage area as directed by the Contracting Officer. Do not remove equipment until approved.

3.1.18.1 Preparation for Storage

Remove water, dirt, dust, and foreign matter from units; tanks, piping and fixtures shall be drained; interiors, if previously used to store flammable, explosive, or other dangerous liquids, must be steam cleaned. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit. Change lubricating systems with the proper oil or grease.

3.1.18.2 Piping

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve shall be attached to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Wrap sprinkler heads individually in plastic bags before boxing. Classify piping not designated for salvage, or not reusable, as scrap metal.

3.1.18.3 Ducts

Classify removed duct work as scrap metal.

3.1.18.4 Fixtures, Motors and Machines

Remove and salvage fixtures, motors and machines associated with plumbing, heating, air conditioning, refrigeration, and other mechanical system installations. Salvage, box and store auxiliary units and accessories with the main motor and machines. Tag salvaged items for identification, storage, and protection from damage. Classify broken, damaged, or otherwise unserviceable units and not caused to be broken, damaged, or otherwise unserviceable as debris and disposed of by the Contractor. Salvage and crush porcelain plumbing fixtures unsuitable for reuse.

3.1.19 Electrical Equipment and Fixtures

Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal ciruits at the point of attachment to their distribution system.

3.1.19.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.

3.1.19.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheated and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, oulet boxes, and similar items. Box and tag these items for identification according to type and size.

3.1.19.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

3.1.19.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

3.1.20 Elevators and Hoists

Remove elevators, hoists, and similar conveying equipment and salvage as whole units, to the most practical extent. Remove and prepare items for salvage without damage to any of the various parts. Salvage and store rails for structural steel with the equipment as an integral part of the unit.

3.1.21 Items With Unique/Regulated Disposal Requirements

Remove and dispose of items with regulated disposal requirements by separating, protecting and conveying to the base hazardous material contractor.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment listed in the Demolition and deconstruction Plan to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.3.3 Salvaged Materials and Equipment

Remove materials and equipment that are listed in the Demolition or deconstruction Plan to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site as directed by the Contracting Officer.

a. Salvage items and material to the maximum extent possible.

b. Store all materials salvaged for the Contractor as approved by the Contracting Officer and remove from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers. Deliver the following items reserved as property of the Government to the areas indicated by the Contracting Officer.

3.3.4 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable material in a disposal area located a minimum of 15 km from base premises. The fill in the disposal area must remain below ground elevation and after disposal is completed, the disposal area must be uniformly graded to drain.

3.3.5 Disposal of Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Section, 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere in accordance with the Overseas Environmental baseline Guidance Document. The Base’s Hazardous Material Contractor will remove and capture all Class I & II ODS refrigerants. Protect or separate all appliances, fire suppression system cylinders and canisters, air conditioning, refrigeration, and other equipment containing refrigerants without releasing chlorofluorocarbon refrigerants to the atmosphere until properly evacuated by the base contractor.

3.4 CLEANUP

Remove debris and rubbish from basement and similar excavations. Remove and transport debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 CLOSEOUT

Contractor shall obtain a written statement from the base land management office certifying completion of demolition or deconstruction plan for each area.

-- End of Section --

310000 - EARTHWORK

SECTION 31 00 00
EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C600	(2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2006) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 139	(2000) Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
ASTM B 117	(2002) Operating Salt Spray (Fog) Apparatus
ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1140	(2000) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 149	(1997a; R 2004) Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 2240	(2004) Rubber Property - Durometer Hardness
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 638	(2003) Tensile Properties of Plastics
ASTM D 695	(2002a) Compressive Properties of Rigid Plastics
ASTM D 785	(2003) Rockwell Hardness of Plastics and Electrical Insulating Materials
ASTM D 790	(2003) Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM E 11	(2004) Wire Cloth and Sieves for Testing Purposes

BRITISH STANDARDS INSTITUTE (BSI)

BS 812-118	(1988) Testing Aggregates Part 118: Method for Determination of Sulphate Content

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Materials classified in ASTM D 2487 using ASTM D 422, ASTM D 1140, ASTM C 136, ASTM C 117 and ASTM D 4318 as GW, GP, GM, SP, and SW are satisfactory. GC, SC, ML, and CL are satisfactory when natural (not man-made) and in-situ, and when properly moisture conditioned and compacted, may be used for fill and backfill upon approval by the Contracting Officer. The plasticity index shall be less than 12 and the liquid limit shall be less than 35. Particles shall not be larger than 76 mm (3 inches) in any dimension, with 70 percent to 100 percent passing the 19 mm (3/4 inch) sieve. Not more than 25 percent by weight shall pass the 0.075 mm (No. 200) sieve. Sieves shall conform to ASTM E 11.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; cobbles; boulders; rock; lenses or pockets of gypsum; gypsiferous soils; expansive soils; and material classified as satisfactory which contains root and other organic matter or frozen material. SC and GC are unsatisfactory when more than 25 percent of the material passes the 0.075 mm sieve. The Contracting Officer shall be notified immediately of any contaminated materials. Unsatisfactory materials also include those materials listed in paragraph

SATISFACTORY MATERIALS if they are determined by the Contracting Officer to be in a saturated, dry, uncompacted, disturbed, or otherwise unacceptable condition at the time of construction.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 117, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 Method C abbreviated as a percent of laboratory maximum density.

1.2.5 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included materials with stones greater than 75 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.6 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding [1/2] [_____] cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.7 Unstable Material

Unstable material are too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.2.8 Select Granular Material

1.2.8.1 General Requirements

Select granular material consist of materials classified as GW, GP, SW, or SP by ASTM D 2487 where indicated. The liquid limit of such material must not exceed 25 percent when tested in accordance with ASTM D 4318. The plasticity index must not be greater than 5 percent when tested in accordance with ASTM D 4318, and not more than 25 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D 1140.

1.2.9 Initial Backfill Material

Initial backfill consists of select granular material or satisfactory materials free from rocks 12 mm inches or larger in any dimension of such size as recommended by the pipe manufacturer, whichever is smaller.

1.2.10 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 25 when tested in accordance with ASTM D 4318.

1.2.11 Gypsiferous Soils

Gypsiferous soils are those found to contain 10 percent or more gypsum as determined by visual inspection. If there is disagreeement with the classification by visual inspection, the following test shall apply. A 1000 gram sample shall be heated to 110 degreee centigrade for 24 hours. At this point the sample will be broken apart. The gypsum can be identified by its white color. The gypsum content can be determined by weight from a chemical analysis performed in accordance with BS 812-118, if necessary, to establish exact quantities. All testing will be done at the expense of the Contractor.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-06 Test Reports

Testing

Within 24 hours of conclusion of physical tests, two (2) copies of test results, including calibration curves and results of calibration tests. Results of testing at the borrow site.

SD-07 Certificates

Testing

Qualifications of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities.

1.4 BLASTING

Blasting is not permitted.

1.5 SUBSURFACE DATA

No site-specific geotechnical information is available. Site specific geotechnical information necessary to design and construct the foundations, pavements and other geotechnically related items contained in this project shall be the Contractor's responsibility.

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Provide metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air

2.1.1 Detectable Warning Tape

Provide acid and alkai-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.2 PIPE CASING

2.2.1 CASING PIPE

Casing pipe shall be a smooth steel pipe conforming to ASTM A 139, Grade B. The minimum yield point of smooth steel casing pipe shall be 240 MPa (35,000 psi). The minimum wall thickness of the casing pipe shall not be less than 6.3 mm (0.25-inches). The ends of smooth steel casing pipe shall be beveled for field welding.

2.2.2 CARRIER PIPE

The carrier pipe shall be the same nominal diameter as the system main on either side of the casing pipe. Pipe shall be ductile iron and have restrained joints.

2.2.3 Casing Spacers

Casing spacers shall consist of two or more segments of circular steel that bolt together forming a shell around the carrier pipe. Casing spacers should protect the carrier pipe and any protective coating or wrapping from damage during the installation, and properly support and electrically isolate the carrier pipe within the casing.

2.2.3.1 Spacer Dimensions

Casing spacers shall be 200 mm (8 inches) long for carrier pipes up to 450 mm (16-inch) diameters and 300 mm (12 inches) long for larger carrier pipe sizes.

2.2.3.2 Spacer Material

Casing spacers shall have a minimum 1.88 mm (14-gauge) 304 stainless steel band and 0.135 mm (10 gauge) 304 stainless steel riser. The band, risers and connecting studs shall be welded and cleaned at the factory before the application of a fluidized bed fusion bonded PVC coating. Stainless steel (type 304) casing spacer is an acceptable alternative.

2.2.3.3 Coatings

The fluidized bed fusion bonded PVC coating shall be between 0.25- 0.40 mm (10-16 mils) thickness. The PVC coating shall provide good resistance to acids and alkalize and excellent resistance under ASTM B 117 salt spray tests. The coating shall have a minimum 1380volts/mil per ASTM D 149 short time 0.010" test and a Durometer "A" @ (10 sec) of 80 per ASTM D 2240. Epoxy coatings are not an acceptable alternative.

2.2.3.4 Spacer Liners

The spacers shall have a flexible PVC liner of 2.29mm (0.09-inch) thickness with Durometer "A" 85-90 hardness and a minimum 58,000- volt dielectric strength (60,000-volt minimum Surge Test.) Moisture absorption shall not exceed 1%.

2.2.3.5 Runners

The runners shall be of high pressure molded glass reinforced polyester with a minimum compressive strength of 18,000 psi per ASTM D 695, flexural strength of 25,300 kg/cm2 (25,300 psi) per ASTM D 790, tensile strength of 1,237 kg/cm2 (17,600 psi) per ASTM D 638 and Rockwell hardness (M) of 90 per ASTM D 785. The riser shall be designed and fabricated to place the runner (skid) in full contact with the inside surface of the casing pipe. This evenly distributes the load force to all support members. The ends of all runners shall be shaped to resist hanging or sticking inside casing during installation of the carrier pipe. Polyethylene runners are not acceptable.

2.2.3.6 Runner Material

Runners shall be a minimum of 50 mm (2.0 inch) in width and a minimum of 175 mm (7 inches) long for carrier pipes up to 400 mm (16 inches). Bolts on runners are not acceptable. The runners shall be attached to the band or riser by 3/8 the wearing surface on the runner. The recess shall be filled with a corrosion inhibiting filler. There shall be four runners per casing spacer for carrier pipes up to 300 mm (12-inches) diameter. The runners can be glass reinforced plastic or nylon, or ultra high molecular weight polymer.

2.2.3.7 Band Section

The band section shall be bolted together with 7.9 mm (5/16-inch) 304 stainless steel studs, nuts and washers. There shall be six sets per 200 mm (8-inch) long casing spacer.

2.2.3.8 Spacer Position

Casing spacers shall be in a centered restrained position configuration in the casing pipe. Casing spacers shall have ample riser height to limit vertical

movement of the carrier pipe in the casing. A minimum of 25 to 50 mm (1 to 2 inches) clearance shall be provided between the top runner and the ID of the casing or tunnel.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Disposal of surplus satisfactory material and unsatisfactory material shall be outside the limits of the project site and is the Contractor's responsibility. It is the Contractor's responsibility to coordinate with the local Government or authorities the location and the time of disposal. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Obtaining borrow and/or fill material is the responsibility of the Contractor.

3.1.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown on drawing. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material, except in no case allow material be deposited a maximum 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.1.2 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete is to be placed.

3.1.3 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working

platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.1.4 Dewatering

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Do not permit French drains, sumps, ditches or trenches within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Take control measures by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly.

3.1.5 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls more than 1 feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in. Shore vertical trench walls more than 1 feet high. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inch inside diameter, and do not exceed 36 inch plus pipe outside diameter for sizes larger than 24 inch inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.1.5.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 75 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.1.5.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, remove such material 150 inch below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.5.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.1.5.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Specify removal of unstable material. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.1.5.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, provide excavation by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.1.6 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement. Backfill and compact over excavations and changes in grade due to pile driving operations to 90 percent of ASTM D 1557 maximum density.

3.2 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used is the Contractor's responsibility. The Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners.

3.3 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory and unsatisfactory as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.4 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. For pile foundations, stop the excavation at an elevation of from 6 to 12 inch above the bottom of the footing before driving piles. After pile driving has been completed, complete the remainder of the excavation to the elevations shown. Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.5 GROUND SURFACE PREPARATION

3.5.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6 inch before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 6 inch, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inch and compact it as specified for the adjacent fill.

3.5.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted.

3.6 UTILIZATION OF EXCAVATED MATERIALS

The Contractor is responsibility for removal and disposal of unsatisfactory material. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Do not waste any satisfactory excavated material without specific written authorization. Disposal of satisfactory material is the Contractor's responsibility.

3.7 BURIED TAPE AND DETECTION WIRE

3.7.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inch below finished grade; under pavements and slabs, bury tape 6 inch below top of subgrade.

3.7.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inch above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over

it's entire length. Install wires at manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, terminate the wire in the valve pit at the pump station end of the pipe.

3.8 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 95 percent laboratory maximum density to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed as specified in paragraph SURFACE PREPARATION. Provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.8.1 Trench Backfill

Backfill the trench to 0.6 meters above the top of pipe prior to performing the required pressure tests. Leave the joints and couplings uncovered during the pressure test. Do not backfill the trench until all specified tests are performed. Backfill trenches to the grade shown.

3.8.1.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with select granular material or initial backfill material.

3.8.1.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with select granular material placed in layers not exceeding 6 inch loose thickness.

3.8.1.3 Bedding and Initial Backfill

Place initial backfill material and compact it with approved tampers to a height of at least one foot above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to top of pipe to 90 percent of ASTM D 1557 maximum density.

3.8.1.4 Final Backfill

Fill the remainder of the trench, except for special materials for roadways and airfields, with satisfactory material. Place backfill material and compact as follows:

a. Roadways, Railroads, and Airfields: Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Deposit backfill in layers of a maximum of 12 inch loose thickness, and compact it to 95 percent maximum density. Do not permit compaction

by water flooding or jetting. Apply this requirement to all other areas not specifically designated above.

3.8.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 14 days, place backfill in such a manner that the structure is not be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.9 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.9.1 Water Lines

Excavate trenches to a depth that provides a minimum cover of 0.9 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.9.2 Electrical Distribution System

Provide a minimum cover of 24 inch from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated.

3.9.3 Pipeline Casing

Provide new smooth wall steel pipeline casing under new or existing pavement by the boring and jacking method of installation. Provide each new pipeline casing, where indicated and to the lengths and dimensions shown, complete and suitable for use with the new piped utility as indicated.

3.9.3.1 Bore Holes

Mechanically bore holes and case through the soil with a cutting head on a continuous auger mounted inside the casing pipe. Weld lengths of pipe together in accordance with AWS D1.1/D1.1M. Do not use water or other fluids in connection with the boring operation.

3.9.3.2 Cleaning

Clean inside of the pipeline casing of dirt, weld splatters, and other foreign matter which would interfere with insertion of the piped utilities by attaching a pipe cleaning plug to the boring rig and passing it through the pipe.

3.9.3.3 End Seals

After installation of piped utilities in pipeline casing, provide watertight end seals at each end of pipeline casing between pipeline casing and piping utilities. Provide watertight segmented elastomeric end seals.

3.10 EMBANKMENTS

3.10.1 Earth Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than [12][_____] inch in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise brake up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 95 percent laboratory maximum density. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.11 SUBGRADE PREPARATION

3.11.1 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inch below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. After rolling, do not show deviations for the surface of the subgrade for roadways and airfields greater than [1/2] [_____] inch when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area. Do not vary the elevation of the finish subgrade more than 0.05 foot from the established grade and cross section.

3.11.2 Required Compaction and Moisture Content

The required degree of compaction is 95 percent of maximum density as determined by ASTM D 1557 unless otherwise stated within this specification or on the drawings. The required moisture content at time and location of compaction shall be uniform throughout the material and within plus 2 and minus 1 percent of optimum moisture as determined by ASTM D 1557. Water shall be added to the stockpile or the borrow area and adjusted, if necessary in each layer. Brine water, brackish ground water, sea water, sewer effluent, or otherwise unsatisfactory water is not permitted.

3.12 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.12.1 Subgrade and Embankments

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do no disturb the finished subgrade by traffic or other operation. The Contractor is responsible for protecting and maintaining the finsihed subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, or frozen subgrade.

3.12.2 Grading Around Structures

Construct areas within 5 feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.13 TESTING

Testing shall be the responsibility of the Contractor and shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. If the Contractor elects to establish testing facilities, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved by the Contracting Officer. Field in-place density shall be determined in accordance with ASTM D 1556 and ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements at no additional expense to the Government. Tests on recompacted areas shall be performed to determine conformance with specification requirements. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.13.1 Material Classification

One (1) test per 1150 cubic meters (1500 cubic yards) stockpiled, borrow, or in-situ material. Classification of the material shall be determined in accordance with ASTM D 2487 using ASTM D 422, ASTM D 1140 and ASTM D 4318.

3.13.2 In-Place Densities

a. One test per (2000 square feet), or fraction thereof, of each lift of fill or backfill for paved areas shall be performed.

b. One test per 100 linear meters (330 linear feet) or fraction thereof, of each lift of excavated trench of embankment or backfill in areas to be paved shall be performed.

c. One test per, or fraction thereof, of each lift of fill or backfill for unpaved areas shall be performed.

d. One test per, or fraction thereof, of each lift of excavated trench in unpaved areas shall be performed.

3.13.3 Moisture Contents

In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed in accordance with ASTM D 2216. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

3.13.4 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values in accordance with ASTM D 1557. One representative test per (1500 cubic yards) of fill and backfill, or when any change in material occurs which
may affect the optimum moisture content or laboratory maximum density.

3.13.5 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in Paragraph "Subgrade Preparation" shall be made during construction.

3.14 SUBGRADE AND EMBANKMENT PROTECTION

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, or pavement be placed on a muddy or spongy subgrade.

3.15 CONTRACTOR QUALITY CONTROL PERSONNEL

A minimum of one person from the Contractor Quality Control staff shall be dedicated full-time to the execution requirements of this specification. This person shall have over five (5) years of experience in earthwork construction activities similar to that of this project.

-- End of Section --

321123 - GRADED-CRUSHED AGGREG

SECTION 32 11 23
GRADED-CRUSHED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(2004) Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2004a) Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 88	(2005) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 75	(2003) Sampling Aggregates
ASTM E 11	(2004) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 (Not Used)

1.2.2 Graded-Crushed Aggregate Base Course

Graded-crushed aggregate (GCA) base course is well graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.3 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557, Method C, abbreviated as a percent of laboratory maximum dry density.

1.3 (NOT USED)

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-03 Product Data

Plant, Equipment, and Tools

List of proposed equipment to be used in performance of construction work, including descriptive data.

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work.

SD-06 Test Reports

Sampling and Testing; G, ED
Field Density Tests; G, ED

Certified copies of test results for approval not less than 30 days before material is required for the work.

Calibration curves and related test results prior to using the device or equipment being calibrated.

Copies of field test results within 24 hours after the tests are performed.

1.5 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Contracting Officer may specify the time and location of the tests. Copies of test results shall be furnished to the Contracting Officer within 24 hours of completion of the tests.

1.5.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.5.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.5.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.5.2.3 Moisture-Density Determinations

The laboratory maximum dry density and optimum moisture content shall be determined in accordance with ASTM D 1557 Method C.

1.5.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 1556, ASTM D 2167 or ASTM D 2922. For the method presented in ASTM D 1556 the base plate as shown in the drawing shall be used. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted if necessary using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed.

1.5.2.5 Wear Test

Wear tests shall be made on GCA course material in conformance with ASTM C 131.

1.5.2.6 Soundness

Soundness tests shall be made on GCA in accordance with ASTM C 88.

1.5.2.7 (Not Used)

1.5.3 Testing Frequency

1.5.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Soundness.

1.5.3.2 In Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted GCA. Samples shall be taken and tested at the rates indicated.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Sieve Analysis shall be performed on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

d. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

1.5.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

1.6 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.7 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work shall be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be

adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.8 WAYBILLS AND DELIVERY TICKETS

Before the final statement is allowed, the Contractor shall file certified waybills and certified delivery tickets for all aggregates actually used, as specified in the Submittals paragraph.

PART 2 PRODUCTS

2.1 AGGREGATES

The GCA shall consist of clean, sound, durable particles of crushed stone, crushed gravel, angular sand, or other approved material. GCA shall be free of silt and clay as defined by ASTM D 2487, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregate

Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.

2.1.1.1 (Not Used)

2.1.1.2 Graded-Crushed Aggregate Base Course

GCA coarse aggregate shall not show more than 40 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. GCA coarse aggregate shall not exhibit a loss greater than 18 percent weighted average, at five cycles, when tested for soundness in magnesium sulfate, or 12 percent weighted average, at five cycles, when tested in sodium sulfate in accordance with ASTM C 88. The amount of flat and elongated particles shall not exceed 20 percent for the fraction retained on the 1/2 inch sieve nor 20 percent for the fraction passing the 1/2 inch sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregate shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 90 percent of which by weight are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 (Not Used)

2.1.2.2 Graded-Crushed Aggregate Base Course

GCA fine aggregate shall consist of angular particles produced by crushing stone or gravel that meets the requirements for wear and soundness specified for GCA coarse aggregate. Fine aggregate shall be produced by crushing only particles larger than No. 4 sieve in size. The fine aggregate shall contain at least 90 percent by weight of particles having two or more freshly fractured faces in the portion passing the No. 4 sieve and retained on the No. 10 sieve, and in the portion passing the No. 10 sieve and retained on the No. 40 sieve.

2.1.3 Gradation Requirements

The specified gradation requirements shall apply to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2	No. 3
2 inch	100	----	----
1-1/2 inch	70-100	100	----
1 inch	45-80	60-100	100
1/2 inch	30-60	30-65	40-70
No. 4	20-50	20-50	20-50
No. 10	15-40	15-40	15-40
No. 40	5-25	5-25	5-25
No. 200	0-8	0-8	0-8

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the GCA is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating shall be the responsibility of the Contractor. The aggregate sources shall be operated to produce the quantity and quality of materials meeting these specifications requirements in the specified time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course(s), the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 31 00 00 EARTHWORK or Section 32 11 16 SUBBASE COURSES. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization shall be accomplished by mixing GCA into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

The coarse and fine aggregates shall be mixed in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. The Contractor shall make adjustments in mixing procedures or in equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification.

3.5.2 Placing

The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall be thicker than 6 inches or thinner than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.5.3 Grade Control

The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The base course(s) shall be placed so that the completed section will be a minimum of [2] [_____] feet wider, on all sides, than the next layer that will be placed above it. Additionally, approved fill material shall be placed along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of base course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Each layer of the base course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in paragraph SAMPLING AND TESTING. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least 100 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be

unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Compacted thickness of the base course shall be as indicated. No individual layer shall be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.5.7 (Not Used)

3.5.8 Finishing

The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.9 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at [50] [_____]foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Completed portions of the base course may be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Heavy equipment shall not be permitted except when necessary to construction, and then the area shall be protected against marring or damage to the completed work.

3.7 MAINTENANCE

The base course shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of as directed. No additional payments will be made for materials that must be replaced.

-- End of Section --

321210 - BITUMINOUS TACK&PRIME

SECTION 32 12 10
BITUMINOUS TACK AND PRIME COATS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 2397	(2002) Cationic Emulsified Asphalt
ASTM D 2995	(1999; R 2004) Determining Application Rate of Bituminous Distributors
ASTM D 977	(2003) Emulsified Asphalt

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-03 Product Data

Equipment, Machines and Tools; G RE

SD-06 Test Reports

Sampling and Testing

Copies of all test results for emulsified asphalt, and bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating temperature viscosity relationship for cutback asphalt, compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

1.3 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.3.1 General Requirements

Plant, equipment, machines and tools used in the work are subject to approval and must be maintained in a satisfactory working condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory within 12 months prior to commencing work and every six (6) months thereafter, by such laboratory from the date of recalibration, during the term of the contract.

1.3.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number that the load produced on the base surface does not exceed 650 psi of tire width and to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 psi and with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the bituminous material during the heating process.

1.3.3 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Steam heaters shall consist of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. Fix an armored thermometer to the tank with a temperature range from 40 to 400 degrees F so that the temperature of the bituminous material may be determined at all times.

1.3.4 Power Brooms and Power Blowers

Use power brooms and power blowers suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 WEATHER LIMITATIONS

Apply bituminous coat only when the surface to receive the bituminous coat is dry. Apply bituminous coat only when the atmospheric temperature in the shade is 50 degrees F or above and when the temperature has not been below 35 degrees F for the 12 hours prior to application, unless otherwise directed.

1.5 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

PART 2 PRODUCTS

2.1 PRIME COAT

2.1.1 Emulsified Asphalt

Prime coat shall be emulsified asphalt and shall conform to ASTM D 977, Type SS-1h or ASTM D 2397, Type CSS-1h.

2.2 TACK COAT

2.2.1 Emulsified Asphalt

Tack coat shall be emulsified asphalt and shall conform to ASTM D 977, Type SS-1h or ASTM D 2397, Type CSS-1h.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a power broom or blower supplemented with hand brooms. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Apply bituminous material for the tack coat in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Apply bituminous material for the prime coat in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. Furnish the temperature viscosity relation to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements determine the application temperature to be used. The following is a normal range of application temperatures:

Liquid Asphalts

[SC-70	120-225 degrees F]
[SC-250	165-270 degrees F]
[MC-30	85-190 degrees F]
[MC-70	120-225 degrees F]
[MC-250	165-270 degrees F]
[RC-70	120-200 degrees F*]
[RC-250	165-250 degrees F*]

Paving Grade Asphalts

Penetration Grades

[200-300	plus 265 degrees F]
[120-150	plus 270 degrees F]
[85-100	plus 280 degrees F]

Viscosity Grades

[AC 2.5	plus 270 degrees F]
[AC 5	plus 280 degrees F]
[AC 10	plus 280 degrees F]
[AR 1000	plus 275 degrees F]
[AR 2000	plus 285 degrees F]
[AR 4000	plus 290 degrees F]

Emulsions

[RS-1	70-140 degrees F]
[MS-1	70-160 degrees F]
[HFMS-1	70-160 degrees F]
[SS-1	70-160 degrees F]
[SS-1h	70-160 degrees F]
[CRS-1	125-185 degrees F]
[CSS-1	70-160 degrees F]
[CSS-1h	70-160 degrees F]

*These temperature ranges exceed the flash point of the material and care should be taken in their heating.

3.4 APPLICATION

3.4.1 General

Following preparation and subsequent inspection of the surface, apply the bituminous prime or tack coat with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots missed by the distributor with the hand spray. Until the succeeding layer of pavement is placed, maintain the surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking,

fires, or flames other than those from the heaters that are a part of the equipment are permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.4.2 Prime Coat

Apply a prime coat to the completed base course material. Hot-mix asphalt shall be placed on the prime coat with five (5) days. The type of liquid asphalt and application rate will be as specified herein. Protect the underlying from any damage (water, traffic, etc.) until the surfacing is placed. Repair (recompact or replace) damage to the underlying material caused by lack of, or inadequate, protection by approved methods at no additional cost to the Government. Apply the bituminous material uniformly over the surface to be treated at a pressure range of 25 to 75 psi and at the rate of not less than [0.20] [_____] gallon not more than [0.30] [_____] gallon per square yard. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application remove and destroy the building paper.

3.4.3 Tack Coat

Apply tack coat at the locations shown on the drawings. Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate of not less than [0.05] [_____] gallon nor more than [0.15] [_____] gallon of diluted emulsion per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material.

3.6 FIELD QUALITY CONTROL

Samples of the bituminous material shall be tested for compliance with the applicable specified requirements. A sample shall be obtained and tested by the Contractor for every gallons of bituminous material used.

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

Furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibrate the bituminous distributor in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, apply three lengths of at least 100 feet for the full width of the distributor bar to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous tack coat materials in the amount of 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous materials in the amount of 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Perform quality control sampling and testing as required in paragraph FIELD QUALITY CONTROL.

3.8 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --

321215 - HOT-MIX ASPHALT (HMA)

SECTION 32 12 15
HOT-MIX ASPHALT (HMA) FOR AIRFIELDS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 308	(2004) Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method

ASPHALT INSTITUTE (AI)

AI MS-02	(6th Edition; 1997) Mix Design Methods for Asphalt

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 1252	(2003) Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)
ASTM C 127	(2004) Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2004a) Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 142	(1997; R 2004) Clay Lumps and Friable Particles in Aggregates
ASTM C 566	(1997; R 2004) Total Evaporable Moisture Content of Aggregate by Drying
ASTM C 88	(2005) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D 140	(2001) Sampling Bituminous Materials

ASTM D 1461	(1985; R 2001) Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 2041	(2003a) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	(2001e1) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	(2002) Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 242	(1995; R 2000e1) Mineral Filler for Bituminous Paving Mixtures
ASTM D 2726	(2004) Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 3203	(1994; R 2000) Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3665	(2002) Random Sampling of Construction Materials
ASTM D 3666	(2004) Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 4125	(1994;R 2000) Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867/D 4867M	(2004) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	(1998) Mechanical Size Analysis of Extracted Aggregate
ASTM D 6307	(2004) Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D 6926	(2004) Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D 6927	(2005e1) Marshall Stability and Flow of Bituminous Mixtures
ASTM D 946	(1982; R 1999) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 979	(2001) Sampling Bituminous Paving Mixtures
ASTM D 995	(1995b; R 2002) Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures

CDT Test 526	(2000) Operation of California Profilograph and Evaluation of Profiles

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 171	(1994) Standard Test Method for Determining Percentage of Crushed Particles in Aggregate

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-02 Shop Drawings

Placement Plan; G, ED

Proposed placement plan, indicating lane widths, longitudinal joints, and transverse joints for each course or lift.

SD-03 Product Data

Mix Design; G, ED

Proposed JMF.

Contractor Quality Control; G, ED

Quality control plan.

SD-04 Samples

Asphalt Cement Binder

5 gallon sample for mix design verification.

Aggregates

Sufficient materials to produce 200 lb of blended mixture for mix design verification.

SD-06 Test Reports

Aggregates; G, ED
QC Monitoring

Aggregate and QC test results.

SD-07 Certificates

Asphalt Cement Binder; G, ED

Copies of certified test data.

Testing Laboratory

Certification of compliance.

1.3 DESCRIPTION OF WORK

The work shall consist of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses, and typical cross sections shown on the drawings. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course. The Contractor shall submit a Placement Plan as specified in the Submittals paragraph.

1.4 (NOT USED)

1.5 (NOT USED)

1.6 ASPHALT MIXING PLANT

Plants used for the preparation of hot-mix asphalt shall conform to the requirements of ASTM D 995 with the following changes:

a. Truck Scales. The asphalt mixture shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed at least annually by an approved calibration laboratory.

b. Testing Facilities. The Contractor shall provide laboratory facilities at the plant for the use of the Government's verification testing and the Contractor's quality control and acceptance testing.

c. Inspection of Plant. The Contracting Officer shall have access at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. The Contractor shall provide assistance as requested, for the Government to procure any desired samples.

d. Storage Bins. The asphalt mixture may be stored in non-insulated storage bins for a period of time not exceeding 3 hours. The asphalt mixture may be stored in insulated storage bins for a period of time not exceeding 8 hours. The mix drawn from bins shall meet the same requirements as mix loaded directly into trucks.

1.7 HAULING EQUIPMENT

Trucks used for hauling hot-mix asphalt shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened.

1.8 ASPHALT PAVERS

Asphalt pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable of spreading and finishing courses of hot-mix asphalt which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

1.8.1 Receiving Hopper

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

1.8.2 Automatic Grade Controls

If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A transverse slope controller shall not be used to control grade. The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet in length.

b. Taut stringline set to grade.

c. Short ski or shoe for joint matching.

d. Laser control.

1.9 ROLLERS

Rollers shall be in good condition and shall be operated at slow speeds to avoid displacement of the asphalt mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. Equipment which causes excessive crushing of the aggregate shall not be used.

1.10 WEATHER LIMITATIONS

The hot-mix asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The temperature requirements may be waived by the Contracting Officer, if requested; however, all other requirements, including compaction, shall be met.

Table 1. Surface Temperature Limitations of Underlying Course

Mat Thickness, inches	Degrees F

3 or greater	40
Less than 3	45

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of crushed stone, crushed gravel, screenings, natural sand and mineral filler, as required. The portion of material retained on the No. 4 sieve is coarse aggregate. The portion of material passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate. The portion passing the No. 200 sieve is defined as mineral filler. All aggregate test results and samples shall be submitted to the Contracting Officer at least 14 days prior to start of construction.Aggregate testing shall have been performed within 90 days of performing the mix design.

2.1.1 Coarse Aggregate

Coarse aggregate shall consist of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. The coarse aggregate particles shall meet the following requirements:

a. The percentage of loss shall not be greater than 40 percent after 500 revolutions when tested in accordance with ASTM C 131.

b. The sodium sulfate soundness loss shall not exceed 12 percent, or the magnesium sulfate soundness loss shall not exceed 18 percent after five cycles when tested in accordance with ASTM C 88.

c. At least 75 percent by weight of coarse aggregate shall have at least two or more fractured faces when tested in accordance with COE CRD-C 171. Fractured faces shall be produced by crushing.

d. The particle shape shall be essentially cubical and the aggregate shall not contain more than 20 percent, by weight, of flat and elongated particles (3:1 ratio of maximum to minimum) when tested in accordance with ASTM D 4791.

e. NOT USED

f. Clay lumps and friable particles shall not exceed 0.3 percent, by weight, when tested in accordance with ASTM C 142.

2.1.2 Fine Aggregate

Fine aggregate shall consist of clean, sound, tough, durable particles. The aggregate particles shall be free from coatings of clay, silt, or any objectionable material and shall contain no clay balls. The fine aggregate particles shall meet the following requirements:

a. The quantity of natural sand (noncrushed material) added to the aggregate blend shall not exceed 15 percent by weight of total aggregate.

b. The individual fine aggregate sources shall have a sand equivalent value greater than 45 when tested in accordance with ASTM D 2419.

c. The fine aggregate portion of the blended aggregate shall have an uncompacted void content greater than 45.0 percent when tested in accordance with ASTM C 1252 Method A.

d. Clay lumps and friable particles shall not exceed 0.3 percent, by weight, when tested in accordance with ASTM C 142.

2.1.3 Mineral Filler

Mineral filler shall be nonplastic material meeting the requirements of ASTM D 242.

2.1.4 Aggregate Gradation

The combined aggregate gradation shall conform to gradations specified in Table 2, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table 2. Aggregate Gradations

Sieve Size, inch	Gradation 1 Percent Passing by Mass	Gradation 2 Percent Passing by Mass	Gradation 3 Percent Passing by Mass
1	100	---	---
3/4	76-96	100	---
1/2	68-88	76-96	100
3/8	60-82	69-89	76-96
No. 4	45-67	53-73	58-78
No. 8	32-54	38-60	40-60
No. 16	22-44	26-48	28-48
No. 30	15-35	18-38	18-38
No. 50	9-25	11-27	11-27
No. 100	6-18	6-18	6-18
No. 200	3-6	3-6	3-6

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to ASTM D 946 Penetration Grade 60-70. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer may sample and test the binder at the mix plant at any time before or during mix production. Samples for this verification testing shall be obtained by the Contractor in accordance with ASTM D 140 and in the presence of the Contracting Officer. These samples shall be furnished to the Contracting Officer for the verification testing, which shall be at no cost to the Contractor. Samples of the asphalt cement specified shall be submitted for approval not less than 14 days before start of the test section.

2.3 MIX DESIGN

The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required,

and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using hand-held hammer procedures contained in AI MS-02 and the criteria shown in Table 3. Laboratory compaction temperatures for Polymer Modified Asphalts shall be as recommended by the asphalt cement manufacturer. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867/D 4867M is less than 75, the aggregates shall be rejected or the asphalt mixture treated with an anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an antistrip agent is required, it shall be provided by the Contractor at no additional cost. Sufficient materials to produce 200 pound of blended mixture shall be provided to the Contracting Officer for verification of mix design at least 14 days prior to construction of test section.

2.3.1 JMF Requirements

The job mix formula shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

a. Percent passing each sieve size.

b. Percent of asphalt cement.

c. Percent of each aggregate and mineral filler to be used.

d. Asphalt viscosity grade, penetration grade, or performance grade.

e. Number of blows of hammer per side of molded specimen.

f. Laboratory mixing temperature.

g. Lab compaction temperature.

h. Temperature-viscosity relationship of the asphalt cement.

i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.

j. Graphical plots and summary tabulation of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-02. Summary tabulation shall include individual specimen data for each specimen tested.

k. Specific gravity and absorption of each aggregate.

l. Percent natural sand.

m. Percent particles with two or more fractured faces (in coarse aggregate).

n. Fine aggregate angularity.

o. Percent flat or elongated particles (in coarse aggregate).

p. Tensile Strength Ratio.

q. Antistrip agent (if required).

r. List of all modifiers.

Table 3. Marshall Design Criteria

Test Property	75 Blow Mix	50 Blow Mix
Stability, pounds minimum	2150 (1)	1350 (1)
Flow, 0.01 inch	8-16 (2)	8-18 (2)
Air voids, percent	3-5	3-5
Percent Voids in mineral aggregate (minimum)	See Table 4	See Table 4
Dust Proportion (3)	0.8-1.2	0.8-1.2
TSR, minimum percent	75	75

(1) This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.

(2) The flow requirement is not applicable for Polymer Modified Asphalts

(3) Dust Proportion is calculated as the aggregate content, expressed as a percent of mass, passing the No. 200 sieve, divided by the effective asphalt content, in percent of total mass of the mixture.

Table 4. Minimum Percent Voids in Mineral Aggregate (VMA) (4)

Aggregate (See Table 2)	Minimum VMA, percent
Gradation 2	14.0

(4) Calculate VMA in accordance with AI MS-02, based on ASTM D 2726 bulk specific gravity for the aggregate.

2.3.2 Adjustments to JMF

The JMF for each mixture shall be in effect until a new formula is approved in writing by the Contracting Officer. Should a change in sources of any materials be made, a new mix design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the JMF within the limits specified below to optimize mix volumetric properties. Adjustments to the JMF shall be limited to plus or minus 4 percent on the No. 4 and coarser sieves; plus or minus 3 percent on the No. 8 to No. 50 sieves; and plus or minus 1 percent on the No. 100 sieve. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; this is acceptable. Adjustments to the JMF shall

be limited to plus or minus 1.0 percent on the No. 200 sieve. The resulting aggregate grading on the No. 200 sieve shall not be outside the limits shown in Table 2. Asphalt content adjustments shall be limited to plus or minus 0.40 of binder content. If adjustments are needed that exceed these limits, a new mix design shall be developed.

2.4 (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION OF ASPHALT BINDER MATERIAL

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates.

3.2 PREPARATION OF MINERAL AGGREGATE

The aggregate for the mixture shall be heated and dried prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F when the asphalt cement is added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a thorough and uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D 1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of dust and debris. A prime coat and/or tack coat shall be applied in accordance with the contract specifications.

3.5 TEST SECTION

Prior to full production, the Contractor shall place a test section for each JMF used. The Contractor shall construct a test section 250 - 500 feet long and two paver passes wide placed in two lanes, with a longitudinal cold joint. The test section shall be of the same depth as the course which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same equipment to be used on the remainder of the course represented by the test section. The test section shall be placed as part of the project pavement as approved by the Contracting Officer.

3.5.1 Sampling and Testing for Test Section

One random sample shall be taken at the plant, triplicate specimens compacted, and tested for stability, flow, laboratory air voids, and Tensile Strength Ratio (TSR). A portion of the same sample shall be tested for theoretical maximum density (TMD), aggregate gradation and asphalt content. Four randomly selected cores shall be taken from the finished pavement mat, and four from the longitudinal joint, and tested for density. Random sampling shall be in accordance with procedures contained in ASTM D 3665. The test results shall be within the tolerances or exceed the minimum values shown in Table 5 for work to continue. If all test results meet the specified requirements, the test section shall remain as part of the project pavement. If test results exceed the tolerances shown, the test section shall be removed and replaced at no cost to the Government and another test section shall be constructed.

Table 5. Test Section Requirements for Material and Mixture Properties

Property	Specification Limit
Aggregate Gradation-Percent Passing (Individual Test Result)	
No. 4 and larger	JMF plus or minus 8
No. 8, No. 16, No. 30, and No. 50	JMF plus or minus 6
No. 100 and No. 200	JMF plus or minus 2.0
Asphalt Content, Percent (Individual Test Result)	JMF plus or minus 0.5
Laboratory Air Voids, Percent (Average of 3 specimens)	JMF plus or minus 1.0
VMA, Percent (Average of 3 specimens)	[13] [14] [15] minimum
Stability, pounds (Average of 3 specimens)	[1350] [2150] minimum
Flow, 0.01 inches (Average of 3 specimens)	[8 - 16] [8 - 18]
Tensile Strength Ratio (TSR)	75% minimum
Mat Density, Percent of TMD (Average of 4 Random Cores)	92.0 - 96.0
Joint Density, Percent of TMD (Average of 4 Random Cores)	90.5 - 92.5

3.5.2 Additional Test Sections

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Full production shall not begin until an acceptable section has been constructed and accepted.

3.6 TESTING LABORATORY

The laboratories used to develop the JMF, perform Contractor Quality Control and acceptance testing, and for Government verification testing shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.7 TRANSPORTING AND PLACING

3.7.1 Transporting

The hot-mix asphalt shall be transported from the mixing plant to the site in clean, tight vehicles. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F.

3.7.2 Placing

The mix shall be placed in lifts of adequate thickness and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, the mixture shall be placed to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.8 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor, with the exception that the Contractor shall not apply more than three passes with a vibratory roller in the vibrating mode. The speed of the roller

shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.9 JOINTS

The formation of joints shall be made ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.9.1 Transverse Joints

The roller shall not pass over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. The cutback material shall be removed from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.9.2 Longitudinal Joints

Longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing the adjacent lane), or otherwise defective, shall be cut back a maximum of 3 inches from the top edge of the lift with a cutting wheel to expose a clean, sound vertical surface for the full depth of the course. All cutback material shall be removed from the project. Cutting equipment that uses water as a cooling or cutting agent shall not be permitted. All contact surfaces shall be given a light tack coat of asphalt material prior to placing any fresh mixture against the joint.

3.10 CONTRACTOR QUALITY CONTROL

3.10.1 General Quality Control Requirements

The Contractor shall develop an approved Quality Control Plan. Hot-mix asphalt for payment shall not be produced until the quality control plan has been approved. The plan shall address all elements which affect the quality of the pavement including, but not limited to:

a. Mix Design and unique JMF identification code

b. Aggregate Grading

c. Quality of Materials

d. Stockpile Management and procedures to prevent contamination

e. Proportioning

f. Mixing and Transportation

g. Correlation of mechanical hammer to hand hammer. Determine the number of blows of the mechanical hammer required to provide the same density of the JMF as provided by the hand hammer. Use the average of three specimens per trial blow application.

h. Mixture Volumetrics

i. Moisture Content of Mixtures

j. Placing and Finishing

k. Joints

l. Compaction

m. Surface Smoothness

n. Truck bed release agent

3.10.2 Testing Laboratory

The Contractor shall provide a fully equipped asphalt laboratory located at the plant or job site. It shall be equipped with heating and air conditioning units to maintain a temperature of 75 plus or minus 5 degrees F. Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Contracting Officer shall be permitted unrestricted access to inspect the Contractor's laboratory facility, to witness quality control activities, and to perform any check testing desired. The Contracting Officer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to adversely affect test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are corrected.

3.10.3 Quality Control Testing

The Contractor shall perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but shall not be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, moisture in the asphalt mixture, laboratory air voids, stability, flow, in-place density, grade and smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

3.10.3.1 Asphalt Content

A minimum of two tests to determine asphalt content will be performed per lot (a lot is defined in paragraph MATERIAL ACCEPTANCE) by one of the following methods: extraction method in accordance with ASTM D 2172, Method A or B, the ignition method in accordance with the AASHTO T 308, ASTM D 6307, or the nuclear method in accordance with ASTM D 4125, provided each

method is calibrated for the specific mix being used. For the extraction method, the weight of ash, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

3.10.3.2 Aggregate Gradation and Specific Gravity

Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of recovered aggregate in accordance with ASTM D 5444 or ASTM D 6307. For batch plants, aggregates shall be tested in accordance with ASTM C 136 using actual batch weights to determine the combined aggregate gradation of the mixture. The specifc gravity of each aggregate size grouping shall be determined for each 20,000 tons in accordance with ASTM C 127 or ASTM C 128.

3.10.3.3 Temperatures

Temperatures shall be checked at least four times per lot, at necessary locations, to determine the temperature at the dryer, the asphalt cement in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

3.10.3.4 Aggregate Moisture

The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

3.10.3.5 Moisture Content of Mixture

The moisture content of the mixture shall be determined at least once per lot in accordance with ASTM D 1461 or an approved alternate procedure.

3.10.3.6 Laboratory Air Voids, Marshall Stability and Flow

Mixture samples shall be taken at least four times per lot and compacted into specimens, using 75 blows per side with the Marshall hand-held hammer as described in ASTM D 6926. After compaction, the laboratory air voids of each specimen shall be determined, as well as the Marshall stability and flow, as described in ASTM D 6927.

3.10.3.7 In-Place Density

The Contractor shall conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge or other non-destructive testing device may be used to monitor pavement density.

3.10.3.8 Grade and Smoothness

The Contractor shall conduct the necessary checks to ensure the grade and smoothness requirements are met in accordance with paragraph MATERIAL ACCEPTANCE.

3.10.3.9 Additional Testing

Any additional testing, which the Contractor deems necessary to control the process, may be performed at the Contractor's option.

3.10.3.10 QC Monitoring

The Contractor shall submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

3.10.4 Sampling

When directed by the Contracting Officer, the Contractor shall sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.10.5 Control Charts

For process control, the Contractor shall establish and maintain linear control charts on both individual samples and the running average of last four samples for the parameters listed in Table 6, as a minimum. These control charts shall be posted as directed by the Contracting Officer and shall be kept current at all times. The control charts shall identify the project number, the test parameter being plotted, the individual sample numbers, the Action and Suspension Limits listed in Table 6 applicable to the test parameter being plotted, and the Contractor's test results. Target values from the JMF shall also be shown on the control charts as indicators of central tendency for the cumulative percent passing, asphalt content, and laboratory air voids parameters. When the test results exceed either applicable Action Limit, the Contractor shall take immediate steps to bring the process back in control. When the test results exceed either applicable Suspension Limit, the Contractor shall halt production until the problem is solved. The Contractor shall use the control charts as part of the process control system for identifying trends so that potential problems can be corrected before they occur. Decisions concerning mix modifications shall be made based on analysis of the results provided in the control charts. The Quality Control Plan shall indicate the appropriate action which shall be taken to bring the process into control when certain parameters exceed their Action Limits.

Table 6. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts

	Individual Samples		Running Average of Last Four Samples	
Parameter to be Plotted	Action Limit	Suspension Limit	Action Limit	Suspension Limit
No. 4 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	6	8	4	5
No. 30 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	4	6	3	4
No. 200 sieve, Cumulative %	1.4	2.0	1.1	1.5

Passing, deviation from JMF target; plus or minus values				
Stability, pounds (minimum)				
75 blow JMF	1760	1640	2150	2030
50 blow JMF	950	830	1350	1230
Flow, 0.01 inches				
75 blow JMF	8 min. 16 max.	7 min. 17 max.	9 min. 15 max.	8 min. 16 max.
50 blow JMF	8 min. 18 max.	7 min. 19 max.	9 min. 17 max.	8 min. 18 max.
Asphalt content, % deviation from JMF target; plus or minus value	0.4	0.5	0.2	0.3
Laboratory Air Voids, % deviation from JMF target value	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Mat Density, % of TMD	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Joint Density, % of TMD	No specific action and suspension limits set since this parameter is used to determine percent payment			

3.11 MATERIAL ACCEPTANCE

Testing for acceptability of work will be performed by the Contractor or by an independent laboratory hired by the Contractor. Acceptance of the plant produced mix and in-place requirements will be on a lot to lot basis. A standard lot for all requirements will be equal to 2000 short tons. Acceptance of individual lots of hot-mix asphalt will be made based on in-place density, laboratory air voids, grade and smoothness in accordance with the following paragraphs. Grade and surface smoothness determinations will be made on the lot as a whole. Exceptions or adjustments to this will be made in situations where the mix within one lot is placed as part of both the intermediate and surface courses, thus grade and smoothness measurements for the entire lot cannot be made. In order to evaluate laboratory air voids and in-place (field) density, each lot will be divided into four equal sublots.

3.11.1 Acceptance

When a lot of material fails to meet the specification requirements for acceptance, that lot shall be removed and replaced.

3.11.2 Sublot Sampling

One random mixture sample for determining laboratory air voids, theoretical maximum density, and for any additional testing the Contracting Officer desires, will be taken from a loaded truck delivering mixture to each sublot, or other appropriate location for each sublot. All samples will be selected randomly, using commonly recognized methods of assuring randomness conforming to ASTM D 3665 and employing tables of random numbers or computer programs. Laboratory air voids will be determined from three laboratory

compacted specimens of each sublot sample in accordance with ASTM D 6926. The specimens will be compacted within 2 hours of the time the mixture was loaded into trucks at the asphalt plant. Samples will not be reheated prior to compaction and insulated containers will be used as necessary to maintain the temperature.

3.11.3 Additional Sampling and Testing

The Contracting Officer reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. The cost of any additional testing will be paid for by the Government. Testing in these areas will be treated as a separate lot. Payment will be made for the quantity of HMA represented by these tests in accordance with the provisions of this section.

3.11.4 Laboratory Air Voids and Theoretical Maximum Density

Laboratory air voids will be calculated in accordance with ASTM D 3203 by determining the Marshall density of each lab compacted specimen using the laboratory-prepared, thoroughly dry method in ASTM D 2726 and determining the theoretical maximum density (TMD) of every other sublot sample using ASTM D 2041. Laboratory air void calculations for each sublot will use the latest theoretical maximum density values obtained, either for that sublot or the previous sublot. The mean absolute deviation of the four laboratory air void contents (one from each sublot) from the JMF air void content will be evaluated for acceptance in accordance with Table 7. All laboratory air void tests will be completed and reported within 24 hours after completion of construction of each lot. The TMD is also used for computation of compaction, as required in paragraph: Mat and Joint Densities.

3.11.5 Mean Absolute Deviation

An example of the computation of mean absolute deviation for laboratory air voids is as follows: Assume that the laboratory air voids are determined from 4 random samples of a lot (where 3 specimens were compacted from each sample). The average laboratory air voids for each sublot sample are determined to be 3.5, 3.0, 4.0, and 3.7. Assume that the target air voids from the JMF is 4.0. The mean absolute deviation is then:

Mean Absolute Deviation = (|3.5 - 4.0| + |3.0 - 4.0| + |4.0 - 4.0| + |3.7 - 4.0|)/4

= (0.5 + 1.0 + 0.0 + 0.3)/4 = (1.8)/4 = 0.45

The mean absolute deviation for laboratory air voids is determined to be 0.45. It can be seen from Table 7 that the lot is acceptable.

Table 7. Acceptance Based on Laboratory Air Voids

Mean Absolute Deviation of Lab Air Voids from JMF	Accept/Reject
0.80 or less	Accept
0.81 or greater	Reject

3.11.6 In-place Density

3.11.6.1 General Density Requirements

For determining in-place density, one random core (4 inches or 6 inches in diameter) will be taken by the Contractor from the mat (interior of the lane) of each sublot, and one random core will be taken from the joint (immediately over joint) of each sublot, in accordance with ASTM D 979. Each random core will be full thickness of the layer being placed. When the random core is less than 1 inch thick, it will not be included in the analysis. In this case, another random core will be taken. After air drying in accordance with ASTM D 2726 for laboratory-prepared, thoroughly dry specimens, cores obtained from the mat and from the joints will be used for in-place density determination.

3.11.6.2 Mat and Joint Densities

The average in-place mat and joint densities are expressed as a percentage of the average TMD for the lot. The average TMD for each lot will be determined as the average TMD of the two random samples per lot. The average in-place mat density and joint density for a lot are determined and compared with Table 8 to determine acceptance or rejection of the lot.

Table 8. Accpetance Based on In-place Density

Average Mat Density (4 Cores)	Accept/Reject	Average Joint Density (4 Cores)
93.0 - 96.5	Accept	91.5 - 96.5
below 93.0 / above 96.5	Reject	below 91.5 / above 96.5

3.11.7 Grade

Within 5 working days after completion of a particular lot incorporating the final wearing course, the Contractor shall test the final wearing surface of the pavement for conformance with specified plan grade requirements. All testing shall be performed in the presence of the Contracting Officer. The final wearing surface of pavement shall conform to the elevations and cross sections shown within a tolerance of 0.03 foot for runways or 0.05 foot for taxiways and aprons from the plan grade established and approved at site of work. Finished surfaces at juncture with other pavements shall coincide with finished surfaces of abutting pavements. Deviation from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. The grade will be determined by running lines of levels at intervals of 25 feet, or less, longitudinally and transversely, to determine the elevation of the completed pavement surface. Detailed notes of the results of the testing shall be kept and a copy furnished to the Government immediately after each day's testing. When more than 10 percent of all measurements made within a lot are outside the tolerance, the Contractor shall remove the surface lift full depth; the Contractor shall then replace the lift with hot-mix asphalt to meet specification requirements, at no additional cost to the Government. Diamond grinding may be used to remove high spots to meet grade requirements. Skin patching for correcting low areas or planing or milling for correcting high areas will not be permitted.

3.11.8 Surface Smoothness

The Contractor shall use both of the following methods to test and evaluate surface smoothness of the pavement. All testing shall be performed in the presence of the Contracting Officer. Detailed notes of the results of the testing shall be kept and a copy furnished to the Government immediately after each day's testing. The profilograph method shall be used for all longitudinal and transverse testing, except where the runs would be less than 200 feet in length and the ends where the straightedge shall be used. Where drawings show required deviations from a plane surface (crowns, drainage inlets, etc.), the surface shall be finished to meet the approval of the Contracting Officer.

3.11.8.1 Smoothness Requirements

a. Straightedge Testing: The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified in Table 9 when checked with an approved 12 foot straightedge.

Table 9. Straightedge Surface Smoothness--Pavements

Pavement Category	Direction of Testing	Tolerance, inches
Runways and taxiways	Longitudinal	1/8
	Transverse	1/4
Calibration hardstands and compass swinging bases	Longitudinal	1/8
	Transverse	1/8
All other airfields and helicopter paved areas	Longitudinal	1/4
	Transverse	1/4

b. Profilograph Testing: The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavement shall have a Profile Index not greater than specified in Table 10 when tested with an approved California-type profilograph. If the extent of the pavement in either direction is less than 200 feet, that direction shall be tested by the straightedge method and shall meet requirements specified above.

Table 10. Profilograph Surface Smoothness--Pavements

Pavement Category	Direction of Testing	Maximum Specified Profile Index (inch/mile)
Runways	Longitudinal	7
	Transverse	9
Taxiways	Longitudinal	9
	Transverse	(Use Straightedge)
Calibration Hardstands & Compass Swinging Bases		(Use Straightedge)
All Other Airfield & Helicopter Paved Areas	Longitudinal	9
	Transverse	9

3.11.8.2 Testing Method

After the final rolling, but not later than 24 hours after placement, the surface of the pavement in each entire lot shall be tested by the Contractor in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. Separate testing of individual sublots is not required. If any pavement areas are ground, these areas shall be retested immediately after grinding. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines. The transverse lines shall be 15 feet or less apart, as directed. The longitudinal lines shall be at the centerline of each paving lane for lines less than 20 feet and at the third points for lanes 20 feet or greater. Other areas having obvious deviations shall also be tested. Longitudinal testing lines shall be continuous across all joints.

a. Straightedge Testing. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points.

b. Profilograph Testing. Profilograph testing shall be performed using approved equipment and procedures described in CDT Test 526. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must-grind" bumps and the Profile Index for the pavement. The "blanking band" shall be 0.2 inches wide and the "bump template" shall span 1 inch with an offset of 0.4 inch. The profilograph shall be operated by an approved, factory-trained operator on the alignments specified above. A copy of the reduced tapes shall be furnished the Government at the end of each day's testing.

3.11.8.3 Payment Adjustment for Smoothness

a. Straightedge Testing. Location and deviation from straightedge for all measurements shall be recorded. When more than 10.0 percent of all measurements made within a lot exceed the tolerance specified in paragraph Smoothness Requirements above, after any reduction of high spots or removal and replacement, the lot shall be removed and replaced at no additional cost to the Government. Regardless of the above, any small individual area with surface deviation which exceeds the tolerance given above by more than 50 percent, shall be corrected by diamond grinding to meet the specification requirements above or shall be removed and replaced at no additional cost to the Government.

b. Profilograph Testing. Location and data from all profilograph measurements shall be recorded. When the Profile Index of a lot exceeds the tolerance specified in paragraph Smoothness Requirements above by 1.0 inch/mile, the lot shall be removed and replaced at no additional cost to the Government. Regardless of the above, any small individual area with surface deviation which exceeds the tolerance given above by more than 5.0 inches/mile or more, shall be corrected by grinding to meet the specification requirements above or shall be removed and replaced at no additional cost to the Government.

c. Bumps ("Must Grind" Areas). Any bumps ("must grind" areas) shown on the profilograph trace which exceed 0.4 inch in height shall be reduced by diamond grinding until they do not exceed 0.3 inch when retested. Such grinding shall be tapered in all directions to provide smooth

transitions to areas not requiring grinding. The following will not be permitted: (1) skin patching for correcting low areas, (2) planing or milling for correcting high areas. At the Contractor's option, pavement areas, including ground areas, may be rechecked with the profilograph in order to record a lower Profile Index.

-- End of Section --

321311 - CONCRETE PAVEMENT

SECTION 32 13 11
CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306R	(1988; R 2002) Cold Weather Concreting

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005) Burlap Cloth Made from Jute or Kenaf

ASTM INTERNATIONAL (ASTM)

ASTM A 184/A 184M	(2001) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185/A 185M	(2006; E 2006) Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 497/A 497M	(2006; E 2006) Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A 615/A 615M	(2006a) Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
ASTM A 775/A 775M	(2004a) Epoxy-Coated Reinforcing Steel Bars
ASTM A 996/A 996M	(2004) Rail-Steel and Axle-Steel Deformed Bars or Concrete Reinforcement
ASTM C 1064/C 1064M	(2005) Temperature of Freshly Mixed Portland Cement Concrete

ASTM C 1077	(2005a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 123	(2004) Lightweight Particles in Aggregate
ASTM C 1240	(2004) Silica Fume Used in Cementitious Mixtures
ASTM C 1260	(2005) Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 142	(1997; R 2004) Clay Lumps and Friable Particles in Aggregates
ASTM C 143/C 143M	(2005a) Slump of Hydraulic Cement Concrete
ASTM C 150	(2005) Portland Cement
ASTM C 1567	(2004) Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C 1602/C 1602M	(2006) Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C 172	(2004) Sampling Freshly Mixed Concrete
ASTM C 174/C 174M	(1997) Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C 192/C 192M	(2005) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2004) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 294	(2004) Standard Descriptive Nomenclature for Constituents of Concrete Aggregates
ASTM C 295	(2003) Petrographic Examination of Aggregates for Concrete
ASTM C 31/C 31M	(2003a) Making and Curing Concrete Test Specimens in the Field

ASTM C 33	(2003) Concrete Aggregates
ASTM C 494/C 494M	(2005a) Chemical Admixtures for Concrete
ASTM C 78	(2002) Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
ASTM C 881/C 881M	(2002) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 94/C 94M	(2004a) Ready-Mixed Concrete
ASTM D 1751	(2004) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2995	(1999; R 2004) Determining Application Rate of Bituminous Distributors
ASTM D 3665	(2002) Random Sampling of Construction Materials
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 75	(2003) Sampling Aggregates

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA QC 3	(2002) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CDT)

CDT Test 526	(2002) Operation of California Profilograph and Evaluation of Profiles

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 130	(2001) Standard Recommended Practice for Estimating Scratch Hardness of Coarse Aggregate Particles
COE CRD-C 143	(1962) Specifications for Meters for Automatic Indication of Moisture in Fine Aggregates
COE CRD-C 300	(1990) Specifications for Membrane-Forming Compounds for Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

COE CRD-C 55 (1992) Test Method for Within-Batch Uniformity of Freshly Mixed Concrete

1.2 SYSTEM DESCRIPTION

This section is intended to stand alone for construction of concrete pavement. However, where the construction covered herein interfaces with other sections, the construction at each interface shall conform to the requirements of both this section and the other section, including tolerances for both.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-03 Product Data

Equipment

a. Details and data on the batching and mixing plant prior to plant assembly including manufacturer's literature showing that the equipment meets all requirements specified herein.

b. A certified copy of the NRMCA QC Manual Section 3 Concrete Plant Certification Checklist and Calibration documentation on all measuring and weighing devices, submitted prior to uniformity testing.

c. A description of the equipment proposed for transporting concrete mixture from the central mixing plant to the paving equipment.

d. A description of the equipment proposed for the machine and hand placing, consolidating and curing of the concrete mixture. Manufacturer's literature on the paver and finisher, together with the manufacturer's written instructions on adjustments and operating procedures necessary to assure a tight, smooth surface on the concrete pavement. The literature shall show that the equipment meets all details of these specifications.

Proposed Techniques; G, ED

Placing and protection methods; paving sequence; jointing pattern; data on curing equipment and profilographs; demolition of existing pavements; as specified.

SD-05 Design Data

Proportioning Studies; G, ED

The results of the mixture proportioning studies shall be signed and stamped by the registered professional engineer having technical responsibility for the mix design study and submitted at least 30 days prior to commencing concrete placing operations. The

results shall include a statement giving the maximum nominal coarse aggregate size and the weights and volumes of each ingredient proportioned on a one cubic yard basis. Aggregate quantities shall be based on the mass in a saturated surface dry condition. The recommended mixture proportions shall be accompanied by test results demonstrating that the proportions selected will produce concrete of the qualities indicated. The submittal shall include:

a. Coarse and fine aggregate gradations and plots.
b. Combined aggregate gradation and coarseness/workability plots.
c. Coarse aggregate quality test results, including deleterious materials.
d. Fine aggregate quality test results.
e. Mill certificates for cement and silica fume.
f. Certified test results for air entraining, water reducing, retarding, non-chloride accelerating admixtures.
g. Specifed flexural strength, slump, and air content.
h. Documentation of required average CQC flexural strength, Ra.
i. Recommended proportions/volumes for proposed mixture and each of three trial water-cementitious materials ratios.
j. Individual beam breaks.
k. Flexural strength summaries and plots.
l. Correlation ratios for acceptance testing and CQC testing.

SD-06 Test Reports

Sampling and Testing; G, ED

Certified copies of laboratory test reports and sources for cement and silica fume, aggregates, admixtures, curing compound, epoxy, and proprietary patching materials proposed for use on this project. All aggregate tests shall have been performed no earlier than 6 months prior to contract award.

SD-07 Certificates

Contractor Quality Control Staff; G, ED

American Concrete Institute certification for Contractor Quality Control staff. Qualifications and resumes for petrographer, surveyor, concrete batch plant operator, and profilograph operator.

Laboratory Accreditation; G, ED

Accreditation of the commercial laboratory by an independent evaluation authority, indicating conformance to ASTM C 1077, including all applicable test procedures.

1.4 ACCEPTABILITY OF WORK

1.4.1 Pavement Lots

A lot will be that quantity of construction that will be evaluated for acceptance with specification requirements. A lot will be equal to one shift of production not to exceed 1000 cubic yards. In order to evaluate thickness, each lot will be divided into four equal sublots. Grade determinations will be made on the lot as a whole. Surface smoothness determinations will be made on every 0.1 mile segment in each lot. Location

of all samples shall be selected on a random basis in accordance with ASTM D 3665. When operational conditions cause a lot to be terminated before the specified four sublots have been completed, the following procedure shall be used to adjust the lot size and number of tests for the lot. Where three sublots have been completed, they shall constitute a lot. Where one or two sublots have been completed, they shall be incorporated into the next lot (except for the last lot), and the total number of sublots shall be used and acceptance criteria adjusted accordingly.

1.4.2 Acceptance of Lots

When a lot of material fails to meet the specification requirements, that lot shall be removed and replaced. Results of strength tests shall be used to control concreting operations. Any pavement not meeting the required 'specified strength' shall be removed and replaced at no additional cost to the Government.

1.4.3 Evaluation

The Contractor shall provide all sampling and testing required at the Contractor's expense. Individuals performing sampling, testing and inspection duties shall meet the requirements of paragraph: QUALIFICATIONS.

1.4.4 Additional Sampling and Testing

The Contracting Officer reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. Testing in these areas will be in addition to the sublot or lot testing, and the requirements for these areas will be the same as those for a sublot or lot. The Contractor shall provide facilities for and, where directed, personnel to assist in obtaining samples for any Government testing.

1.4.5 Surface Smoothness

The profilograph method shall be used for all longitudinal testing, except for paving lanes less than 200 feet in length. The straightedge method shall be used for transverse testing, for longitudinal testing where the length of each pavement lane is less than 200 feet, and at the ends of the paving limits for the project. Where drawings show required deviations from a plane surface (crowns, drainage inlets, etc.), the surface shall be finished to meet the approval of the Contracting Officer. Detailed notes shall be kept of the results of the testing and a copy furnished to the Government after each day's testing.

1.4.5.1 Smoothness Requirements

a. Straightedge Testing: The finished surfaces of the pavements shall have no abrupt change of 1/4 inch or more, and all pavements shall be within the limits specified herinafter when checked with an approved 12 foot straightedge. Runways and taxiways shall have a variation from the specified straight edge not greater than 1/8 inch in the longitudinal direction and not greater than 1/4 inch in the transverse direction. All other airfield areas shall have a variation from a straight edge not greater than 1/4 inch in either the longitudinal or transverse direction.

b. Profilograph Testing: The finished surfaces of the pavements shall have no abrupt change of 1/4 inch or more, and each 0.1 mile segment of

each pavement lot shall have a Profile Index not greater than specified herinafter when tested with an approved California-type profilograph. Runways and taxiways shall have a Profile index not greater than 7 inches per mile in the longitudinal direction. Runway and taxiway transverse smoothness shall be measured with the straight edge method and the straight edge requirements shall apply. All other airfield areas shall have a Profile Index not greater than 9 inches per mile in the longitudinal direction.

1.4.5.2 Testing Method

After the concrete has hardened sufficiently to permit walking thereon, but not later than 48 hours after placement, the entire surface of the pavement in each lot shall be tested by the Contractor in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. If any pavement areas are ground, these areas shall be retested immediately after diamond grinding. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines. The transverse lines shall be 15 feet or less apart, as directed. The longitudinal lines shall be at the centerline of each paving lane shown on the drawings, regardless of whether the Contractor is allowed to pave two lanes at a time, and at the 1/8th point in from each side of the lane. Other areas having obvious deviations shall also be tested. Longitudinal testing lines shall be continuous across all joints. Transverse testing lines for pilot lanes shall be carried to construction joint lines and for fill-in lanes shall be carried 24 inches across construction joints, and the readings in this area applied to the fill-in lane. Straightedge testing of the longitudinal edges of slipformed pilot lanes shall also be performed before paving fill-in lanes as specified in paragraph "Edge Slump and Joint Face Deformation".

a. Straightedge Testing: The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and measuring the maximum gap between the straightedge and the pavement surface. Measurements shall be determined along the entire length of the straight edge.

b. Profilograph Testing: Profilograph testing shall be performed using approved equipment and procedures described in CDT Test 526. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must-grind" bumps and the Profile Index for each 0.1 mile segment of the pavement lot. Grade breaks on aprons shall be accomodated by breaking the profile segment into short sections and repositioning the blanking band on each section. The "blanking band" shall be 0.2 inches wide and the "bump template" shall span 1 inch with an offset of 0.4 inch. The profilograph testing of the last 30 feet of a paving lane in the longitudinal direction from each day's paving operation shall be counted on the following day's continuation lane. The profile index shall be computed for each pass of the profilograph (3 per lane) in each 0.1 mile segment. The profile index for each segment shall be the average of the profile indices for each pass in each segment. Profilographs of unequal lengths shall be scaled and proportioned to an equivalent 0.1 mile as outlined in the CDT Test 526. A copy of the reduced tapes shall be furnished the Government at the end of each day's testing.

1.4.5.3 Acceptance for Smoothness

a. Straightedge Testing: Location and deviation from straightedge for all measurements shall be recorded. When 10.0 percent or more of all measurements made within a lot exceed the tolerance specified in paragraph "Smoothness Requirements" above, after any reduction of high spots or removal and replacement, the lot shall be removed and replaced at no additional cost to the Government.

b. Profilograph Testing: Location and data from all profilograph measurements shall be recorded. When the Profile Index of a 0.1 mile segment of a lot exceeds the tolerance specified in paragraph "Smoothness Requirements" above by 1.0 inch per mile or more, the lot shall be removed and replaced at no additional cost to the Government.

c. Bumps ("Must Grind" Areas): Any bumps ("must grind" areas) shown on the profilograph trace which exceed 0.4 inch in height shall be reduced by diamond grinding in accordance with subparagraph "Areas Defective In Plan Grade Or Smoothness" until they do not exceed 0.3 inch when retested. Such grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding.

1.4.6 Edge Slump and Joint Face Deformation

1.4.6.1 Edge Slump

When slip-form paving is used, not more than 15.0 percent of the total free edge of each pavement panel shall have an edge slump exceeding 1/4 inch and none of the free edge of the pavement lot shall have an edge slump exceeding 3/8 inch as determined in accordance with the measurements specified in paragraph: "Determination of Edge Slump". (A pavement panel is defined as a lane width by the length between two adjacent transverse contraction joints. The total free edge of the pavement will be considered to be the cumulative total linear measurement of pavement panel edge originally constructed as non-adjacent to any existing pavement; i.e., 100 feet of pilot lane originally constructed as a separate lane, will have 200 feet of free edge; 100 feet of fill-in lane will have no free edge, etc.,). The area affected by the downward movement of the concrete along the pavement edge shall not exceed 18 inches back from the edge.

1.4.6.2 Joint Face Deformation

In addition to the edge slump limits specified above, the vertical joint face shall have a surface within the maximum limits shown below:

Offset from Straightedge Applied Longitudinally To Pavement Surface	Offset from Straightedge Applied Longitudinally To Vertical Face	Offset From Straightedge Applied Top to Bottom Against the Joint Face	Abrupt Offset in Any Direction	Offset of Joint Face From True Vertical
Airfield Pavement				
3 mm	6 mm	9 mm	3 mm	8 mm/100 mm

1.4.6.3 Determination of Edge Slump and Joint Face Deformation

Immediately after the concrete has hardened sufficiently to permit walking thereon, the pavement surface of each lot shall be tested by the Contractor. Testing shall be performed with a minimum 12 foot straightedge to reveal irregularities exceeding the edge slump tolerance specified above. The vertical edge slump shall be determined at each free edge of each slipformed paving lane constructed. The straightedge shall be placed transverse to the direction of paving and the end of the straightedge located at the edge of the paving lane. Measurements shall be made at 5 to 15 foot spacings, as directed, commencing at the header where paving was started. Initially measurements shall be made at 5 foot intervals in each lane. When no deficiencies are present, the Contracting Officer may approve an increase in the interval. When any deficiencies exist, the interval will be returned to 5 feet. In no case shall the interval exceed 15 feet. In addition to the transverse edge slump determination above, the Contractor, at the same time, shall check the longitudinal surface smoothness of the joint on a continuous line 1 inch back from the joint line using the 12 foot straightedge advanced one-half its length for each reading. Other tests of the exposed joint face shall be made to ensure that a uniform, true vertical joint face is attained. The measurements shall be made by the Contractor, shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Contracting Officer within 24 hours after measurement is made. The report shall also identify areas requiring replacement in accordance with paragraph: "Excessive Edge Slump".

1.4.6.4 Excessive Edge Slump

When edge slump exceeding the limits specified above is encountered on either side of the paving lane, additional straightedge measurements shall be made, if required, to define the linear limits of the excessive slump. The concrete slabs having excessive edge slump or joint deformation shall be removed and replaced to the next transverse joint in conformance with paragraph: REPAIR, REMOVAL, REPLACEMENT OF NEWLY CONSTRUCTED SLABS. Use of slip-form paving equipment and procedures that fail to consistently provide edges within the specified tolerances on edge slump and joint face deformation shall be discontinued and the pavements shall be constructed by means of standard paving procedures using fixed forms.

1.4.7 Plan Grade

1.4.7.1 Grade Conformance Tests

Within 5 days after paving of each lot, the finished surface of the pavement area shall be tested by the Contractor, by running lines of levels at intervals corresponding with every longitudinal and transverse joint to determine the elevation at each joint intersection. The results of this survey shall be recorded and a copy given to the Government at the completion of the survey of each lot. The finished surfaces of airfield runway, taxiway, and apron pavements shall vary not more than 1/2 inch above or below the plan grade line or elevation indicated. The surfaces of other pavements shall vary not more than 3/4 inch. The above deviations from the approved grade line and elevation will not be permitted in areas where closer conformance with the planned grade and elevation is required for the proper functioning of appurtenant structures. The finished surfaces of new abutting pavements shall coincide at their juncture.

1.4.7.2 Acceptance for Plan Grade

When 10.0 percent or more of all measurements made within a lot are outside the specified tolerance, the deficient area shall be removed and replaced at no additional cost to the Government.

1.4.8 Flexural Strength

Each lot of pavement will be evaluated for acceptance in accordance with the following procedures.

1.4.8.1 Sampling and Testing

For acceptance, one composite sample of concrete from each sublot shall be obtained in accordance with ASTM C 172 from one batch or truckload. Test beams 6 x 6 inches shall be fabricated and cured in accordance with ASTM C 31/C 31M; and tested in accordance with ASTM C 78. Two test beams per sublot (8 per lot) shall be tested at 28 days.

1.4.8.2 Computations

Average the eight 28-day strength tests for the lot. The average strength shall be used in accordance with paragraph "Concrete Strength for Final Acceptance".

1.4.9 Thickness

Each lot of pavement will be evaluated for acceptance in accordance with the following procedure. The Contractor shall be responsible for drilling the cores, measuring the cores, and for filling the core holes with a non-shrink concrete, as approved.

1.4.9.1 Drilling, Measuring, and Computations

Two cores, between 4 and 6 inches in diameter, shall be drilled from the pavement, per sublot (8 per lot). Eight measurements of thickness shall be made around the circumference of each core and one in the center, in accordance with ASTM C 174/C 174M, using calibrated calipers for specimens longer than 10 inches. The pavement thickness from the 8 cores for the lot shall be averaged and shall be evaluated as described below.

1.4.9.2 Evaluation for Thickness

Computed Percent Payment for Thickness

Determined by Cores Inches	Deficiency in Thickness Pavements Over 8 Inches Thick	Pavements Less than 8 Inches Thick
0.00 to 0.24	100	100
0.25 to 0.49	75	65
0.50 to 0.74	50	0
0.75 or greater	0	0

Where rejection is indicated, the entire lot shall be removed and replaced at no additional cost to the Government. Where either of the two cores from a sublot show a thickness deficiency of 0.75 inch or greater, two more cores shall be drilled in the sublot and the average thickness of the four cores computed. If this average shows a thickness deficiency of 0.75 inch or more the entire sublot shall be removed.

1.4.10 Areas Defective in Plan Grade or Smoothness

In areas not meeting the specified limits for surface smoothness and plan grade, high areas shall be reduced to attain the required smoothness and grade, except as depth is limited below. High areas shall be reduced by grinding the hardened concrete with an approved diamond grinding machine after the concrete is 14 days or more old. The area corrected by grinding the surface of the hardened concrete shall not exceed 1 percent of the total area of any sublot. The depth of diamond grinding shall not exceed 1/4 inch. All pavement areas requiring plan grade or surface smoothness corrections in excess of the limits specified above, shall be removed and replaced in conformance with paragraph REPAIR, REMOVAL, REPLACEMENT OF NEWLY CONSTRUCTED SLABS. All areas in which diamond grinding has been performed will be subject to the thickness tolerances specified in paragraph: Thickness. Any diamond grinding performed on individual slabs with excessive deficiencies shall be performed at the Contractor's own decision without entitlement to additional compensation if eventual removal of the slab is required.

1.5 ACCEPTABILITY OF WORK

The materials and the pavement itself will be accepted on the basis of tests made by the Contractor. The Government may, at its discretion, make check tests to validate the results of the Contractor's testing. If the results of the Contractor tests vary by less than 2.0 percent of the Government's test results, the results of the Contractor's tests will be used. If the results of the Government and Contractor tests vary by 2.0 percent, but less than 4.0 percent, the average of the two will be considered the value to be used. If these vary by 4.0 percent or more, each sampling and testing procedure shall be carefully evaluated and both the Government and the Contractor shall take another series of tests on duplicate samples of material. If these vary by 4.0 percent or more, the results of the tests made by the Government shall be used and the Government will continue check testing of this item on a continuous basis until the two sets of tests agree within less than 4.0 percent on a regular basis. Testing performed by the Government will in no way at any time relieve the Contractor from the specified testing requirements.

1.6 PRECONSTRUCTION TESTING OF MATERIALS

All sampling and testing shall be performed by, and at the expense of, the Contractor. The Contractor shall use an approved commercial laboratory or, for cementitious materials and chemical admixtures, a laboratory maintained by the manufacturer of the material. No material shall be used until notice of acceptance has been given. The Contractor will not be entitled to any additional payment or extension of time due to failure of any material to meet project requirements, or for any additional sampling or testing required. Additional tests may be performed by the Government at the discretion of the Contracting Officer; such Government testing will not relieve the Contractor of any testing responsibilities.

1.6.1 Aggregates

Aggregates shall be sampled by the Contractor in the presence of a Government representative. Samples shall be obtained in accordance with ASTM D 75 and shall be representative of the materials to be used for the project. Test results shall be submitted 7 days before commencing mixture proportioning studies.

1.6.2 Chemical Admixtures, Curing Compounds and Epoxies

At least 30 days before the material is used, the Contractor shall submit certified copies of test results for the specific lots or batches to be used on the project. Test results shall be not more than 6 months old prior to use in the work. Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing will be retested at the expense of the Contractor and shall be rejected if test results are not satisfactory.

1.6.3 Cementitious Materials

Cement and silica fume will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports showing that the material in each shipment meets the requirements of the specification under which it is furnished. Mill test reports shall be no more than 1 month old, prior to use in the work. No cementitious material shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious material may be subjected to check testing by the Government from samples obtained at the mill, at transfer points, or at the project site. If tests prove that a cementitious material that has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cementitious material that has not been used within 6 months after testing shall be retested at the Contractor's expense and shall be rejected if test results are not satisfactory.

1.7 TESTING DURING CONSTRUCTION

During construction, the Contractor shall be responsible for sampling and testing aggregates, cementitious materials, and concrete as specified herein. The Government will sample and test concrete and ingredient materials as considered appropriate. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Testing by the Government will in no way relieve the Contractor of the specified testing requirements.

1.8 QUALIFICATIONS

1.8.1 Contractor Quality Control Staff

All Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) certified in the following grade (or shall have written evidence acceptable to the Contracting Officer's representative of having completed similar qualification programs):

1. CQC personnel responsible for inspection of concrete paving operations: ACI Concrete Transportation Inspector.

2. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews: ACI Concrete Flatwork Technician/Finisher.

3. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

4. Laboratory Testing Technicians: ACI Concrete Strength Testing Technician and Laboratory Testing Technician, Grade I or II.

1.8.2 Other Staff

Submit for approval, the qualifications and resumes for the following staff:

1. Petrographer: Bachelor of Science degree in geology or petrography, trained in petrographic examination of concrete aggregate according to ASTM C 294 and ASTM C 295 and trained in identification of the specific deleterious materials and tests identified in this specification. Resume shall detail the education, training and experience related to the project-specific test methods and deleterious materials and shall be submitted at least 20 days before petrographic and deleterious materials examination is to commence.

2. Licensed Surveyor: All survey work shall be performed under the supervision of a Licensed Surveyor.

3. Concrete Batch Plant Operator: National Ready Mix Concrete Association (NRMCA) Level 2.

4. Profilograph Operator: Certification by equipment manufacturer or a state Department of Transportation.

1.8.3 Laboratory Accreditation

Laboratory and testing facilities shall be provided by and at the expense of the Contractor. The laboratories performing the tests shall be accredited in accordance with ASTM C 1077, including ASTM C 78 and ASTM C 1260. The accreditation shall be current and shall include the required and optional test methods, as specified throughout this section. Onsite temperature-controlled concrete curing facilities shall be provided.

1. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies shall be performed by a commercial laboratory.

2. Acceptance Testing: The Contractor shall furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Steel molds shall be used for molding the beam specimens. The Contractor shall furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C 31/C 31M. Flexural loading equipment shall be in accordance with ASTM C 78.

3. Contractor Quality Control: All sampling and testing shall be performed by an approved, onsite, independent, commercial laboratory, or for cementitious materials and admixtures, the manufacturer's laboratory.

4. Laboratory Inspection: The Government will inspect the laboratory equipment and test procedures prior to the start of concreting operations for conformance to ASTM C 1077. The laboratory shall maintain this certification for the duration of the project.

1.9 TEST SECTION

At least 10 days but not more than 60 days prior to construction of the concrete pavement, a test section shall be constructed near the job site, but not as part of the production pavement area. The Contractor shall use the test section to develop and demonstrate to the satisfaction of the

Contracting Officer the proposed techniques of mixing, hauling, placing, consolidating, finishing, curing, initial saw cutting, start-up procedures, testing methods, plant operations, and the preparation of the construction joints. The test section shall consist of one paving lane at least 400 feet long and shall be constructed to the same thickness as the thickest portion of pavement shown on the Drawings. The lane width shall be the same as that required for use in the project. The test section shall contain at least one transverse construction joint. If doweled longitudinal construction joints are required in any of the production pavements, they shall be installed full length along one side of the test strip throughout the test section. Two separate days shall be used for construction of the test section. Variations in mixture proportions other than water shall be made if directed. The Contractor shall vary the water content, as necessary, to arrive at the appropriate content. The mixing plant shall be operated and calibrated prior to start of placing the test section. The Contractor shall use the same equipment, materials, and construction techniques on the test section as will be used in all subsequent work. Base course preparation, concrete production, placing, consolidating, curing, construction of joints, and all testing shall be in accordance with applicable provisions of this specification. Three days after completion of the test section, the Contractor shall provide eight cores at least 6 inch diameter by full depth cut from points selected in the test section by the Government. The cores will be evaluated for homogeneity, consolidation and segregation. The Contractor shall construct the test section meeting all specification requirements and being acceptable to the Contracting Officer in all aspects, including surface texture. Failure to construct an acceptable test section will necessitate construction of additional test sections at no additional cost to the Government. If the Contractor proposes to use slipform paving and is unable to construct an acceptable test section, the slipform paving equipment shall be removed from the job and the construction completed using stationary side forms and equipment compatible with them. Production paving shall not commence until the results on aggregates and concrete, including evaluation of the cores, and all pavement measurements for edge slump, joint face deformation, actual plan grade, surface smoothness and thickness have been submitted and approved by the Contracting Officer.

1.10 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

1.10.1 Bulk Cementitious Materials

All cementitious material shall be furnished in bulk. The temperature of the cementitious material, as delivered to storage at the site, shall not exceed 150 degrees F. Sufficient cementitious materials shall be in storage to sustain continuous operation of the concrete mixing plant while the pavement is being placed. Separate facilities shall be provided which will prevent any intermixing during unloading, transporting, storing, and handling of each type of cementitious material.

1.10.2 Aggregate Materials

Aggregate shall be stored at the site of the batching and mixing plant avoiding breakage, segregation, intermixing or contamination by foreign materials. Each size of aggregate from each source shall be stored separately in free-draining stockpiles. Aggregate stored on ground shall have a minimum 24 inch thick sacrificial layer left undisturbed. Fine aggregate and the smallest size coarse aggregate shall remain in free-draining storage for at least 24 hours immediately prior to use. Sufficient aggregate shall be maintained at the site at all times to permit continuous uninterrupted operation of the mixing plant at the time concrete pavement is

being placed. Tracked equipment shall not be allowed on coarse aggregate stockpiles.

1.10.3 Other Materials

Reinforcing bars and accessories shall be stored above the ground on supports. All materials shall be stored avoiding contamination and deterioration.

1.11 EQUIPMENT

All plant, equipment, tools, and machines used in the work shall be maintained in satisfactory working conditions at all times.

1.11.1 Batching and Mixing Plant

1.11.1.1 Location of Batching and Mixing Plant

The location for the batching and mixing plant shall be the Contractor's responsibility and its location shall be subject to the Contracting Officer's approval. There shall be operable telephonic or radio communication between the plant and the placing site at all times concreting is taking place. The method of communication shall be subject to the Contracting Officer's approval. The Contractor shall submit to the Contracting Officer the frequency, output power and antenna gain for all radio communication equipment used at the project site.

1.11.1.2 Type and Capacity of Batching and Mixing Plant

The batching and mixing plant shall be a stationary-type central mix plant. The plant shall be designed and operated to produce concrete within the specified tolerances, and shall have a capacity of at least 250 cubic yards per hour. The batching and mixing plant shall conform to the requirements of NRMCA QC 3 including provisions addressing:

1. Material Storage and Handling
2. Batching Equipment
3. Central Mixer
4. Ticketing System
5. Delivery System

1.11.1.3 Batching Tolerances

The following tolerances shall apply.

Materials	Percentage of Required Mass
Cementitious Materials	plus or minus 1
Aggregate	plus or minus 2
Water	plus or minus 1
Admixture	plus or minus 3

For volumetric batching equipment for water and admixtures, the above numeric tolerances shall apply to the required volume of material being batched. Concentrated admixtures shall be uniformly diluted, if necessary, to provide sufficient volume per batch to ensure that the batchers will consistently operate within the above tolerance.

1.11.1.4 Moisture Control

The plant shall be capable of ready adjustment to compensate for the varying moisture contents of the aggregates and to change the quantities of the materials being batched. An electric moisture meter complying with the provisions of COE CRD-C 143 shall be provided for measuring of moisture in the fine aggregate. The sensing element shall be arranged so that measurement is made near the batcher charging gate of the fine aggregate bin or in the fine aggregate batcher.

1.11.2 Concrete Mixers

Mixers shall be stationary or truck mixers. Truck mixers shall not be used for mixing or transporting slipformed paving concrete. Mixers shall be capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Mixer blades or paddles shall be replaced when worn down more than 10 percent of their depth when compared with the manufacturer's dimension for new blades or paddles.

1.11.2.1 Stationary, Central Plant, Mixers

Stationary mixers shall be drum or pan mixers. Mixers shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed.

1.11.2.2 Truck Mixers

The only truck mixers used for mixing or transporting paving concrete shall be those designed with extra large blading and rear opening specifically for low-slump paving concrete. Truck mixers, the mixing of concrete therein, and concrete uniformity and testing thereof shall conform to the requirements of ASTM C 94/C 94M. The number of revolutions between 70 to 100 for truck-mixed concrete and the number of revolutions for shrink-mixed concrete shall be determined by uniformity tests as specified in ASTM C 94/C 94M and in requirements for mixer performance stated in paragraph TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL. If requirements for the uniformity of concrete are not met with 100 revolutions of mixing after all ingredients including water are in the truck mixer drum, the mixer shall not be used until the condition is corrected. Water shall not be added after the initial introduction of mixing water except, when on arrival at the job site, the slump is less than specified and the water-cement ratio is less than that given as a maximum in the approved mixture. Additional water may be added to bring the slump within the specified range provided the approved water-cement ratio is not exceeded. Water shall be injected into the head of the mixer (end opposite the discharge opening) drum under pressure, and the drum or blades shall be turned a minimum of 30 additional revolutions at mixing speed. Water shall not be added to the batch at any later time.

1.11.2.3 Mixing Time and Uniformity

a. Stationary Mixers: For stationary mixers, before uniformity data are available, the mixing time for each batch after all solid materials are in the mixer, provided that all of the mixing water is introduced before one-fourth of the mixing time has elapsed, shall be 1 minute for mixers having a capacity of 1 cubic yard. For mixers of greater

capacity, this minimum time shall be increased 20 seconds for each additional 1.33 cubic yard or fraction thereof. After results of uniformity tests are available, the mixing time may be reduced to the minimum time required to meet uniformity requirements; but if uniformity requirements are not being met, the mixing time shall be increased as directed. The mixing time for full batch production shall be a minimum of 75 seconds. Mixer performance tests at new mixing times shall be performed immediately after any change in mixing time. When regular testing is performed, the concrete shall meet the limits of any five of the six uniformity requirements listed in Table 1 below. When abbreviated testing is performed, the concrete shall meet only those requirements listed for abbreviated testing. The concrete proportions used for uniformity tests shall be as used on the project. Regular testing shall consist of performing all six tests on three batches of concrete. The range for regular testing shall be the average of the ranges of the three batches. Abbreviated testing shall consist of performing the three required tests on a single batch of concrete. The range for abbreviated testing shall be the range for one batch. If more than one mixer is used and all are identical in terms of make, type, capacity, condition, speed of rotation, etc., the results of tests on one of the mixers shall apply to the others, subject to the approval of the Contracting Officer. All mixer performance (uniformity) testing shall be performed in accordance with COE CRD-C 55 and with paragraph titled TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL.

TABLE 1
UNIFORMITY REQUIREMENTS--STATIONARY MIXERS

Parameter	Regular Tests Allowable Maximum Range for Average of 3 Batches	Abbreviated Tests Allowable Maximum Range for 1 Batch
Unit weight of air-free mortar	32 kg/cubic m	32 kg/cubic m
Air content	1.0 percent	--
Slump	25 mm	25 mm
(Slump	1.0 inch	1.0 inch)
Coarse aggregate	6.0 percent	6.0 percent
Compressive strength at 7 days,	10.0 percent	10.0 percent
Water content	1.5 percent	--

b. Truck Mixers: Mixer performance (uniformity) tests for truck mixers shall be made in accordance with ASTM C 94/C 94M.

1.11.3 Transporting Equipment

Slipform concrete shall be transported to the paving site in nonagitating equipment conforming to ASTM C 94/C 94M or in approved agitators. Fixed form concrete shall be transported in approved truck mixers designed with extra large blading and rear opening specifically for low slump concrete. All transporting equipment shall be designed and operated to deliver and discharge the required concrete mixture completely without segregation.

1.11.4 Transfer and Spreading Equipment

Equipment for transferring concrete from the transporting equipment to the paving lane in front of the paver shall be specially manufactured, self-propelled transfer equipment which will accept the concrete outside the paving lane and will transfer and spread it evenly across the paving lane in front of the paver and strike off the surface evenly to a depth which permits the paver to operate efficiently.

1.11.5 Paver-Finisher

The paver-finisher shall be a heavy-duty, self-propelled machine designed specifically for paving and finishing high quality pavement. The paver-finisher shall weigh at least 2200 lb/foot of lane width, and shall be powered by an engine having at least 6.0 horsepower/foot of lane width. The paver-finisher shall spread, consolidate, and shape the plastic concrete to the desired cross section in one pass. The mechanisms for forming the pavement shall be easily adjustable in width and thickness and for required crown. In addition to other spreaders required by paragraph Transfer and Spreading Equipment, the paver-finisher shall be equipped with a full width knock-down auger or paddle mechanism, capable of operating in both directions, which will evenly spread the fresh concrete in front of the screed or extrusion plate. Immersion vibrators shall be gang mounted at the front of the paver on a frame equipped with suitable controls so that all vibrators can be operated at any desired depth within the slab or completely withdrawn from the concrete, as required. The vibrators shall be automatically controlled so that they will be immediately stopped as forward motion of the paver ceases. The spacing of the immersion vibrators across the paving lane shall be as necessary to properly consolidate the concrete, but the clear distance between vibrators shall not exceed 30 inches. The outside vibrators shall not be more than 12 inches from the lane edge. Spud vibrators shall operate at a frequency of not less than 8000 impulses/minute and an amplitude of not less than 0.03 inch and tube vibrators at a frequency of not less than 5000 impulses/minute and an amplitude of not less than 0.03 inch, as determined by COE CRD-C 521. The paver-finisher shall be equipped with a transversely oscillating screed or an extrusion plate to shape, compact, and smooth the surface and shall so finish the surface that no significant amount of hand finishing, except use of cutting straightedges, is required. The screed or extrusion plate shall be constructed to provide adjustment for crown in the pavement. The entire machine shall provide adjustment for variation in lane width or thickness and to prevent more than 8 inches of the screed or extrusion plate extending over previously placed concrete on either end when paving fill-in lanes. Machines that cause displacement of properly installed forms or cause ruts or indentations in the prepared underlying materials and machines that cause frequent delays due to mechanical failures shall be replaced as directed.

1.11.5.1 Paver-Finisher with Fixed Forms

The paver-finisher shall be equipped with wheels designed to ride the forms, keep it aligned with the forms, and spread the load so as to prevent deformation of the forms.

1.11.5.2 Slipform Paver-Finisher

The slipform paver-finisher shall be automatically controlled and crawler mounted with padded tracks so as to be completely stable under all operating conditions. The paver-finisher shall finish the surface and edges so that

no edge slump beyond allowable tolerance occurs. Suitable moving side forms shall be provided that are adjustable and will produce smooth, even edges, perpendicular to the top surface and meeting specification requirements for alignment and freedom from edge slump.

1.11.5.3 Longitudinal Mechanical Float

A longitudinal mechanical float shall be specially designed and manufactured to smooth and finish the pavement surface without working excess paste to the surface. It shall be rigidly attached to the rear of the paver-finisher or to a separate self-propelled frame spanning the paving lane. The float plate shall be at least 5 feet long by 8 inches wide and shall automatically be oscillated in the longitudinal direction while slowly moving from edge to edge of the paving lane, with the float plate in contact with the surface at all times.

1.11.5.4 Nonrotating Pipe Float

A pipe float if used, shall be a nonrotating pipe 6 to 10 inches in diameter and sufficiently long to span the full paving width when oriented at an angle of approximately 60 degrees with the centerline. The pipe float shall be mounted on a self-propelled frame that spans the paving lane. No means of applying water to the surface shall be incorporated in the pipe float.

1.11.5.5 Other Types of Finishing Equipment

Clary screeds, other rotating tube floats, or bridge deck finishers shall not be allowed on mainline paving, but may be allowed on irregular or odd-shaped slabs, and near buildings or trench drains, subject to the Contracting Officer's approval. Bridge deck finishers shall have a minimum operating weight of 7500 pounds and shall have a transversely operating carriage containing a knock-down auger and a minimum of two immersion vibrators. Vibrating screeds or pans shall be used only for isolated slabs where hand finishing is permitted as specified, and only where specifically approved. Concrete finishing equipment of types other than specified above may be demonstrated on a test section outside the production pavement if approved in writing.

1.11.6 Curing Equipment

Equipment for applying membrane-forming curing compound shall be mounted on a self-propelled frame that spans the paving lane. The reservoir for curing compound shall be constantly mechanically (not air) agitated during operation and shall contain means for completely draining the reservoir. The spraying system shall consist of a mechanically powered pump which will maintain constant pressure during operation, an operable pressure gauge, and either a series of spray nozzles evenly spaced across the lane to give uniformly overlapping coverage or a single spray nozzle which is mounted on a carriage which automatically traverses the lane width at a speed correlated with the forward movement of the overall frame. All spray nozzles shall be protected with wind screens. Calibrate the spraying system in accordance with ASTM D 2995, Method A, for the rate of application required in paragraph: Membrane Curing. Any hand-operated sprayers allowed by paragraph: Membrane Curing shall be compressed air supplied by a mechanical air compressor. If the curing equipment fails to apply an even coating of compound at the specified rate, it shall immediately be replaced.

1.11.7 Texturing Equipment

Texturing equipment shall be as specified below. Before use, the texturing equipment shall be demonstrated on a test section, and the equipment shall be modified as necessary to produce the texture directed.

1.11.7.1 Burlap Drag

A burlap drag shall be securely attached to a separate wheel mounted frame spanning the paving lane or to one of the other similar pieces of equipment. Length of the material shall provide 24 to 36 inches dragging flat on the pavement surface. Width shall be at least equal to the width of the slab. The material shall be clean, reasonably new burlap, completely saturated with water before attachment to the frame, always resaturated before start of use, and kept clean and saturated during use. Burlap shall conform to AASHTO M 182, Class 3 or 4.

1.11.8 Sawing Equipment

Equipment for sawing joints and for other similar sawing of concrete shall be standard diamond-type concrete saws mounted on a wheeled chassis which can be easily guided to follow the required alignment. Blades shall be diamond tipped. If demonstrated to operate properly, abrasive blades may be used. Provide spares as required to maintain the required sawing rate. Wheel saws used in the removal of concrete shall be saws with large diameter tungsten carbide tipped blades mounted on a heavy-duty chassis which will produce a saw kerf at least 1-1/2 inch wide. All saws shall be capable of sawing to the full depth required. Early-entry saws may be used, subject to demonstration and approval of the Contracting Officer. No change to the initial sawcut depth shall be permitted.

1.11.9 Straightedge

The Contractor shall furnish and maintain at the job site, in good condition, one 12 foot straightedge for each paving train for testing the hardened portland cement concrete surfaces. These straightedges shall be constructed of aluminum or magnesium alloy and shall have blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Straightedges shall have handles for operation on the pavement.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious materials shall be portland cement in combination with silica fume and shall conform to appropriate specifications listed below.

2.1.1 Portland Cement

Portland cement shall conform to ASTM C 150 Type I or ASTM C 150, Type V, low alkali, including false set requirements. Low alkali cement is required if the proposed aggregates are found to have greater than 0.04 percent expansion when tested in accordance with paragraph: Alkali-Silica Reactivity.

2.1.2 Silica Fume

Silica fume shall conform to ASTM C 1240, including the optional limits on reactivity with cement alkalis. Silica fume may be furnished as a dry, densified material or as a slurry. The Contractor shall provide at his

expense the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative shall be present on the project prior to and during at least the first 4 days of concrete using silica fume.

2.2 AGGREGATES

2.2.1 Aggregate Sources

2.2.1.1 Alkali-Silica Reactivity

Fine and coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity. Both coarse aggregate size groups shall be tested if from different sources.

The fine and coarse aggregates shall be evaluated separately, using ASTM C 1260. Test results of the individual aggregates shall have a measured expansion equal to or less than 0.08 percent at 16 days after casting. Should the test data indicate an expansion of greater than 0.08 percent, the aggregate(s) shall be rejected or additional testing, using ASTM C 1567 shall be performed using the following method:

Utilize the Contractor's proposed low alkali portland cement and silica fume in combination with the proposed aggregate percentage for the test proportioning. Silica fume shall be used in the range of 7.0 percent to 9.0 percent of the total cementitious material by mass. The quantity shall be determined that will meet all the requirements of these specifications and that which will lower the expansion equal to or less than 0.08 percent at 16 days after casting.

2.2.1.2 Combined Aggregate Gradation

In addition to the grading requirements specified for coarse aggregate and for fine aggregate, the combined aggregate grading shall meet the following requirements:

a. The materials selected and the proportions used shall be such that when the Coarseness Factor (CF) and the Workability Factor (WF) are plotted on a diagram as described in d. below, the point thus determined shall fall within the parallelogram described therein.

b. The Coarseness Factor (CF) shall be determined from the following equation:

CF = (cumulative percent retained on the 3/8 in. sieve)(100)/(cumulative percent retained on the No. 8 sieve)

c. The Workability Factor WF is defined as the cumulative percent passing the No. 8 sieve. However, WF shall be adjusted, upwards only, by 2.5 percentage points for each 94 pounds of cementitious material per cubic yard greater than 564 pounds per cubic yard.

d. A diagram shall be plotted using a rectangular scale with WF on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this diagram a parallelogram shall be plotted with corners at the following coordinates (CF-75, WF-28), (CF-75, WF-40), (CF-45, WF-32.5), and (CF-45, WF-44.5. If the point determined by the intersection of the

computed CF and WF does not fall within the above parallelogram, the grading of each size of aggregate used and the proportions selected shall be changed as necessary.)

e. A blending aggregate shall be used to meet the required combined grading. This blending aggregate shall be batched separately. The combined grading of all aggregates used, in the proportions selected, shall be computed on the basis of cumulative percent retained on each sieve specified for fine and coarse aggregate.

2.2.2 Coarse Aggregate

2.2.2.1 Material Composition

Coarse aggregate shall consist of crushed or uncrushed gravel, crushed stone, or a combination thereof. If dust, coatings or other deleterious fine materials are present in amounts in excess of limits specified in ASTM C 33, they shall be removed from the coarse aggregates by washing or air blasting. Coarse aggregate shall not show more than 40 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131.

2.2.2.2 Particle Shape Characteristics

Particles of the coarse aggregate shall be generally spherical or cubical in shape. The quantity of flat and elongated particles in any size group coarser than the3/8 inch sieve shall not exceed 20 percent by weight as determined by the Flat Particle Test and the Elongated Particle Test of ASTM D 4791. A flat particle is defined as one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3.

2.2.2.3 Size and Grading

The nominal maximum size of the coarse aggregate shall be [1.5] [_____] inch. The coarse aggregates shall be graded and furnished in two size groups meeting the individual grading requirements of ASTM C 33, Size No. 4 (1.5 to 0.75 inches) and Size No. 67 (0.75 inches to No. 4).

2.2.2.4 Deleterious Materials - Airfield Pavements

The amount of deleterious material in each size group of coarse aggregate shall not exceed the limits shown in Table 5 below, determined in accordance with the test methods shown.

TABLE 5
LIMITS OF DELETERIOUS MATERIALS IN COARSE AGGREGATE
FOR AIRFIELD PAVEMENTS
Percentage by Mass

Materials [h]	Moderate Weather
Clay lumps and friable particles (ASTM C 142)	0.2
Shale (a) (ASTM C 295)	0.2

Material finer than 0.075 mm (No. 200 sieve) (b) (ASTM C 117)	0.5
Lightweight particles (c) (ASTM C 123)	0.2
Clay ironstone (d) (ASTM C 295)	0.5
Chert and cherty stone (less than 2.40 Mg/cubic meter density SSD (2.40 Sp. Gr.)) (e) (ASTM C 123) and ASTM C 295)	0.5
Claystone, mudstone, and siltstone (f) (ASTM C 295)	0.1
Shaly and argillaceous limestone (g) (ASTM C 295)	0.2
Other soft particles (COE CRD-C 130)	1.0
Total of all deleterious substances exclusive of material finer than 0.075 mm (No. 200 sieve)	2.0

a. Shale is defined as a fine-grained, thinly laminated or fissile sedimentary rock. It is commonly composed of clay or silt or both. It has been indurated by compaction or by cementation, but not so much as to have become slate.

b. Limit for material finer than 0.075 mm (No. 200 sieve) will be increased to 1.5 percent for crushed aggregates if the fine material consists of crusher dust that is essentially free from clay or shale.

c. The separation medium shall have a density of 2.0 Mg/cubic meter (Sp. Gr. of 2.0). This limit does not apply to coarse aggregate manufactured from blast-furnace slag unless contamination is evident.

d. Clay ironstone is defined as an impure variety of iron carbonate, iron oxide, hydrous iron oxide, or combinations thereof, commonly mixed with clay, silt, or sand. It commonly occurs as dull, earthy particles, homogeneous concretionary masses, or hard-shell particles with soft interiors. Other names commonly used for clay ironstone are "chocolate bars" and limonite concretions.

e. Chert is defined as a rock composed of quartz, chalcedony or opal, or any mixture of these forms of silica. It is variable in color. The texture is so fine that the individual mineral grains are too small to be distinguished by the unaided eye. Its hardness is such that it scratches glass but is not scratched by a knife blade. It may contain impurities such as clay, carbonates, iron oxides, and other minerals. Cherty stone is defined as any type of rock (generally limestone) that contains chert as lenses and nodules, or irregular masses partially or completely replacing the original stone.

f. Claystone, mudstone, or siltstone, is defined as a massive fine-grained sedimentary rock that consists predominantly of indurated clay or silt without laminations or fissility. It may be indurated either by compaction or by cementation.

g. Shaly limestone is defined as limestone in which shale occurs as one or more thin beds or laminae. These laminae may be regular or very irregular and may be spaced from a few inches down to minute fractions of an inch. Argillaceous limestone is defined as a limestone in which clay minerals occur disseminated in the stone in the amount of 10 to 50 percent by weight of the rock; when these make up from 50 to 90 percent, the rock is known as calcareous (or dolomitic) shale (or claystone, mudstone, or siltstone).

h. Testing shall be performed in accordance with the referenced test methods, except that the minimum sample size shall be as specified in Paragraph: Testing Deleterious Materials-Airfields Only.

2.2.2.5 Testing Sequence Deleterious Materials -- Airfields Only

The Contractor will not be entitled to any extension of time or additional payment due to any delays caused by the testing, evaluation, or personnel requirements. The size of the coarse aggregate sample shall be at least 200 pounds for the 3/4 inch and larger maximum size and 25 pounds for the No. 4 to 3/4 inch coarse aggregate and 10 pounds for the fine aggregate. The Contractor shall provide facilities for the ready procurement of representative test samples. The testing procedure on each sample of coarse aggregate for compliance with limits on deleterious materials shall be as follows:

Step 1: Wash each full sample of coarse aggregate for material finer than the No. 200 sieve. Discard material finer than the No. 200 sieve.

Step 2: Test remaining full sample for clay lumps and friable particles and remove.

Step 3: Test remaining full sample for lightweight particles (Sp.Gr.2.0) and remove.

Step 4. Test remaining full sample for chert and/or cherty stone with SSD density of less than 2.40 Mg/cubic meter (Sp. Gr. 2.40). Remove lightweight chert and/or cherty stone. Restore other materials less than 2.40 to the sample.

Step 5: Test remaining sample for clay-ironstone, shale, claystone, mudstone, siltstone, shaly and/or argillaceous limestone, and remove.

Step 6: Test approximately one-fifth of remaining full sample for other soft particles.

2.2.3 Fine Aggregate

2.2.3.1 Composition

Fine aggregate shall consist of natural sand, manufactured sand, or a combination of the two, and shall be composed of clean, hard, durable particles meeting the requirements of ASTM C 33. Aggregate used for paving compass calibration hardstands shall be free of materials having undesirable magnetic properties, including magnetite in granite, high-iron minerals in

traprcok, and pyrite in limestone. Each type of fine aggregate shall be stockpiled and batched separately. Particles of the fine aggregate shall be generally spherical or cubical in shape.

2.2.3.2 Grading

Grading of the fine aggregate, as delivered to the mixer, shall conform to the requirements of ASTM C 33 and shall have a fineness modulus of not less than 2.50 nor more than 3.00.

2.2.3.3 Deleterious Material

The amount of deleterious material in the fine aggregate shall not exceed the following limits by mass:

Material	Percentage by Mass
Clay lumps and friable particles ASTM C 142	1.0
Material finer than 0.075 mm (No. 200 sieve) ASTM C 117	3.0
Lightweight particles ASTM C 123 using a medium with a density of 2.0 Mg/cubic meter (Sp. Gr. of 2.0))	0.5
Total of all above	3.0

2.3 CHEMICAL ADMIXTURES

2.3.1 General Requirements

Chemical admixtures may only be used when the specific admixture type and manufacturer is the same material used in the mixture proportioning studies. Air-entraining admixture shall be used and shall conform to ASTM C 260. An accelerator conforming to ASTM C 494/C 494M, Type C, may be used only when approved by the Contracting Officer and shall not be used to reduce the amount of cementitious material used. Calcium chloride and admixtures containing calcium chloride shall not be used. Retarding or water-reducing admixture shall meet the requirements of ASTM C 494/C 494M, Type F or G, except that the 6-month and 1-year compressive strength tests are waived.

2.3.2 Retarding or High Range Water Reducing Admixture (HRWR)

Retarding and high-range water-reducng admixture shall meet the requirements of ASTM C 494/C 494M, Type F or G. The retarding and HRWR shall be free from chlorides, alkalies, and shall be of the synthesized, sulfonated complex polymer type, which shall be added to the concrete as a single component at the batch plant. The admixture shall be added to the concrete mixture only when its use is approved or directed, and only when it has been used in mixture proportioning studies to arrive at approved mixture proportions. The Contractor shall submit certified copies of the independent laboratory test results required for compliance with ASTM C 494.

2.4 MEMBRANE FORMING CURING COMPOUND

Membrane forming curing compound shall be a white pigmented compound conforming to COE CRD-C 300.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water, or water from concrete production operations, may be used if it meets the requirements of ASTM C 1602/C 1602M.

2.6 JOINT MATERIALS

2.6.1 Expansion Joint Material

Expansion joint filler shall be a preformed material conforming to ASTM D 1751 or ASTM D 1752 Type II or III. Expansion joint filler shall be 3/4 inch thick, unless otherwise indicated, and shall be furnished in a single full depth piece.

2.6.2 Slip Joint Material

Slip joint material shall be 1/4 inch thick expansion joint filler, unless otherwise indicated, conforming to para: Expansion Joint Material.

2.7 REINFORCING

All reinforcement shall be free from loose, flaky rust, loose scale, oil, grease, mud, or other coatings that might reduce the bond with concrete. Removal of thin powdery rust and tight rust is not required. However, reinforcing steel which is rusted to the extent that it does not conform to the required dimensions or mechanical properties shall not be used.

2.7.1 Reinforcing Bars and Bar Mats

Reinforcing bars shall conform to ASTM A 615/A 615M, billet-steel ASTM A 996/A 996M, rail and axle steel, Grade 60. Bar mats shall conform to ASTM A 184/A 184M. The bar members may be billet rail or axle steel.

2.7.2 Welded Wire Reinforcement

Welded Wire Reinforcement shall be deformed or smooth, conforming to ASTM A 497/A 497M or ASTM A 185/A 185M, and shall be furnished in flat sheets.

2.8 DOWELS AND TIE BARS

2.8.1 Dowels

Dowels shall be single piece bars fabricated or cut to length at the shop or mill before delivery to the site. Dowels shall be free of loose, flaky rust and loose scale and shall be clean and straight. Dowels may be sheared to length provided that the deformation from true shape caused by shearing does not exceed 0.04 inch on the diameter of the dowel and does not extend more than 0.04 inch from the end of the dowel. Dowels shall be plain (non-deformed) steel bars conforming to ASTM A 615/A 615M, Grade 40 or 60; ASTM A 996/A 996M, Grade 50 or 60. Dowel bars shall be epoxy coated in conformance with ASTM A 775/A 775M. Grout retention rings shall be fully circular metal or plastic devices capable of supporting the dowel until the epoxy hardens.

2.8.2 Dowel Bar Assemblies

Dowel bar assemblies shall consist of a framework of metal bars or wires arranged to provide rigid support for the dowels throughout the paving

operation, with a minimum of four continuous bars or wires extending along the joint line. The dowels shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from rising, sliding out, or becoming distorted during paving operations.

2.9 EPOXY RESIN

All epoxy-resin materials shall be two-component materials conforming to the requirements of ASTM C 881/C 881M, Class as appropriate for each application temperature to be encountered, except that in addition, the materials shall meet the following requirements:

a. Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.

b. Material for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for use for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete shall be Type V, Grade as approved.

2.10 SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES

2.10.1 Specified Flexural Strength

Specified flexural strength, R, for concrete is 3.8 psi at 28 days, as determined by tests made in accordance with ASTM C 78 of beams fabricated and cured in accordance with ASTM C 192/C 192M. Maximum allowable water-cementitious material ratio is 0.45. The water-cementitious material ratio will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus silica fume by the mass equivalency method described in ACI 211.1. The concrete shall be air-entrained with a total air content of 4 plus or minus 1.5 percentage points, at the point of placement. Air content shall be determined in accordance with ASTM C 231. The maximum allowable slump of the concrete at the point of placement shall be 2 inches for pavement constructed with fixed forms. For slipformed pavement, the maximum allowable slump shall be 30 mm. The selected slump shall be applicable to both pilot and fill-in lanes.

2.10.2 Concrete Temperature

The temperature of the concrete as delivered shall conform to the requirements of paragraphs, Paving in Hot Weather and Paving in Cold Weather. Temperature of concrete shall be determined in accordance with ASTM C 1064/C 1064M.

2.10.3 Concrete Strength for Final Acceptance

The strength of the concrete will be considered acceptable when the 28-day flexural strengths for each lot are above the'Specified Flexural Strength' and no individual set (2 specimens per sublot) in the lot are 25 psi or more below the equivalent 'Specified Flexural Strength'. If any lot or sublot, respectively, fails to meet the above criteria, the lot or sublot shall be removed and replaced at no additional cost to the Government. This is in addition to and does not replace the average strength required for day-to-

day CQC operations as specified in paragraph: Average CQC Flexural Strength Required for Mixtures.

2.11 MIXTURE PROPORTIONS

2.11.1 Composition

Concrete shall be composed of cementitious material, water, fine and coarse aggregates, and admixtures. The cementitious materials shall be portland cement in combination with silica fume. Silica fume shall consist of not less than 7.0 percent of the cementitious material by mass and not more than 9.0 percent. The total cementitious materials content shall be at least. Admixtures shall consist of air entraining admixture and may also include, as approved, a retarder, conventional water-reducing admixture, and high-range water reducing admixture (HRWR). If a HRWR is used, it shall be used only at the dosage determined during mixture proportioning studies.

2.11.2 Proportioning Studies

Trial design batches, mixture proportioning studies, and testing requirements shall be the responsibility of the Contractor. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in ACI 211.1, modified as necessary to accommodate flexural strength.

2.11.2.1 Water-Cement Ratio

At least three different water-cement ratios, which will produce a range of strength encompassing that required on the project, shall be used. The maximum allowable water-cement ratio required in paragraph: Specified Flexural Strength will be the equivalent water-cement ratio. Laboratory trial mixtures shall be proportioned for maximum permitted slump and air content.

2.11.2.2 Trial Mixture Studies

Separate sets of trial mixture studies shall be made for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for each placing method proposed. The temperature of concrete in each trial batch shall be reported. Each mixture shall be designed to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

2.11.2.3 Mixture Proportioning for Flexural Strength

The following step by step procedure shall be followed:

a. Fabricate all beams for each mixture from the same batch or blend of batches. Fabricate and cure all beams in accordance with ASTM C 192/C 192M, using 6 x 6 inch steel beam forms.

b. Cure test beams from each mixture for 3, 7, and 28-day flexural tests; 6 beams to be tested per age.

c. Test beams in accordance with ASTM C 78.

d. Using the average strength for each w/c at each age, plot all results from each of the three mixtures on separate graphs for w/c versus:
3-day flexural strength
7-day flexural strength
28-day flexural strength

e. From these graphs select a w/c that will produce a mixture giving a 28-day flexural strength equal to 1.15 times the Specified Flexural Strength.

f. Using the above selected w/c, select from the graphs the expected 7-day flexural strength.

g. From the above expected strengths for the selected mixture, determine the Ratio of the 7-day flexural strength of the selected mixture to the 28-day flexural strength of the mixture (for CQC control).

h. If there is a change in materials, additional mixture design studies shall be made using the new materials and new Correlation Ratios shall be determined.

i. No concrete pavement shall be placed until the Contracting Officer has approved the Contractor's mixture proportions. The approved water-cementitious materials ratio shall not exceed the maximum value specified in paragraph: Specified Flexural Strength and shall not be increased without the Contracting Officer's written approval.

2.11.3 Average CQC Flexural Strength Required for Mixtures

In order to ensure meeting the strength requirements specified in paragraph: SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES, during production, the mixture proportions selected during mixture proportioning studies and used during construction shall produce a required average CQC flexural strength exceeding the specified strength, R, by 15 percent. This required average CQC flexural strength, Ra, will be used only for CQC operations as specified in paragraph: TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL and as specified in the previous paragraph. During production, the required Ra shall be adjusted , as appropriate and as approved, based on the standard deviation of average 28-day strengths being attained during paving.

PART 3 EXECUTION

3.1 PREPARATION FOR PAVING

Before commencing paving, the following shall be performed. If used, forms shall be in place, cleaned, coated, and adequately supported. Any reinforcing steel needed shall be at the paving site. All transporting and transfer equipment shall be ready for use, clean, and free of hardened concrete and foreign material. Equipment for spreading, consolidating, screeding, finishing, and texturing concrete shall be at the paving site, clean and in proper working order. All equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the paving site, in proper working condition, and in sufficient amount for the entire placement.

3.1.1 Weather Prevention

When windy conditions during paving appear probable, equipment and material shall be at the paving site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.2 Proposed Techniques

The Contractor shall submit for approval the following items:

a. A description of the placing and protection methods proposed when concrete is to be placed in or exposed to hot, cold, or rainy weather conditions.

b. A detailed paving sequence plan and proposed paving pattern showing all planned construction joints; transverse and longitudinal dowel bar spacing; and identifying pilot lanes and hand placement areas. No deviation from the jointing pattern shown on the drawings shall be made without written approval of the Corps of Engineers Transatlantic Programs Center.

c. Plan and equipment proposed to control alignment of sawn joints within the specified tolerances.

d. Data on the curing equipment, media and methods to be used.

e. Data on profilograph and methods to measure pavement smoothness.

f. Pavement demolition work plan, presenting the proposed methods and equipment to remove existing pavement and protect pavement to remain in place.

3.2 CONDITIONING OF UNDERLYING MATERIAL

3.2.1 General Procedures

Underlying material, upon which concrete is to be placed shall be clean, damp, and free from debris, waste concrete or cement, frost, ice, and standing or running water. Prior to setting forms or placement of concrete, the underlying material shall be well drained and shall have been satisfactorily graded and uniformly compacted in accordance with the applicable Section of these specifications. The surface of the underlying material shall be tested as to crown, elevation, and density in advance of setting forms or of concrete placement using slip-form techniques. High areas shall be trimmed to proper elevation. Low areas shall be filled and compacted to a condition similar to that of surrounding grade, or filled with concrete monolithically with the pavement. Low areas filled with concrete shall not be cored for thickness to avoid biasing the average thickness used for evaluation. Any underlying material disturbed by construction operations shall be reworked and recompacted to specified density immediately in front of the paver. If a slipform paver is used, the same underlying material under the paving lane shall be continued beyond the edge of the lane a sufficient distance and shall be thoroughly compacted and true to grade to provide a suitable trackline for the slipform paver and firm support for the edge of the paving lane.

3.2.2 Traffic on Underlying Material

Equipment shall be allowed to operate on the underlying material only if approved by the Contracting Officer and only if no damage is done to the underlying material and its degree of compaction. Any disturbance to the underlying material that does occur shall be corrected, as approved, before the paver-finisher or the deposited concrete reaches the location of the disturbance and the equipment shall be replaced or procedures changed to prevent any future damage.

3.3 WEATHER LIMITATIONS

3.3.1 Placement and Protection During Inclement Weather

The Contractor shall not commence placing operations when heavy rain or other damaging weather conditions appear imminent. At all times when placing concrete, the Contractor shall maintain on-site sufficient waterproof cover and means to rapidly place it over all unhardened concrete or concrete that might be damaged by rain. Placement of concrete shall be suspended whenever rain, high winds, or other damaging weather commences to damage the surface or texture of the placed unhardened concrete, washes cement out of the concrete, or changes the water content of the surface concrete. All unhardened concrete shall be immediately covered and protected from the rain or other damaging weather. Any slab damaged by rain or other weather shall be completely removed full depth, by full slab width, to the nearest original joint, and replaced at the Contractor's expense as specified in paragraph: REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS,

3.3.2 Paving in Hot Weather

When the ambient temperature during paving is expected to exceed 90 degrees F, the concrete shall be properly placed and finished in accordance with procedures previously submitted, approved, and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water or aggregates or placing in the cooler part of the day may be required to obtain an adequate placing temperature. Steel forms and reinforcing shall be cooled as needed to maintain steel temperatures below 120 degrees F. Transporting and placing equipment shall be cooled or protected if necessary to maintain proper concrete placing temperature. The finished surfaces of the newly laid pavement shall be kept damp by applying a fog spray (mist) with approved spraying equipment until the pavement is covered by the curing medium.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature in Degrees F
Greater than 60	90
40-60	85
Less than 40	80

3.3.3 Prevention of Plastic Shrinkage Cracking

During weather with low humidity, and particularly with high temperature and appreciable wind, the Contractor shall develop and institute measures to

prevent plastic shrinkage cracks from developing. If plastic shrinkage cracking occurs, further placement of concrete shall be halted until protective measures are in place to prevent further cracking. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition to the protective measures specified in the previous paragraph, the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, the addition of monomolecular films, or wet covering. When such water treatment is stopped, curing procedures shall be immediately commenced. Plastic shrinkage cracks that occur shall be repaired in accordance with paragraph: REPAIR, REMOVAL, REPLACEMENT OF NEWLY CONSTRUCTED SLABS. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.3.4 Paving in Cold Weather

Cold weather paving shall conform to ACI 306R. Special protection measures, as specified herein, shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. Placement of concrete shall not begin unless the ambient temperature is at least 35 degrees F and rising. Thereafter, placement of concrete shall be halted whenever the ambient temperature drops below 40 degrees F. When the ambient temperature is less than 50 degrees F, the temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. If allowed under paragraph: MIXTURE PROPORTIONS, an accelerating admixture may be used when the ambient temperature is below 50 degrees F. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period. Pavement slabs damaged by freezing shall be removed full depth, by full slab width, to the nearest original joint, and replaced at the Contractor's expense as specified in paragraph: REPAIR, REMOVAL, REPLACEMENT OF NEWLY CONSTRUCTED SLABS.

3.4 CONCRETE PRODUCTION

Batching, mixing, and transporting equipment shall have a capacity sufficient to maintain a continuous, uniform forward movement of the paver of not less than 2.5 feet per minute. Concrete shall be deposited in front of the paver within 45 minutes from the time cement has been charged into the mixing drum, except that if the ambient temperature is above 90 degrees F, the time shall be reduced to 30 minutes. Every load of concrete delivered to the paving site shall be accompanied by a batch ticket from the operator of the batching plant. Tickets shall be on approved forms and shall show at least the mass, or volume, of all ingredients in each batch delivered, the water meter and revolution meter reading on truck mixers and the time of day. Tickets shall be delivered to the placing foreman who shall keep them on file and deliver them to the Government weekly, or as directed by the Contracting Officer.

3.4.1 Batching and Mixing Concrete

Scale pivots and bearings shall be kept clean and free of rust. Any equipment which fails to perform as specified shall immediately be removed from use until properly repaired and adjusted, or replaced.

3.4.2 Transporting and Transfer - Spreading Operations

Non-agitating equipment shall be used only on smooth roads and for haul time less than 15 minutes. Concrete shall be deposited as close as possible to its final position in the paving lane. All equipment shall be operated to discharge and transfer concrete without segregation. In no case shall dumping of concrete in discrete piles be permitted. No transfer or spreading operation which requires the use of front-end loaders, dozers, or similar equipment to distribute the concrete will be permitted.

3.5 PAVING

3.5.1 General Requirements

Pavement shall be constructed with paving and finishing equipment utilizing rigid fixed forms or by use of slipform paving equipment. Paving and finishing equipment and procedures shall be capable of constructing paving lanes of the required width at a rate of at least 100 feet of paving lane per hour on a routine basis. Paving equipment and its operation shall be controlled, and coordinated with all other operations, such that the paver-finisher has a continuous forward movement, at a reasonably uniform speed, from beginning to end of each paving lane, except for inadvertent equipment breakdown. Failure to achieve this shall require the Contractor to halt operations, regroup, and modify operations to achieve this requirement. Workmen with foreign material on their footwear or construction equipment that might deposit foreign material shall not be permitted to walk or operate in the plastic concrete. Where an open-graded granular base is required under the concrete, the Contractor shall select paving equipment and procedures which will operate properly on the base course without causing displacement or other damage.

3.5.2 Consolidation

Concrete shall be consolidated with the specified type of lane-spanning, gang-mounted, mechanical, immersion type vibrating equipment mounted in front of the paver, supplemented, in rare instances as specified, by hand-operated vibrators. The vibrators shall be inserted into the concrete to a depth that will provide the best full-depth consolidation but not closer to the underlying material than 2 inches. Excessive vibration shall not be permitted. If the vibrators cause visible tracking in the paving lane, the paving operation shall be stopped and equipment and operations modified to prevent it. Concrete in small, odd-shaped slabs or in isolated locations inaccessible to the gang-mounted vibration equipment shall be vibrated with an approved hand-operated immersion vibrator operated from a bridge spanning the area. Vibrators shall not be used to transport or spread the concrete. Hand-operated vibrators shall not be operated in the concrete at one location for more than 20 seconds. Insertion locations for hand-operated vibrators shall be between 6 to 15 inches on centers. For each paving train, at least one additional vibrator spud, or sufficient parts for rapid replacement and repair of vibrators shall be maintained at the paving site at all times. Any evidence of inadequate consolidation (honeycomb along the edges, large air pockets, or any other evidence) shall require the immediate stopping of the paving operation and approved adjustment of the equipment or procedures.

3.5.3 Operation

When the paver approaches a header at the end of a paving lane, a sufficient amount of concrete shall be maintained ahead of the paver to provide a roll

of concrete which will spill over the header. The amount of extra concrete shall be sufficient to prevent any slurry that is formed and carried along ahead of the paver from being deposited adjacent to the header. The spud vibrators in front of the paver shall be brought as close to the header as possible before they are lifted. Additional consolidation shall be provided adjacent to the headers by hand-manipulated vibrators. When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provisions shall be made to prevent damage to the previously constructed pavement. Screeds or extrusion plates shall be electronically controlled from the previously placed pavement so as to prevent them from applying pressure to the existing pavement and to prevent abrasion of the pavement surface. The overlapping area of existing pavement surface shall at all times be kept completely free of any loose or bonded foreign material as the paver-finisher operates across it. When the paver travels on existing pavement, approved provisions shall be made to prevent damage to the existing pavement. Pavers using transversely oscillating screeds shall not be used to form fill-in lanes that have widths less than a full width for which the paver was designed or adjusted.

3.5.4 Required Results

The paver-finisher, and its gang-mounted vibrators, together with its operating procedures shall be adjusted and operated and coordinated with the concrete mixture being used to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. The paver-finishing operation shall produce a surface finish free of irregularities, tears, voids of any kind, and any other discontinuities. The paver-finisher shall make only one pass across the pavement; multiple passes will not be permitted. The equipment and its operation shall produce a finished surface requiring no hand finishing other than the use of cutting straightedges, except in very infrequent instances. If any equipment or operation fails to produce the above results, the paving shall be stopped, the equipment shall be replaced or properly adjusted, the operation shall be appropriately modified, or the mixture proportions modified, in order to produce the required results before recommencing paving. No water, other than fog sprays (mist) as specified in paragraph: Prevention of Plastic Shrinkage Cracking, shall be applied to the concrete or the concrete surface during paving and finishing.

3.5.5 Fixed Form Paving

Paving equipment for fixed-form paving and the operation thereof shall conform to the requirements of paragraph EQUIPMENT, all requirements specified above under paragraph PAVING and as specified herein.

3.5.5.1 Forms for Fixed-Form Paving

a. Straight forms shall be made of steel and shall be furnished in sections not less than 10 feet in length. Flexible or curved forms of proper radius shall be used for curves of 100-foot radius or less. Wood forms for curves and fillets shall be made of well-seasoned, surfaced plank or plywood, straight, and free from warp or bend. Wood forms shall be adequate in strength and rigidly braced. Forms shall have a depth equal to the pavement thickness at the edge. Where the project requires several different slab thicknesses, forms may be built up by bolting or welding a tubular metal section or by bolting wood planks to the bottom of the form to completely cover the underside of the base of the form and provide an increase in depth of not more than 25 percent. The base

width of the one-piece or built-up form shall be not less than eight-tenths of the vertical height of the form, except than forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Maximum vertical deviation of top of any side form, including joints, shall not vary from a true plane more than 1/8 inch in 0 feet, and the upstanding leg shall not vary more than 1/4 inch.

b. Form sections shall be tightly locked and shall be free from play or movement in any direction. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment.

c. Set forms for full bearing on foundation for entire length and width and in alignment with edge of finished pavement. Support forms during entire operation of placing, compaction, and finishing so that forms will not deviate vertically more than 0.01 foot from required grade and elevations indicated. Conformity to the alignment and grade elevations shown on the drawings shall be checked and necessary corrections shall be made immediately prior to placing the concrete. The forms shall be cleaned and oiled each time before concrete is placed. No concrete shall be placed until setting of forms has been checked and approved by the CQC team.

3.5.5.2 Form Removal

Forms shall remain in place at least 12 hours after the concrete has been placed. When conditions are such that the early strength gain of the concrete is delayed, the forms shall be left in place for a longer time, as directed. Forms shall be removed by procedures that do not injure the concrete. Bars or heavy metal tools shall not be used directly against the concrete in removing the forms. Any concrete found to be defective after form removal shall be repaired promptly, using procedures specified hereinafter or as directed.

3.5.6 Slipform Paving

3.5.6.1 General

Paving equipment for slipform paving and the operation thereof shall conform to the requirement of paragraph EQUIPMENT, all requirements specified above in subparagraphs, General, Consolidation, Operation, and Required Results, and as specified herein. The slipform paver shall shape the concrete to the specified and indicated cross section, meeting all tolerances, in one pass. The slipform paver shall finish the surface and edges so that only a very minimum isolated amount of hand finishing is required. If the paving operation does not meet the above requirements and the specified tolerances, the operation shall be immediately stopped, and the Contractor shall regroup and replace or modify any equipment as necessary, modify paving procedures or modify the concrete mix, in order to resolve the problem. The slipform paver shall be automatically electronically controlled from a taut wire guideline for horizontal alignment and on both sides from a taut wire guideline for vertical alignment, except that electronic control from a ski operating on a previously constructed adjoining lane shall be used where applicable for either or both sides. Automatic, electronic controls for vertical alignment shall always be used on both sides of the lane. Control from a slope-adjustment control or control operating from the underlying material shall never be used. Side forms on slipform pavers shall be

properly adjusted so that the finished edge of the paving lane meets all specified tolerances. Dowels in longitudinal construction joints shall be installed as specified below. The installation of these dowels by dowel inserters attached to the paver or by any other means of inserting the dowels into the plastic concrete shall not be permitted.

3.5.6.2 Guideline for Slipform Paving

Guidelines shall be accurately and securely installed well in advance of concrete placement. Supports shall be provided at necessary intervals to eliminate all sag in the guideline when properly tightened. The guideline shall be high strength wire set with sufficient tension to remove all sag between supports. Supports shall be securely staked to the underlying material or other provisions made to ensure that the supports will not be displaced when the guideline is tightened or when the guideline or supports are accidentally touched by workmen or equipment during construction. The appliances for attaching the guideline to the supports shall be capable of easy adjustment in both the horizontal and vertical directions. When it is necessary to leave gaps in the guideline to permit equipment to use or cross underlying material, provisions shall be made for quickly and accurately replacing the guideline without any delay to the forward progress of the paver. Supports on either side of the gap shall be secured in such a manner as to avoid disturbing the remainder of the guideline when the portion across the gap is positioned and tightened. The guideline across the gap and adjacent to the gap for a distance of 200 feet shall be checked for horizontal and vertical alignment after the guideline across the gap is tightened. Vertical and horizontal positioning of the guideline shall be such that the finished pavement shall conform to the alignment and grade elevations shown on the drawings within the specified tolerances for grade and smoothness. The specified tolerances are intended to cover only the normal deviations in the finished pavement that may occur under good supervision and do not apply to setting of the guideline. The guideline shall be set true to line and grade.

3.5.7 Placing Reinforcing Steel

The type and amount of steel reinforcement shall be as shown on the drawings. For pavement thickness of 12 inches or more, the reinforcement steel shall be installed by the strike-off method wherein a layer of concrete is deposited on the underlying material, consolidated, and struck to the indicated elevation of the steel reinforcement. The reinforcement shall be laid upon the prestruck surface, and the remaining concrete shall then be placed and finished in the required manner. When placement of the second lift causes the steel to be displaced horizontally from its original position, provisions shall be made for increasing the thickness of the first lift and depressing the reinforcement into the unhardened concrete to the required elevation. The increase in thickness shall be only as necessary to permit correct horizontal alignment to be maintained. Any portions of the bottom layer of concrete that have been placed more than 30 minutes without being covered with the top layer shall be removed and replaced with newly mixed concrete without additional cost to the Government. For pavements less than 12 inches thick, the reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement. Concrete shall be vibrated after the steel has been placed. Regardless of placement procedure, the reinforcing steel shall be free from coatings which could impair bond between the steel and concrete, and laps in the reinforcement shall be as indicated. In lieu of the above, automatic reinforcement depressing attachments may be used to position the reinforcement provided the entire operation is approved by the Contracting

Officer. Regardless of the equipment or procedures used for installing reinforcement, the Contractor shall ensure that the entire depth of concrete is adequately consolidated.

3.5.8 Placing Dowels

The method used in installing and holding dowels in position shall ensure that the error in alignment of any dowel from its required horizontal and vertical alignment after the pavement has been completed will not be greater than 1/8 in. per ft. Except as otherwise specified below, horizontal spacing of dowels shall be within a tolerance of plus or minus 5/8 inch. The vertical alignment of the dowels shall be measured parallel to the designated top surface of the pavement, except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge. The horizontal alignment shall be checked with a framing square. Dowels shall not be placed closer than 0.6 times the dowel bar length to the planned joint line. If the last regularly spaced dowel is closer than that dimension, it shall be moved away from the joint to a location 0.6 times the dowel bar length, but not closer than 6 inches to its nearest neighbor. Dowel interference at a transverse joint-longitudinal joint intersection shall be resolved by deleting the closest transverse dowel. Dowels shall be installed as specified in the following subparagraphs.

3.5.8.1 Contraction Joints

Dowels in longitudinal and transverse contraction joints within the paving lane shall be held securely in place, as indicated, by means of rigid metal frames or basket assemblies of an approved type. The basket assemblies shall be held securely in the proper location by means of suitable pins or anchors. Do not cut or crimp the dowel basket tie wires unless the tie wires are 6 mm or larger in diameter. At the Contractor's option, in lieu of the above, dowels in contraction joints shall be installed near the front of the paver by insertion into the plastic concrete using approved equipment and procedures. Approval will be based on the results of a preconstruction demonstration which the Contractor shall conduct, showing that the dowels are installed within specified tolerances.

3.5.8.2 Construction Joints-Fixed Form Paving

Installation of dowels shall be by the bonded-in-place method. Installation by removing and replacing in preformed holes will not be permitted. Dowels shall be prepared and placed across joints where indicated, correctly aligned, and securely held in the proper horizontal and vertical position during placing and finishing operations, by means of devices fastened to the forms. The spacing of dowels in construction joints shall be as indicated, except that, where the planned spacing cannot be maintained because of form length or interference with form braces, closer spacing with additional dowels shall be used.

3.5.8.3 Dowels Installed in Hardened Concrete

Dowels installed in hardened concrete shall be installed by bonding the dowels into holes drilled into the hardened concrete. The concrete shall have cured for 7 days or reached a minimum flexural strength of 450 psi before drilling commences. Holes 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete using rotary-core drills. Rotary-percussion drills may be used, provided that excessive spalling does

not occur to the concrete joint face. Continuing damage shall require modification of the equipment and operation. Upon completion of the drilling operation, the dowel hole shall be blown out with oil-free, compressed air. Dowels shall be bonded in the drilled holes using epoxy resin. Epoxy resin shall be injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel will not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic grout retention ring fitted around the dowel. Dowels required to be installed in any joints between new and existing concrete shall be grouted in holes drilled in the existing concrete, all as specified above.

3.5.8.4 Lubricating Dowel Bars

The portion of each dowel intended to move within the concrete or expansion cap shall be wiped clean and coated with a thin, even film of lubricating oil or light grease before the concrete is placed.

3.6 FINISHING

Finishing operations shall be a continuing part of placing operations starting immediately behind the strike-off of the paver. Initial finishing shall be provided by the transverse screed or extrusion plate. The sequence of operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, texturing, and then edging of joints. Finishing shall be by the machine method. The hand method shall be used only on isolated areas of odd slab widths or shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Any machine finishing operation which requires appreciable hand finishing, other than a moderate amount of straightedge finishing, shall be immediately stopped and proper adjustments made or the equipment replaced. Every effort shall be made to prevent bringing excess paste to the surface and any operations which produce more than 1/8 inch of mortar-rich surface (deficient in plus No. 4 sieve size aggregate) over the top layer of coarse aggregate shall be halted immediately and the equipment, mixture, or procedures modified as necessary. Compensation shall be made for surging behind the screeds or extrusion plate and settlement during hardening and care shall be taken to ensure that paving and finishing machines are properly adjusted so that the finished surface of the concrete (not just the cutting edges of the screeds) will be at the required line and grade. Finishing equipment and tools shall be maintained clean and in an approved condition. At no time shall water be added to the surface of the slab with the finishing equipment or tools, or in any other way, except for fog (mist) sprays specified to prevent plastic shrinkage cracking.

3.6.1 Machine Finishing With Fixed Forms

The machine shall be designed to ride the forms and shall be operated to screed and consolidate the concrete. Machines that cause displacement of the forms shall be replaced. The machine shall make only one pass over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, the operation shall be immediately stopped and the equipment, mixture, and procedures adjusted as necessary.

3.6.2 Machine Finishing with Slipform Pavers

The slipform paver shall be operated so that only a very minimum of additional finishing work is required to produce pavement surfaces and edges meeting the specified tolerances. Any equipment or procedure that fails to meet these specified requirements shall immediately be replaced or modified as necessary. A self-propelled nonrotating pipe float may be used while the concrete is still plastic, to remove minor irregularities and score marks. Only one pass of the pipe float shall be allowed. If there is concrete slurry or fluid paste on the surface that runs over the edge of the pavement, the paving operation shall be immediately stopped and the equipment, mixture, or operation modified to prevent formation of such slurry. Any slurry which does run down the vertical edges shall be immediately removed by hand, using stiff brushes or scrapers. No slurry, concrete or concrete mortar shall be used to build up along the edges of the pavement to compensate for excessive edge slump, either while the concrete is plastic or after it hardens.

3.6.3 Surface Correction and Testing

After all other finishing is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated by means of cutting straightedges. Such straightedges shall be 12 feet in length and shall be operated from the sides of the pavement and from bridges. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than one-half the width of the pavement. The surface shall then be tested for trueness with a straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. The straightedge shall be advanced along the pavement in successive stages of not more than one-half the length of the straightedge. Depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. The straightedge testing and finishing shall continue until the entire surface of the concrete is free from observable departure from the straightedge and conforms to the surface requirements specified in paragraph: ACCEPTABILITY OF WORK. This straightedging shall not be used as a replacement for the straightedge testing of paragraph: Surface Smoothness. Long-handled, flat bull floats shall be used very sparingly and only as necessary to correct minor, scattered surface defects. If frequent use of bull floats is necessary, the paving operation shall be stopped and the equipment, mixture or procedures adjusted to eliminate the surface defects. Finishing with hand floats and trowels shall be held to the absolute minimum necessary. Extreme care shall be taken to prevent overfinishing joints and edges. The surface finish of the pavement shall be produced essentially by the finishing machine and not by subsequent hand finishing operations. All hand finishing operations shall be subject to approval and shall be modified when directed.

3.6.4 Hand Finishing

Hand finishing operations shall be used only as specified below.

3.6.4.1 Equipment

In addition to approved mechanical internal vibrators for consolidating the concrete, a strike-off and tamping template and a longitudinal float shall be provided for hand finishing. The template shall be at least 1 foot longer than the width of pavement being finished, of an approved design, and

sufficiently rigid to retain its shape, and shall be constructed of metal or other suitable material shod with metal. The longitudinal float shall be at least 10 feet long, of approved design, and rigid and substantially braced, and shall maintain a plane surface on the bottom. Grate tampers (jitterbugs) shall not be used.

3.6.4.2 Finishing and Floating

As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. In addition to previously specified complete coverage with handheld immersion vibrators, the entire surface shall be tamped with the strike-off and tamping template, and the tamping operation continued until the required compaction and reduction of internal and surface voids are accomplished. Immediately following the final tamping of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed, consolidated and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces.

3.6.5 Texturing

Before the surface sheen has disappeared and before the concrete hardens or curing compound is applied, the surface of the pavement shall be given a texture as described herein. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris.

3.6.5.1 Burlap Drag Surface

Surface texture shall be applied by dragging the surface of the pavement, in the direction of the concrete placement, with an approved burlap drag. The drag shall be operated with the fabric moist, and the fabric shall be cleaned or changed as required to keep clean. The dragging shall be done so as to produce a uniform finished surface having a fine sandy texture without disfiguring marks.

3.6.6 Edging

After texturing has been completed, the edge of the slabs along the forms, along the edges of slipformed lanes, and at the joints shall be carefully finished with an edging tool to form a smooth rounded surface of 1/8 inch radius. Tool marks shall be eliminated, and the edges shall be smooth and true to line. No water shall be added to the surface during edging. Extreme care shall be taken to prevent overworking the concrete.

3.6.7 Outlets in Pavement

Recesses for the tie-down anchors, lighting fixtures, and other outlets in the pavement shall be constructed to conform to the details and dimensions shown. The concrete in these areas shall be carefully finished to provide a surface of the same texture as the surrounding area that will be within the requirements for plan grade and surface smoothness.

3.7 CURING

3.7.1 Protection of Concrete

Concrete shall be continuously protected against loss of moisture and rapid temperature changes for at least 7 days from the completion of finishing operations. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. If any selected method of curing does not afford the proper curing and protection against concrete cracking, the damaged pavement shall be removed and replaced, and another method of curing shall be employed as directed. Curing shall be accomplished by one of the following methods except that only moist curing shall be used for the first 24 hours.

3.7.2 Membrane Curing

A uniform coating of white-pigmented, membrane-forming, curing compound shall be applied to the entire exposed surface of the concrete as soon as the free water has disappeared from the surface. Along the formed edge faces, it shall be applied immediately after the forms are removed. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water, and the curing compound applied as soon as the free water disappears. The curing compound shall be applied to the finished surfaces by means of an approved automatic spraying machine. The curing compound shall be applied with an overlapping coverage that will give a two-coat application at a coverage of 400 square feet per gallon, plus or minus 5.0 percent for each coat. A one-coat application may be applied provided a uniform application and coverage of 200 square feet per gallon, plus or minus 5.0 percent is obtained. The application of curing compound by hand-operated, mechanical powered pressure sprayers will be permitted only on odd widths or shapes of slabs and on concrete surfaces exposed by the removal of forms. When the application is made by hand-operated sprayers, a second coat shall be applied in a direction approximately at right angles to the direction of the first coat. If pinholes, abrasions, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be immediately resprayed. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.3 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period, or until curing compound is applied, commencing immediately after finishing. If forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. Lap sheets to provide full coverage. The Contractor shall have an approved work system to ensure that moist curing is continuous 24 hours per day and that the entire surface is wet.

3.8 JOINTS

3.8.1 General Requirements for Joints

Joints shall conform to the locations and details indicated and shall be perpendicular to the finished grade of the pavement. All joints shall be straight and continuous from edge to edge or end to end of the pavement with no abrupt offset and no gradual deviation greater than 1/2 inch. Where any joint fails to meet these tolerances, the slabs adjacent to the joint shall be removed and replaced at no additional cost to the Government. No change from the jointing pattern shown on the drawings shall be made without written approval of the Contracting Officer. Joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Joints shall be sealed as specified in 32 13 73 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS.

3.8.2 Longitudinal Construction Joints

Dowels shall be installed in the longitudinal construction joints, or the edges shall be thickened as indicated. Dowels shall be installed in conformance with paragraph, Placing Dowels. After the end of the curing period, longitudinal construction joints shall be sawed to provide a groove at the top for sealant conforming to the details and dimensions indicated.

3.8.3 Transverse Construction Joints

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for 30 minutes or longer. The transverse construction joint shall be installed at a planned transverse joint. Transverse construction joints shall be constructed by utilizing headers or by paving through the joint, then full-depth sawcutting the excess concrete. Pavement shall be constructed with the paver as close to the header as possible, and the paver shall be run out completely past the header. Transverse construction joints installed at a planned transverse joint shall be constructed as shown or, if not shown otherwise, shall be dowelled in accordance with paragraph: Dowels Installed in Hardened Concrete, or paragraph: Construction Joints - Fixed Form Paving.

3.8.4 Expansion Joints

Expansion joints shall be formed where indicated, and about any structures and features that project through or into the pavement, using joint filler of the type, thickness, and width indicated, and shall be installed to form a complete, uniform separation between the structure and the pavement. The filler shall be attached to the original concrete placement with adhesive or other fasteners and shall extend the full slab depth. Adjacent sections of filler shall be fitted tightly together, and the filler shall extend across the full width of the paving lane or other complete distance in order to prevent entrance of concrete into the expansion space. Edges of the concrete at the joint face shall be finished with an edger with a radius of 1/8 inch. The joint filler strips shall be installed 3/4 inch below the pavement surface with a slightly tapered, dressed-and-oiled wood strip or other approved material temporarily secured to the top of the filler to form a recess to be filled with joint sealant.

3.8.5 Slip Joints

Slip joints shall be installed where indicated using the specified materials. Preformed joint filler material shall be attached to the face of the original concrete placement with adhesive or other fasteners. A 3/4 inch deep reservoir for joint sealant shall be constructed at the top of the joint. Edges of the joint face shall be finished with an edger with a radius of 1/8 inch.

3.8.6 Contraction Joints

Transverse and longitudinal contraction joints shall be constructed by sawing an initial groove in the concrete with a 1/8 inch blade to the indicated depth. During sawing of joints, and again 24 hours later, the CQC team shall inspect all exposed lane edges for development of cracks below the saw cut, and shall immediately report results to the Contracting Officer. If the Contracting Officer determines that there are more uncracked joints than desired, the Contractor will be directed to saw succeeding joints 25 percent deeper than originally indicated at no additional cost to the Government. The time of initial sawing shall vary depending on existing and anticipated weather conditions and shall be such as to prevent uncontrolled cracking of the pavement. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting the concrete without chipping, spalling, or tearing. The sawed faces of joints will be inspected for undercutting or washing of the concrete due to the early sawing, and sawing shall be delayed if undercutting is sufficiently deep to cause structural weakness or excessive roughness in the joint. The sawing operation shall be carried on as required during both day and night regardless of weather conditions. The joints shall be sawed at the required spacing consecutively in the sequence of the concrete placement. Adequate lighting shall be provided for night work. Illumination using vehicle headlights will not be permitted. A chalk line or other suitable guide shall be used to mark the alinement of the joint. Before sawing a joint, the concrete shall be examined closely for cracks, and the joint shall not be sawed if a crack has occurred near the planned joint location. Sawing shall be discontinued when a crack develops ahead of the saw cut. Immediately after the joint is sawed, the saw cut and adjacent concrete surface shall be thoroughly flushed with water and vacuumed until all waste from sawing is removed from the joint and adjacent concrete surface. The surface shall be resprayed with curing compound as soon as free water disappears. Necessary precautions shall be taken to insure that the concrete is properly protected from damage and cured at sawed joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed with cord backer rod before the concrete in the region of the joint is resprayed with curing compound, and shall be maintained until removed immediately before sawing the joint sealant reservoir. After expiration of the curing period, the upper portion of the groove shall be widened by sawing with ganged diamond saw blades to the width and depth indicated for the joint sealer. The reservoir shall be centered over the initial sawcut.

3.8.7 Thickened Edge Joints

Thickened edge joints shall be constructed as indicated on the drawings. Underlying material in the transition area shall be graded as shown and shall meet the requirements for smoothness and compaction specified for all other areas of the underlying material.

3.9 REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS

3.9.1 General Criteria

New pavement slabs that are broken, have spalled edges, or contain cracks shall be removed and replaced or repaired, as specified hereinafter at no cost to the Government. Removal of partial slabs is not permitted. Not more than 15.0 percent of each slab's longitudinal joint edge shall be spalled. Slabs with spalls exceeding this quantity, regardless of spall size, shall be sawn full depth to remove the spalled face, or removed, as directed. The Contracting Officer will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be at least 6 inch diameter, and shall be drilled and backfilled with a well consolidated concrete mixture bonded to the walls of the hole with Type V, Grade 3 epoxy resin. Drilling of cores and refilling holes shall be performed by the Contractor at no expense to the Government.

3.9.2 Slabs with Cracks

Cracks that do not exceed 25 percent of the design thickness in depth shall be cleaned and then pressure injected full depth with epoxy resin, Type IV, Grade 1. Slabs containing cracks deeper than 25 percent of the design thickness shall be removed.

3.9.3 Removal and Replacement of Full Slabs

Where it is necessary to remove full slabs, removal shall be in accordance with paragraph: Removal of Existing Pavement Slab. Removal and replacement shall be full depth, by full width of the slab, and the limit of removal shall be normal to the paving lane and extend to each original joint. Dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified in paragraph: Placing Dowels. Original damaged dowels shall be cut off flush with the joint face. Protruding portions of dowels shall be painted and lightly oiled. All four edges of the new slab shall thus contain dowels. Placement of concrete shall be as specified for original construction. Prior to placement of new concrete, the underlying material shall be recompacted and shaped as specified in the appropriate section of these specifications, and the surfaces of all four joint faces shall be cleaned of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels. The resulting joints around the new slab shall be prepared and sealed as specified for original construction.

3.9.4 Repairing Spalls Along Joints

Where directed, spalls along joints of new slabs, along edges of adjacent existing concrete, and along parallel cracks shall be repaired by first making a vertical saw cut at least 1 inch outside the spalled area and to a depth of at least 2 inches. Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete and into at least 1/2 inch of visually sound concrete. Spalls along joints to be sealed with compression seals shall be sawn, chipped out, and repaired to a depth to restore the full joint-face support. The cavity thus formed shall be thoroughly cleaned with high pressure water jets supplemented with oil-free compressed air to remove all loose material. Immediately before filling the cavity, a prime coat shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall

be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Prime coat for portland cement repairs shall be a neat cement grout and for epoxy resin repairs shall be epoxy resin, Type III, Grade 1. The prepared cavity shall be filled with: Portland cement concrete or latex modified mortar for larger cavities, those more than 1/3 cu. ft. in size after removal operations; Portland cement mortar for cavities between 0.03 cu. ft. and 1/3 cu. ft.; and epoxy resin mortar or epoxy resin or latex modified mortar for those cavities less than 0.03 cu. ft. in size. Portland cement concretes and mortars shall be very low slump mixtures, 1/2 inch slump or less, proportioned, mixed, placed, consolidated by tamping, and cured, all as directed. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions and mixing and placing procedures as recommended by the manufacturer and approved by the Contracting Officer. Proprietary patching materials may be used, subject to approval by the Contracting Officer. The epoxy resin materials shall be placed in the cavity in layers not over 2 inches thick. The time interval between placement of additional layers shall be such that the temperature of the epoxy resin material does not exceed 140 degrees F at any time during hardening. Mechanical vibrators and hand tampers shall be used to consolidate the concrete or mortar. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints. The reservoir shall be thoroughly cleaned and then sealed with the sealer specified for the joints. In lieu of sawing, spalls not adjacent to joints and popouts, both less than 6 inches in maximum dimension, may be prepared by drilling a core 2 inches in diameter greater than the size of the defect, centered over the defect, and 2 inches deep or 1/2 inch into sound concrete, whichever is greater. The core hole shall be repaired as specified above for other spalls.

3.10 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

Existing concrete pavement shall be removed at locations indicated on the drawings. Prior to commencing pavement removal operations, the Contractor shall inventory the pavement distresses (cracks, spalls, and corner breaks) along the pavement edge to remain. After pavement removal, the remaining edge shall again be surveyed to quantify any damage caused by Contractor's removal operations. Both surveys shall be performed by the Contractor, in the presence of the Contracting Officer. Repairs shall be made as indicated and as specified herein. All operations shall be carefully controlled to prevent damage to the concrete pavement and to the underlying material to remain in place. All saw cuts shall be made perpendicular to the slab surface, forming rectangular areas.

3.10.1 Removal of Existing Pavement Slab

When existing concrete pavement is to be removed and adjacent concrete is to be left in place, the joint between the removal area and adjoining pavement to stay in place shall first be cut full depth with a standard diamond-type concrete saw. Next, a full depth saw cut shall be made parallel to the joint at least 24 inches from the joint and at least 6 inches from the end of any dowels. This saw cut shall be made with a wheel saw as specified in paragraph: Sawing Equipment. All pavement to be removed beyond this last saw cut shall be removed in accordance with the approved demolition work plan. All pavement between this last saw cut and the joint line shall be removed by carefully pulling pieces and blocks away from the joint face with suitable equipment and then picking them up for removal.

3.10.2 Edge Repair

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Slabs which are damaged during construction shall be removed and replaced as directed by the Contracting Officer at no cost to the Government. Repair of previously existing damage areas will be considered a subsidiary part of concrete pavement construction. All exposed keyways shall be sawn off full depth.

3.10.2.1 Spall Repair

Not more than 15.0 percent of each slab's edge shall be spalled as a result of the Contractor's actions. Slabs with spalls exceeding this quantity, regardless of spall size, shall be sawn full depth to remove the spalled face. Spalls along joints and along cracks shall be repaired where indicated and where directed. Repair materials and procedures shall be as previously specified in paragraph: Repairing Spalls Along Joints.

3.10.2.2 Underbreak and Underlying Material

All underbreak shall be repaired by removal and replacement of the damaged slabs in accordance with paragraph: Removal and Replacement of Full Slabs. The underlying material adjacent to the edge of and under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new concrete, and shall be shaped as shown on the drawings or as directed. Sufficient underlying material shall be kept in place outside the joint line to completely prevent disturbance of material under the pavement which is to remain in place. Any material under the portion of the concrete pavement to remain in place which is disturbed or loses its compaction shall be carefully removed and replaced with concrete.

3.11 PAVEMENT PROTECTION

The Contractor shall protect the pavement against all damage prior to final acceptance of the work by the Government. Aggregates, rubble, or other similar construction materials shall not be placed on airfield pavements. Traffic shall be excluded from the new pavement by erecting and maintaining barricades and signs until the concrete is at least 14 days old, or for a longer period if so directed. As a construction expedient in paving intermediate lanes between newly paved pilot lanes, operation of the hauling equipment will be permitted on the new pavement after the pavement has been cured for 7 days and the joints have been sealed or otherwise protected. Also, the subgrade planer, concrete paving and finishing machines, and similar equipment may be permitted to ride upon the edges of previously constructed slabs when the concrete has attained a minimum field cured flexural strength of 550 psi and approved means are furnished to prevent damage to the slab edge. All new and existing pavement carrying construction traffic or equipment shall be continuously kept completely clean, and spillage of concrete or other materials shall be cleaned up immediately upon occurrence. Special care shall be used where Contractor's traffic uses or crosses active airfield pavement. Other existing pavements used by the Contractor shall be power broomed at least daily when traffic operates. For fill-in lanes, equipment shall be used that will not damage or spall the edges or joints of the previously constructed pavement.

3.12 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL

3.12.1 Testing and Inspection by Contractor

During construction, the Contractor shall be responsible for sampling and testing aggregates, cementitious materials (cement and silica fume), and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. The Contractor shall furnish sampling platforms and belt templates to obtain representative samples of aggregates from charging belts at the concrete plant. Samples of concrete shall be obtained at the point of delivery to the paver. Testing by the Government will in no way relieve the Contractor of the specified testing requirements. The Contractor shall perform the inspection and tests described below, and based upon the results of these inspections and tests, shall take the action required and submit reports as required. This testing shall be performed by the Contractor regardless of any other testing performed by the Government, or for any other reason.

3.12.2 Testing and Inspection Requirements

Contractor CQC sampling, testing, inspection and reporting shall be in accordance with the following Table.

TABLE 6
CONTRACTOR TESTING AND INSPECTION REQUIREMENTS

Frequency	Test Method	Control Limit/Corrective Action
	Fine Aggregate Gradation and Fineness Modulus	
2 per lot	ASTM C 136 sample at belt	9 of 10 tests vary <0.15 from average Outside limits on any sieve-retest 2nd failure-stop, repair, retest
	Coarse Aggregate Gradation	
2 per lot	ASTM C 136 sample at belt	Outside limits on any sieve-retest 2nd failure-report to COR, correct 2 consecutive avgs of 5 tests out-report to COR, stop ops, repair, retest
	Aggregate Deleterious Materials	
Every 30 days	see paragraph: AGGREGATES	Stop production, retest, replace aggregate Increase testing interval to 90 days if previous 2 tests pass
	Plant - Scales, Weighing Accuracy	
Monthly	NRMCA QC 3	Stop plant ops, repair, recalibrate
	Plant - Batching and Recording Accuracy	
Weekly	Record/Report	Record required/recorded/actual batch mass Stop plant ops, repair, recalibrate
	Plant - Batch Plant Control	
Every lot	Record/Report	Record type/amt of each material per lot
	Plant - Mixer Uniformity - Stationary Mixers	
Every 4 months during paving	COE CRD-C 55	After initial approval, use abbreviated method. Increase mixing time, change batching sequence, reduce batch size to bring into compliance. Retest

	Plant - Mixer Uniformity - Truck Mixers	
Every 4 months during paving	ASTM C 94/C 94M	Random selection of truck. Increase mixing time, change batching sequence, reduce batch size to bring into compliance. Retest.
	Concrete Mixture - Air Content	
When test specimens prepared + 2 random	ASTM C 231 sample at paving site	Individual test control chart: Warning +/-1.0 - adjust AEA, retest Action +/-1.5 - halt ops, repair, retest Range between 2 consecutive tests: Warning +2.0 - recalibrate AEA dispenser Action +3.0 - halt ops, repair, retest
	Concrete Mixture - Slump	
When test specimens prepared + 4 random	ASTM C 143/C 143M sample at paving site	Individual test control chart: Upper Warning - 1/2 inch below max-adjust batch masses within max W/C ratio Upper Action - maximum allowable slump stop operations, adjust, retest Range between each consecutive test: 1-1/2 inches stop operations, repair, retest
	Concrete Mixture - Temperature	
When test specimens prepared	ASTM C 1064/C 1064M sample at paving site	See paragraph: WEATHER LIMITATIONS
	Concrete Mixture - Strength	
8 per lot	ASTM C 31/C 31M sample at paving site	See Paragraph: Concrete Strength Testing for CQC
	Paving - Inspection Before Paving	
Prior to each paving operation	Report	Inspect underlying materials, construction joint faces, forms, reinforcing, dowels, and embedded items
	Paving - Inspection During Paving	
During each paving operation		Monitor and control paving operation, including placement, consolidation, finishing, texturing, curing, and joint sawing.
	Paving - Vibrators	
Weekly, during paving	COE CRD-C 521	Test frequency (in concrete), and amplitude (in air), measure at tip/head and average. Repair or replace defective vibrators.
	Moist Curing	
2 per lot, min 4 per day	Visual	Repair defects, extend curing by 1 day
	Membrane Compound Curing	
Daily	Visual	Calculate coverage based on quantity/area Respray areas where coverage defective

Recalibrate equipment

Cold Weather Protection

Once per	Visual	Repair defects, report conditions to COR

3.12.3 Concrete Strength Testing for Contractor CQC

a. Take samples for strength tests at the paving site. Fabricate and cure test beams in accordance with ASTM C 31/C 31M; test them in accordance with ASTM C 78.

b. Fabricate and cure 2 test beams per sublot from the same batch or truckload and at the same time acceptance beams are fabricated and test them for flexural strength at 7-day age.

c. Average all 8 flexural tests per lot. Convert this average 7-day flexural strength per lot to equivalent 28-day flexural strength using the Correlation Ratio determined during mixture proportioning studies.

d. Compare the equivalent 28-day flexural strength from the conversion to the Average Flexural Strength Required for Mixtures from paragraph of same title.

e. If the equivalent average 28-day strength for the lot is below the Average Flexural Strength Required for Mixtures by 69 psi flexural strength or more, at any time, adjust the mixture to increase the strength, as approved.

f. The Contractor's CQC testing agency shall maintain up-to-date control charts for strength, showing the 7-day CQC flexural strength and the 28-day flexural strength (from acceptance tests) of each of these for each lot.

3.12.4 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all Contractor quality control records.

-- End of Section --

321373 - COMPRESSION JOINTS

SECTION 32 13 73
COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 2628	(1991; R 2005) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D 2835	(1989; R 2003) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 548	(1988) Standard Specification for Jet-Fuel and Heat Resistant Preformed Polychloroprene Elastomeric Joint Seals for Rigid Pavements

1.2 SAFETY

Compression joint seals shall not be placed within 25 feet of liquid oxygen (LOX) equipment, LOX storage, or LOX piping.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-03 Product Data

Equipment

List of proposed equipment to be used in the performance of construction work, including descriptive data, 60 days prior to use on the project.

Manufacturer's Instructions

Where installation procedures are required in accordance with the manufacturer's recommendations, printed copies of manufacturers' instructions, 60 days prior to use on the project.

SD-04, Samples

Compression Seals; G RE

Regardless of testing responsibility, 9 foot long samples of the materials, 60 days prior to use on the project. Printed directions from the manufacturer on recommended installation criteria shall be furnished with the samples plus the manufacturer's certification

that the selected seal is recommended for the installation on this project.

SD-06 Test Reports

Test Requirements

Certified copies of test results, 60 days prior to use of material on the project.

1.4 TEST REQUIREMENTS

Each lot of compression joint seal and lubricant/adhesive shall be sampled, identified, and tested for conformance with the applicable material specification. A lot of compression seal shall consist of 1 day's production or 20,000 linear feet for each cross section, whichever is less. A lot of lubricant/adhesive shall consist of 1 day's production. Testing of the compression joint seal and lubricant/adhesive material shall be the responsibility of the Contractor and shall be performed in an approved independent laboratory, and certified copies of the test reports shall be submitted for approval 60 days prior to the use of the materials at the jobsite. Samples of each lot of material shall also be submitted and will be retained by the Government for possible future testing should the materials appear defective during or after application. The Contractor shall furnish additional samples of materials, in sufficient quantity to be tested, upon request. Final acceptance will be based on conformance to the specified test requirements and the performance of the in-place materials.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.5.1 Joint Cleaning Equipment

1.5.1.1 Concrete Saw

A self-propelled power saw with water-cooled diamond saw blades shall be provided for cutting joints to the depths and widths specified and for removing filler, existing old joint seal, or other material embedded in the joints or adhered to the joint faces.

1.5.1.2 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hose, and a long-wearing venturi-type nozzle of proper size, shape, and opening. The maximum nozzle opening should not exceed 1/4 inch. The air compressor shall be portable and shall be capable of furnishing not less than 150 cubic feet per minute and maintaining a line pressure of not less than 90 psi at the nozzle while in use. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint about 1 inch above the pavement surface and will direct the blast to clean the joint walls. The height, angle of inclination, and the size of the nozzle shall be adjusted as necessary to ensure satisfactory results.

1.5.1.3 Waterblasting Equipment

Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, a wand with safety release cutoff controls, nozzle, and auxiliary water resupply equipment. The water tank and auxiliary water resupply equipment shall be of sufficient capacity to permit continuous operations. The pumps, hoses, wand, and nozzle shall be of sufficient capacity to permit the cleaning of both walls of the joint and the pavement surface for a width of at least 1/2 inch on either side of the joint. A pressure gauge mounted at the pump shall show at all times the pressure in psi at which the equipment is operating.

1.5.2 Sealing Equipment

Equipment used to install the compression seal shall place the compression seal to the prescribed depths within the specified tolerances without cutting, nicking, twisting, or otherwise damaging the seal. The equipment shall be capable of placing the seal with not more than two percent longitudinal stretch or compression of the seal during installation. The machine shall be an automatic self-propelled joint seal application equipment and engine powered. The machine shall include a reservoir for the lubricant/adhesive, a device for conveying the lubricant/adhesive in the proper quantities to the sides of the compression seal or the sidewalls of the joints, a reel capable of holding one full spool of compression seal, and a power-driven apparatus for feeding the joint seal through a compression device and inserting the seal into the joint. The equipment shall also include a guide to maintain the proper course along the joint being sealed. The machine shall at all times be operated by an experienced operator.

1.6 TRIAL JOINT SEAL AND LUBRICANT/ADHESIVE INSTALLATION

Prior to the cleaning and sealing of the joints for the entire project, a test section at least 200 feet long shall be prepared at a designated location in the project pavement, using the specified materials and the approved equipment to demonstrate the proposed joint preparation and sealing of all types of joints in the project. Following the completion of the trial length and before any other joint is sealed, the trial joints will be inspected by the Government to determine that the materials and installation meet the requirements specified. If materials or installation do not meet requirements, the materials shall be removed, and the joints shall be recleaned and resealed at no cost to the Government. No other joints shall be sealed until the test installation has been approved. If the trial section is approved, it may be incorporated into the permanent work. Other joints shall be sealed in the manner approved for sealing the trial joint.

1.7 DELIVERY AND STORAGE

Materials delivered to the jobsite shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall protect materials from weather and shall maintain materials at temperatures recommended by the manufacturer.

1.8 ENVIRONMENTAL CONDITIONS

The ambient temperature and the pavement temperature within the joint wall shall be at least 35 degrees F and rising at the time of installation of the materials. Sealant installation will not be allowed if moisture or foreign material is observed in the joint.

PART 2 PRODUCTS

2.1 COMPRESSION SEALS

Compression joint seal materials shall be a vulcanized elastomeric compound using polychloroprene as the only base polymer. The material and manufactured seal shall conform to ASTM D 2628 and COE CRD-C 548 where jet fuel and/or heat blast resistance is required. The joint seal shall be a labyrinth type seal. The uncompressed depth of the face of the compression seal (that is to be bonded to the joint wall) shall be greater than the uncompressed width of the seal, except that for seals 1 inch or greater in width, the depth need be only 1 inch or greater. The actual width of the uncompressed seal for construction and contraction joints shall be [0.75 or 1] [_____] inches and for expansion joints shall be 1.25 [____] inches. The tolerance on the seal shall be plus 1/8 inch or minus 1/16 inch.

2.2 LUBRICANT/ADHESIVE

Lubricant/adhesive used for the compression elastomeric joint seal shall be a one-component compound conforming to ASTM D 2835.

PART 3 EXECUTION

3.1 PREPARATION OF JOINTS

Immediately before installation of the compression joint seal, the joints shall be thoroughly cleaned to remove laitance, filler, existing sealer, foreign material and protrusions of hardened concrete from the sides and upper edges of the joint space to be sealed. Cleaning shall be by sandblasting or waterblasting and shall extend along pavement surfaces at least 1/2 inch on either side of the joint. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water. The Contractor shall demonstrate that the selected cleaning operation meets the cleanliness requirements. Any irregularity in the joint face which would prevent uniform contact between the joint seal and the joint face shall be corrected prior to the installation of the joint seal.

3.1.1 Sawing

Joints shall be cleaned and opened to the specified width and depth by sawing. Immediately following the sawing operation, the joint faces and opening shall be thoroughly cleaned using a water jet to remove saw cuttings or debris remaining on the faces or in the joint opening. Compression seal shall be installed within 3 calendar days of the time the joint cavity is sawed. Depth of the joint cavity shall be per manufacturer's instructions. The saw cut for the joint seal cavity shall be centered over the joint line. The nominal width of the sawed joint seal cavity shall be as follows; the actual width shall be within a tolerance of plus or minus 1/16 inch:

a. If a nominal 13/16 inch wide compression seal is furnished, the nominal width of the saw cut shall be 14 inches when the pavement temperature at the time of sawing is between 12 and 82 degrees F. If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1.5 mm 1/16 inch. If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 inch.

b. The pavement temperature shall be measured in the presence of the Contracting Officer. Measurement shall be made each day before commencing sawing and at any other time during the day when the temperature appears to be varying from the allowable sawing range.

3.1.2 Sandblast Cleaning

A multiple pass sandblasting technique shall be used until the surfaces are free of dust, dirt, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete.

3.1.3 Waterblast Cleaning

A multiple pass waterblast technique shall be used until the surfaces are free of dust, dirt, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete.

3.1.4 Rate of Progress

Sandblasting or waterblasting of joint faces shall be limited to the length of joint that can be sealed during the same workday.

3.2 INSTALLATION OF THE COMPRESSION SEAL

3.2.1 Time of Installation

Joints shall be sealed immediately within 3 calendar days of sawing the joint seal cavity and following concrete cure and the final cleaning of the joint walls. Open joints ready for sealing that cannot be sealed under the specified conditions shall be provided with an approved temporary seal to prevent infiltration of foreign material. When rain interrupts the sealing operations, the joints shall be washed, air pressure cleaned, and allowed to dry prior to installing the lubricant/adhesive and compression seal.

3.2.2 Sequence of Installation

Longitudinal joints shall be sealed first, followed by transverse joints. Seals in longitudinal joints shall be installed so that all transverse joint seals will be intact from edge to edge of the pavement. Intersections shall be made monolithic by use of joint seal adhesive and care in fitting the intersection parts together. Extender pieces of seal shall not be used at intersections. Any seal falling short at the intersection shall be removed and replaced with new seal at no additional cost to the Government. Seals that are required to change direction by more than 20 degrees, may require a poured sealant at the intersection. Poured sealant shall be per compression seal manufacturer's instructions.

3.3 SEALING OF JOINTS

The sides of the joint seal or the sides of the joint shall be covered with a coating of lubricant/adhesive and the seal installed as specified. Butt joints and seal intersections shall be coated with liberal applications of lubricant/adhesive. Lubricant/adhesive spilled on the pavement shall be removed immediately to prevent setting on the pavement. The in-place joint seal shall be in an upright position and free from twisting, distortion, and cuts. Adjustments shall be made to the installation equipment and procedure, if the stretch exceeds 1 percent. Any seal exceeding 2 percent

stretch shall be removed and replaced. The joint seal shall be placed at a uniform depth within the tolerances specified. In-place joint seal which fails to meet the specified requirements shall be removed and replaced with new joint seal at no cost to the Government. The compression joint seal shall be placed to a depth of 1/4 inch, plus or minus 1/8 inch, below the pavement surface except when the joint is beveled or has a radius at the surface, or unless otherwise directed. For beveled joints or joints with a radius at the surface, the compression joint seal shall be installed at a depth of 1/8 inch, plus or minus 1/8 inch, below the bottom of the edge of the bevel or radius. No part of the seal shall be allowed to project above the surface of the pavement or above the edge of the bevel or radius. The seal shall be installed in the longest practicable lengths in longitudinal joints and shall be cut at the joint intersections to provide continuous installation of the seal in the transverse joints. The lubricant/adhesive in the longitudinal joints shall be allowed to set for 1 hour prior to cutting at the joint intersections to reduce the possibility of shrinkage. For all transverse joints, the minimum length of the compression joint seal shall be the pavement width from edge to edge.

3.4 CLEAN-UP

Upon completion of the project, all unused materials shall be removed from the site, any lubricant/adhesive on the pavement surface shall be removed, and the pavement shall be left in clean condition.

3.5 QUALITY CONTROL PROVISIONS

3.5.1 Application Equipment

The application equipment shall be inspected to assure uniform application of lubricant/adhesive to the sides of the compression joint seal or the walls of the joint. If any equipment causes cutting, twisting, nicking, excessive stretching or compressing of the seal, or improper application of the lubricant/adhesive, the operation shall be suspended until causes of the deficiencies are determined and corrected.

3.5.2 Procedures

3.5.2.1 Quality Control Inspection

Quality control provisions shall be provided during the joint cleaning process to prevent or correct improper equipment and cleaning techniques that damage the concrete in any manner. Cleaned joints shall be approved by the Government prior to installation of the lubricant/adhesive and compression joint seal.

3.5.2.2 Conformance to Stretching and compression Limitations

Conformance to stretching and compression limitations shall be determined. The top surface of the compression seal shall be marked at 1 foot intervals in a manner clear and durable to enable length determinations of the seal. After installation, the distance between the marks shall be measured on the seal. If the stretching or compression exceeds 2 percent, the seal shall be removed and replaced with new joint at no additional cost to the Government. The seal shall be removed up to the last correct measurement. The seal shall be inspected a minimum of once per [100] [400] feet of seal for compliance to the shrinkage or compression requirements. Measurements shall also be made at the same interval to determine conformance with depth and width of installation requirements. Compression seal that is not in

conformance with specification requirements shall be removed and replaced with new joint seal at no additional cost to the Government.

3.5.2.3 Pavement Temperature

The pavement temperature shall be determined by placing a thermometer in the initial saw cut for the joint and the reading shall be recorded. The thermometer shall remain in the joint for an adequate time to provide a control reading.

3.5.3 Final Inspection

The joint sealing system (compression seal and lubricant/adhesive) shall be inspected for proper rate of cure and bonding to the concrete, cuts, twists, nicks and other deficiencies. Seals exhibiting any defects, at any time prior to final acceptance of the project, shall be removed from the joint, wasted, and replaced in a satisfactory manner.

-- End of Section --

321724.0010 - PAVEMENT MARKING

SECTION 32 17 24.00 10
PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325	(Rev C) Beads (Glass Spheres) Retro-Reflective (Metric)
FS TT-P-1952	(Rev D) Paint, Traffic and Airfield Markings, Waterborne

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-03 Product Data

Equipment; G

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range,

tank and flow capacities, and safety precautions required for the equipment operation.

Composition Requirements

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications

Documentation on personnel qualifications, as specified.

SD-06 Test Reports

Sampling and Testing

Certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory.

SD-08 Manufacturer's Instruction

Mixing, Thinning and Application

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

1.3 DELIVERY AND STORAGE

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.4 EQUIPMENT

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads and runways shall display low speed traffic markings and traffic warning lights.

1.4.1 Paint Application Equipment

1.4.1.1 Self-Propelled or Mobile-Drawn Pneumatic Spraying Machines

The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall have a speed during application not less than 5 mph, and shall be capable of applying the stripe widths indicated, at the paint coverage rate specified in paragraph APPLICATION, and of even uniform thickness with clear-cut edges. The equipment used to apply the paint binder to airfield pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a line width at any one time in multiples of 6 inches, from 6 inches to 36 inches. The paint applicator shall have paint reservoirs or tanks of sufficient capacity and suitable gauges to apply paint in accordance with requirements

specified. Tanks shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gauges in full view and reach of the operator. Paint strainers shall be installed in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

1.4.2 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION, at all operating speeds of the applicator to which it is attached.

1.4.3 Surface Preparation Equipment

1.4.3.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cfm of air at a pressure of not less than 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water.

1.4.3.2 Waterblast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.4.4 Marking Removal Equipment

Equipment shall be mounted on rubber tires and shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Waterblasting equipment shall be capable of producing an adjustable, pressurized stream of water. Sandblasting equipment shall include an air compressor, hoses, and nozzles. The compressor shall be equipped with traps to maintain the air free of oil and water.

1.4.4.1 Shotblasting Equipment

Shotblasting equipment shall be capable of producing an adjustable depth of removal of marking and pavement. Each unit shall be self-cleaning and self-contained, shall be able to confine dust and debris from the operation, and shall be capable of recycling the abrasive for reuse.

1.4.4.2 Chemical Equipment

Chemical equipment shall be capable of application and removal of chemicals from the pavement surface, and shall leave only non-toxic biodegradeable residue.

1.4.5 Traffic Controls

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.5 MAINTENANCE OF TRAFFIC

1.5.1 Airfield

The performance of work in the controlled zones of airfields shall be coordinated with the Contracting Officer and with the Flight Operations Officer. Verbal communications shall be maintained with the control tower before and during work in the controlled zones of the airfield. The control tower shall be advised when the work is completed. A radio for this purpose shall be provided by the Contractor and approved by the Contracting Officer.

1.6 WEATHER LIMITATIONS FOR REMOVAL

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

1.7 QUALIFICATIONS

The Contractor shall submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for airfields and roads shall conform to FS TT-P-1952, color as indicated. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control Regulations.

2.2 REFLECTIVE MEDIA

Reflective media for airfields shall conform to FS TT-B-1325, Type I, Gradation A. Reflective media for roads shall conform to FS TT-B-1325, Type I, Gradation A.

2.3 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the

Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers by the Contractor in the presence of a representative of the Contracting Officer. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved. No material shall be used at the project prior to receipt by the Contractor of written notice that the materials meet the laboratory requirements. Testing shall be performed in an approved independent laboratory. If materials are approved based on reports furnished by the Contractor, samples will be retained by the Government for possible future testing should the material appear defective during or after application.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Newly laid flexible and rigid pavements require aging prior to painting in order to obtain satisfactory paint performance. All new pavement surfaces shall be at least 30 days old before applying paint.

Surfaces to be marked shall be thoroughly cleaned before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements prior to 30 day curing of concrete, temporary markings with paint conforming to FS TT-P-1952, shall be placed. Temporary markings shall not be placed prior to completion of 7 days of concrete curing. Leave curing compound on. Apply paint at 1/2 the normal application rate. Apply glass beads at 1/2 the normal application rate. After 30 days remove the paint, beads and curing compound (with water blasting or sand blasting) and apply new marking and glass beads per the marking specification. This provision only applies to rigid concrete pavements. No markings shall be placed on asphalt pavements prior to completion of 30 days.

3.1.2 Cleaning Existing Pavement Markings

In general, markings shall not be placed over existing pavement marking patterns. Existing pavement markings, which are in good condition but interfere or conflict with the newly applied marking patterns, shall be removed. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. Whenever grinding, scraping, sandblasting or other operations are performed the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is

misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

3.1.3 Cleaning Concrete Curing Compounds

On new Portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.

b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.

c. All remaining curing compound is intact; all loose and flaking material is removed.

d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.

e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. The Contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 2.6 plus or minus 0.1 square meter/L 105 plus or minus 5 square feet/gallon. Glass spheres shall be applied uniformly to the wet paint on airfield pavement at a rate of 1.0 8 kg of glass spheres per liter of paint and on road pavement at a rate of 0.7 6 kg of glass spheres per liter of paint plus or minus 0.5 pounds of glass spheres per gallon of paint.

b. Nonreflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 2.6 plus or minus 0.1 square meter/L 105 plus or minus 5 square feet/gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

3.2.2 Reflective Media

Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass spheres shall be accomplished to insure that reflective media is evenly distributed at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, operations shall be discontinued immediately until deficiency is corrected.

3.3 MARKING REMOVAL

Pavement marking shall be removed in the areas shown on the drawings. Removal of marking shall be as complete as possible without damage to the surface. Aggregate shall not be exposed by the removal process. After the markings are removed, the cleaned pavement surfaces shall exhibit adequate texture for remarking as specified in paragraph SURFACE PREPARATION. Contractor shall demonstrate removal of pavement marking in an area designated by the Contracting Officer. The demonstration area will become the standard for the remainder of the work.

3.3.1 Equipment Operation

Equipment shall be controlled and operated to remove markings from the pavement surface, prevent dilution or removal of binder from underlying pavement, and prevent emission of blue smoke from asphalt or tar surfaces.

3.3.2 Cleanup and Waste Disposal

The worksite shall be kept clean of debris and waste from the removal operations. Cleanup shall immediately follow removal operations in areas subject to air traffic. Debris shall be disposed of at approved sites.

-- End of Section --

331100 - WATER DISTRIBUTION

SECTION 33 11 00
WATER DISTRIBUTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1015	(2005) Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA B300	(2004) Hypochlorites
AWWA B301	(2004) Liquid Chlorine
AWWA C104/A21.4	(2003) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105/A21.5	(2005) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110/A21.10	(2003) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm through 1219 mm), for Water
AWWA C111/A21.11	(2007) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115/A21.15	(2005) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151/A21.51	(2002; Errata 2002) Ductile-Iron Pipe, Centrifugally Cast, for Water
AWWA C153/A21.53	(2006) Ductile-Iron Compact Fittings for Water Service
AWWA C300	(2004) Reinforced Concrete Pressure Pipe, Steel-Cylinder Type
AWWA C301	(1999; Errata 2000) Prestressed Concrete Pressure Pipe, Steel-Cylinder Type
AWWA C303	(2002) Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type
AWWA C500	(2002) Metal-Seated Gate Valves for Water Supply Service
AWWA C502	(2005) Dry-Barrel Fire Hydrants
AWWA C504	(2006) Rubber-Seated Butterfly Valves
AWWA C507	(2005) Ball Valves, 6 In. through 48 In. (150 mm through 1200 mm)
AWWA C508	(2001) Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS

AWWA C509	(2001) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(2005) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C605	(2005) Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
AWWA C651	(2005) Disinfecting Water Mains
AWWA C700	(2002) Cold-Water Meters - Displacement Type, Bronze Main Case
AWWA C703	(1996; R 2004) Cold-Water Meters - Fire Service Type
AWWA C704	(2002) Propeller-Type Meters for Waterworks Applications
AWWA C706	(1996; R 2005) Direct-Reading, Remote-Registration Systems for Cold-Water Meters
AWWA C707	(2005) Encoder-Type Remote-Registration Systems for Cold-Water Meters
AWWA C800	(2005) Underground Service Line Valves and Fittings
AWWA C900	(1997) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution
AWWA C901	(2002) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13mm) Through 3 In. (76 mm), for Water Service
AWWA C905	(1997) Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In. (350 mm through 1,200 mm)
AWWA C906	(1999) Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) through 63 In., (1,575 mm) for Water Distribution and Transmission
AWWA M23	(2002) PVC Pipe - Design and Installation - Second Edition
AWWA M55	(2006) PE Pipe - Design and Installation - First Edition

ASME INTERNATIONAL (ASME)

ASME B16.1	(2005) Cast Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250
ASME B16.15	(1985; R 2004) Cast Bronze Threaded Fittings Classes 125 and 250
ASME B16.18	(2001; R 2005) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(2001; R 2005) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.26	(2006) Cast Copper Alloy Fittings for Flared Copper Tubes
ASME B18.2.2	(1987; R 2005) Square and Hex Nuts (Inch Series)
ASME B18.5.2.1M	(2006) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2005) Metric Round Head Square Neck Bolts

INTERNATIONAL ORGANIZATION FOR STANDARDS (ISO)

ISO 161/1	(1996) Thermoplastics pipes for the conveyance of fluids -- Nominal outside diameters and nominal pressures

ASTM INTERNATIONAL (ASTM)

ASTM A 307	(2004e1) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 47/A 47M	(1999; R 2004) Ferritic Malleable Iron Castings
ASTM A 536	(1984; R 2004) Ductile Iron Castings
ASTM B 32	(2004) Solder Metal
ASTM B 42	(2002e1) Seamless Copper Pipe, Standard Sizes
ASTM B 61	(2002) Steam or Valve Bronze Castings
ASTM B 62	(2002) Composition Bronze or Ounce Metal Castings
ASTM C 94/C 94M	(2006) Ready-Mixed Concrete
ASTM D 1599	(2005) Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings

ASTM D 1784	(2006a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(2006) Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(2005) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2464	(2006) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(2006) Poly(Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(2006) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(2004e1) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2657	(2003) Heat Fusion Joining Polyolefin Pipe and Fittings
ASTM D 2774	(2004e1) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2837	(2008) Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
ASTM D 2855	(1996; R 2002) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 2996	(2001) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 2997	(2001) Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 3350	(2002a) Polyethylene Plastics Pipe and Fittings Materials
ASTM D 4161	(2001; R 2005) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM F 402	(1993; R 1999) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	(2002e1) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(2003) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2006) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 325	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 49	(2003) Hazardous Chemicals Data
NFPA 704	(2006) Identification of the Hazards of Materials for Emergency Response

TECHNICAL MANUAL (TM)

TM 5-813-5/AFM 88-10 Volume 5	(1986) Water Supply, Water Distribution

UNIFIED FACILITIES CRITERIA (UFC)

UFC 3-230-10A	(2004) Water Supply: Water Distribution

UNDERWRITERS LABORATORIES (UL)

UL 246	(1993; Rev thru Dec 1998) Hydrants for Fire-Protection Service
UL 262	(2004) Gate Valves for Fire-Protection Service
UL 312	(2004) Check Valves for Fire-Protection Service

PLASTICS PIPE INSTITUTE (PPI)

PPI TR-33	(2005) Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe

1.2 PIPING

This section covers water distribution mains and water service line connections to buildings at a point approximately 1.5 m outside buildings and structures to which service is required. For design guidance refer to UFC 3-230-10A or TM 5-813-5/AFM 88-10 Volume 5. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.2.1 Water Distribution Mains

Provide water distribution mains indicated as 4 through 12 inch diameter pipe sizes of ductile-iron (DI) or high denisty polyethylene (HDPE). Also provide water main accessories, gate valves, check valves and water meters as specified and where indicated.

1.2.2 Water Service Lines

Provide water service lines indicated as 25 mm (1 inch) to 80 mm (3 inch).

Piping for water service 25 mm (1 inch) or less shall be copper tubing unless otherwise specified. Service lines from 25 mm to 80 mm (3 inches) in diameter shall be polyvinyl chloride (PVC) or unplasticised polyvinyl chloride (UPVC) plastic, unless otherwise shown or specified. Piping for water service lines larger than 80 mm (3 inch) shall be ductile iron, filament-wound or centrifugally cast reinforced thermosetting resin, unless otherwise shown or specified. Provide water service lines indicated to building service at a point approximately 1.5 m from the building.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-03 Product Data

Piping Materials; G TAC

Water distribution main piping, fittings, joints, valves, and coupling; G TAC

Water service line piping, fittings, joints, valves, and coupling; G TAC

Hydrants; G TAC

Valve boxes; G TAC

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-05 Design Data

Design calculations of water piping; G TAC

SD-06 Test Reports

Bacteriological Disinfection; G TAC.

Test results from commercial laboratory verifying disinfection

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling; G TAC

Water service line piping, fittings, joints, valves, and coupling; G TAC

Shop-applied lining and coating; G TAC

Fire hydrants; G TAC

Displacement Type Meters; G TAC

1.4 DELIVERY, STORAGE, MARKING AND HANDLING

1.4.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.4.2 Marking

All pipe and fitings shall bear the mark of the manufacturer and required markings such as AWWA classification, material code designations, production date code with month and year, nominal size and pressure class.
All pipe markings shall withstand shipping, handling and storage.

1.4.3 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be

defective before or after laying shall be replaced with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

1.4.3.1 Polyethylene (PE) Pipe, Fittings, and Accessories

Handle PE pipe, fittings, and accessories in accordance with AWWA C901.

1.4.3.2 Miscellaneous Plastic Pipe and Fittings

Handle Polyvinyl Chloride (PVC), pipe and fittings in accordance with the manufacturer's recommendations. Store plastic piping and jointing materials that are not to be installed immediately under cover out of direct sunlight.

Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

The Contractor may offer alternative pipe materials that meet other AWWA, ASTM or International Standards DIN or BS. Refer to Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT, paragraph 3.6.2 entitled "Variations."

2.1.1.1 PVC Plastic Pipe

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B.

a. Pipe Less Than 4 inch Diameter:

(1) Screw-Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified. Pipe couplings when used, shall be tested as required by ASTM D 2464.

(2) Elastomeric-Gasket Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 40, with joints meeting the requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified, or it may be pipe conforming to requirements of ASTM D 2241, elastomeric joint, with the following applications:

SDR	Maximum Working Pressure psi	Minimum Hydrostatic Pressure psi

26	100	133
21	120	160
17	150	200
13.5	200	266

(3) Solvent Cement Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 or ASTM D 2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

2.1.1.2 Ductile-Iron Piping (100 mm (4-inch) and Larger I.D)

a. Pipe and Fittings: Pipe, except flanged pipe, AWWA C151/A21.51, Pressure Class 350 Thickness Class 51. Fittings, AWWA C110/A21.10 or AWWA C153/A21.53; fittings with push-on joint ends conforming to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved, for push-on joint. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the specified joints. Pipe and fittings shall have cement-mortar lining, AWWA C104/A21.4, standard thickness.

b. Joints and Jointing Material:

(1) Joints: Joints for pipe and fittings shall be push-on joints or mechanical joints unless otherwise indicated. Provide mechanical joints where indicated. Provide flanged joints where required. Flanged joints shall be located in valve pits. Provide mechanically coupled type joints using a sleeve-type mechanical coupling where indicated. Joints made with sleeve-type mechanical coupling may be used in lieu of push-on joint, subject to the limitations specified in paragraph entitled "Sleeve-Type Mechanical Couplings."

(2) Push-On Joints: Shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly, AWWA C111/A21.11.

(3) Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets, AWWA C111/A21.11.

(4) Flanged Joints: Bolts, nuts, and gaskets for flanged connections as recommended in the Appendix to AWWA C115/A21.15. Flange for setscrewed flanges shall be of ductile iron, ASTM A 536, Grade 65-45-12, and conform to the applicable requirements of ASME B16.1, Class 250. Setscrews for setscrewed flanges shall be 190,000 psi tensile strength, heat treated and zinc-coated steel. Gasket and lubricants for setscrewed flanges, in accordance with applicable requirements for mechanical-joint gaskets specified in AWWA C111/A21.11. Design of setscrewed gasket shall provide for confinement and compression of gasket when joint to adjoining flange is made.

(5) Insulating Joints: Designed to effectively prevent metal-to-metal contact at the joint between adjacent sections of piping. Joint shall be of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers. Gasket shall be

of the dielectric type, full face, and in other respects as recommended in the Appendix to AWWA C115/A21.15. Bolts and nuts, as recommended in the Appendix to AWWA C115/A21.15.

(6) Sleeve-Type Mechanical Coupled Joints: As specified in paragraph entitled "Sleeve-Type Mechanical Couplings."

c. When installed, underground pipe shall be encased with (8 mil) thick polyethylene in accordance with AWWA C105/A21.5.

2.1.1.3 HDPE Pipe (100mm (4-inch) through 1600mm (63-inch))

a. Pipe and Fittings: Pipe AWWA C906, PE Code 3408 by ASTM D 3350 and ASTM D 2837, Minimum Cell Classification PE 334434 and Hydrostatic Design Basis. Dimensional Ratio (DR) 11, following standards ISO 161/1 or AWWA C110/A21.10 or ANSI B 36.10. Fittings, AWWA C906. Fittings shall have pressure rating at least equivalent to that of the Pipe. Ends of pipe and fittings shall be suitable for the specified joints.

b. Joints and Jointing Material:

(1) Thermal Butt-Fusion Joints: HDPE pipe or fittings joined to HDPE pipe or fittings shall be joined with thermal butt fusion joints following AWWA M55.

(2) Mechanical Joint Adapter with Restraining Device: HDPE pipe joined to valve joints or buried ductile iron pipe shall be joined by a mechanical joint adapter with restraining devices. Dimensional and material requirements for these pipe ends, glands, bolts and nuts, and gaskets, AWWA C111/A21.11.

(3) Flanged Joints: HDPE pipe joined to expsosed ductile iron pipe shall be joined by a HDPE flange adaptor. Each flange end shall be lap joint type with HDPE stub end and ductile iron back-up flange. Bolts, nuts, and gaskets for flanged connections as recommended in the Appendix to AWWA C115/A21.15. Flange for setscrewed flanges shall be of ductile iron, ASTM A 536, Grade 65-45-12, and conform to the applicable requirements of ASME B16.1, Class 250. Setscrews for setscrewed flanges shall be 190,000 psi tensile strength, heat treated and zinc-coated steel. Gasket and lubricants for setscrewed flanges, in accordance with applicable requirements for mechanical-joint gaskets specified in AWWA C111/A21.11. Design of setscrewed gasket shall provide for confinement and compression of gasket when joint to adjoining flange is made. Joint between stub end and HDPE pipe shall eb thermal butt-fusion.

(4) Sleeve-Type Mechanical Coupled Joints: HDPE pipe joined to AWWA C900 or 355mm to 610mm AWWA C905 PVC pipe shall be joined by a mechanical joint sleeve. As specified in paragraph entitled "Sleeve-Type Mechanical Couplings."

c. When installed, underground pipe shall be encased with (8 mil) thick polyethylene in accordance with AWWA C105/A21.5.

2.1.1.4 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Malleable and ductile iron shall, conform to ASTM A 47/A 47M and ASTM A 536, respectively. Steel shall have a strength not less than that of the pipe. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11.

Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ASME B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be 5/8 inch in diameter. The minimum number of bolts for each coupling shall be 3 for inch pipe 4 for inch pipe, 5 for pipe, 6 for inch pipe, 7 for pipe and 1 bolt for each thereafter. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used.

Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint. Mechanical couplings shall provide a tight flexible joint under all reasonable conditions, such as pipe movements caused by expansion, contraction, slight setting or shifting in the ground, minor variations in trench gradients, and traffic vibrations. Couplings shall be of strength not less than the adjoining pipeline.

2.1.1.5 Insulating Joints

Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.1.1.6 Dielectric Fittings

Dielectric fittings shall be installed between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains. Dielectric fittings shall prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure.

2.1.2 Piping Beneath Right-of-Ways

Where proposed pipeline passes under the right-of-way of roadways, airfields or railways, piping shall be cased following Section 33 05 27, Pipe Sleeves for Utility Lines. Appurtenances such as valves, meters and manholes shall meet without further modification the casing strength requirements for pipes following Section 33 05 27, Pipe Sleeves for Utility Lines.

2.1.3 Valves, Hydrants, and Other Water Main Accessories

2.1.3.1 Valves, General

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends or resilient-seated gate valves 3 to 12 inches in size, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of psi 200 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to flanges of treatment equipment or others..

2.1.3.2 Check Valves

Swing-check type, AWWA C508 or UL 312. Valves conforming to: (1) AWWA C508 shall have iron or steel body and cover and flanged ends, and (2) UL 312 shall have cast iron or steel body and cover, flanged ends, and designed for a working pressure of 200 psi. Materials for UL 312 valves shall conform to the reference standards specified in AWWA C508. Valves shall have clear port opening.

2.1.3.3 Rubber-Seated Butterfly Valves

Rubber-seated butterfly valves shall conform to the performance requirements of AWWA C504. Wafer type valves conforming to the performance requirements of AWWA C504 in all respects, but not meeting laying length requirements will be acceptable if supplied and installed with a spacer providing the specified laying length. All tests required by AWWA C504 shall be met. Flanged-end valves shall be installed in an approved pit and provided with a union or sleeve-type coupling in the pit to permit removal. Mechanical-end valves 3 through 10 inches in diameter may be direct burial if provided with a suitable valve box, means for manual operation, and an adjacent pipe joint to facilitate valve removal. Valve operators shall restrict closing to a rate requiring approximately 60 seconds, from fully open to fully closed.

2.1.3.4 Vacuum and Air Relief Valves

Vacuum and air relief valves shall be of the size shown and shall be of a type that will release air and prevent the formation of a vacuum. The valves shall automatically release air when the lines are being filled with water and shall admit air into the line when water is being withdrawn in excess of the inflow. Valves shall be iron body with bronze trim and stainless steel float.

2.1.3.5 Globe Valves

Globe valves shall be opened by turning counterclockwise. Valves 3 inches and larger shall be iron body, brass mounted, conforming to AWWA C507 and AWWA C508.

2.1.3.6 Pressure Reducing Valves

Pressure reducing valves shall maintain a constant downstream pressure regardless of fluctuations in demand. Valves shall be suitable for 365 kPa psioperating pressure on the inlet side, with outlet pressure set for 274 kPa.psi. The valves shall be of the hydraulically-operated, pilot controlled, globe or angle type, and may be actuated either by diaphragm or piston. The pilot control shall be the diaphragm-operated, adjustable, spring-loaded type, designed to permit flow when controlling pressure exceeds the spring setting. Ends shall be flanged. Valve bodies shall be bronze, cast iron or cast steel with bronze trim. Valve stem shall be stainless steel. Valve discs and diaphragms shall be synthetic rubber. Valve seats shall be bronze. Pilot controls shall be bronze with stainless steel working parts.

2.1.3.7 Backflow Preventers

Backflow preventers shall be approved and listed by the Foundation for Cross-Connection Control and Hydraulic Research. Backflow preventers shall conform to ASSE 1015.

2.1.3.8 Propeller Type Meters

Propeller type meters shall conform to AWWA C704. Registers shall be straight-reading type, shall be permanently sealed and shall read in [U.S. gallons] [cubic feet]. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading remote register designed in accordance with AWWA C706. Meters shall comply with the accuracy and capacity requirements of AWWA C703.

2.1.3.9 Fire Hydrants

Dry-barrel type, except that flush-top hydrants shall be provided where indicated. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint. Check valves shall be installed between water transmission lines and hydrants in non-secured locations.

a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6 inch inlet, 5 1/4 inch valve opening, onepumper connection, and two 2 1/2 inch hose connections. Hose connections shall be individually valved with independent nozzle gate valves. Inlet shall have mechanical-joint end only; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502 or UL 246. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and shall be designed to have the special couplings break from a force not less than that which would be imposed by a moving vehicle; hydrant shall operate properly under normal conditions.

b. Flush-Top Fire Hydrants: Hydrants shall conform to the applicable requirements of AWWA C502, except that they shall be of a design that will permit placement of a frangible hydrant below the surface of pavement. Hydrants shall have 6 inch inlet, 4 1/4 inch minimum valve opening, pumper connection, and one 2 1/2 inch hose connection. Hose and pumper connections and operating nuts shall

be readily accessible, and enclosed in a cast iron box with top flush with pavement and having cast-iron cover with flush lifting handle. Inlet shall have mechanical-joint or push-on joint end. Size and shape of operating nut and cap nuts and threads on hose and pumper connections shall be as specified in AWWA C502.

2.1.3.10 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Cast-iron boxes shall have a minimum cover and wall thickness of 3/16 inch. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.1.3.11 Tracer Wire for Nonmetallic Piping

Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.2 WATER SERVICE LINE MATERIALS

2.2.1 Piping Materials

The Contractor may offer alternative pipe materials such as UPVC that may meet ASTM or International Standards DIN or BS. Refer to Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT, paragraph 3.6.2 entitled "Variations."

2.2.1.1 Copper Pipe and Associated Fittings

Pipe, ASTM B 42, regular, threaded ends. Fittings shall be brass or bronze, ASME B16.15, rated to 125 pound.

2.2.1.2 Copper Tubing and Associated Fittings

Tubing, ASTM B 88, Type K. Fittings for solder-type joint, ASME B16.18 or ASME B16.22; fittings for compression-type joint, ASME B16.26, flared tube type.

2.2.1.3 Plastic Piping

Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation (NSF) for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.

a. Polyvinyl Chloride (PVC) Plastic Piping with Screw Joints: ASTM D 1785, Schedule 40; or ASTM D 2241, with SDR as necessary to meet the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.. Fittings, ASTM D 2466 or ASTM D 2467. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting, respectively: PVC 2120/PVC II; PVC

2116/PVC II. Solvent cement for jointing, ASTM D 2564. Pipe couplings, when used shall be tested as required by ASTM D 2464.

b. Polyvinyl Chloride (PVC) Plastic Piping with Elastomeric-Gasket Joints:

Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 40, with joints meeting the requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified.

c. Polyvinyl Chloride (PVC) Plastic Piping with Solvent Cement Joints:

Pipe shall conform to dimensional requirements of ASTM D 1785 or ASTM D 2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

d. Polyethylene (PE) Plastic Pipe: Pipe tubing, and heat fusion fitting shall conform to AWWA C901.

2.2.1.4 Reinforced Thermosetting Resin Pipe (RTRP)

a. Pipe shall have a quick-burst strength greater than or equal to four times the normal working pressure of the pipe. The quick-burst strength test shall conform to the requirements of ASTM D 1599.

b. Fittings and specials required for closures, curves, bends, branches and connections to valves, pipe, or structures shall be approved by the Contracting Officer and conform to the details furnished by the manufacturer and to AWWA C300, AWWA C301, or AWWA C303, as applicable.

c. Joints shall be bell and spigot gasket coupling utilizing an elastomeric gasket in accordance with ASTM D 4161.

d. RTRP-I, Grade 1 and 2 Pipe and Joints: RTRP-I pipe shall conform to ASTM D 2996, except pipe shall have an outside diameter equal to cast iron outside diameter or standard weight steel pipe. The pipe shall be suitable for a normal working pressure of 1.03 MPa (150 psi) 150 psi at 23 degrees C.73 degrees F. The inner surface of the pipe shall have a smooth uniform continuous resin-rich surface liner conforming to ASTM D 2996. Joints shall be bell and spigot with elastomeric gasket, mechanical coupling with elastomeric gasket, threaded and bonded coupling, or tapered bell and spigot with compatible adhesive. All RTRP-I materials shall be products of a single manufacturer.

e. RTRP-II, Grade 1 and 2: RTRP-II shall conform to ASTM D 2997. Pipe shall have an outside diameter equal to standard weight steel pipe. Joints shall be the bell and spigot type with elastomeric gasket, bell and spigot with adhesive, butt-jointed with adhesive bonded reinforced overlay, mechanical, flanged, threaded or commercially available proprietary joints, provided they are capable of conveying water at the pressure and temperature of the pipe.

2.2.1.5 Insulating Joints

Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.2.2 Water Service Line Appurtenances

2.2.2.1 Corporation Stops

Ground key type; bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder-joint, or flared tube compression type joint. Threaded ends for inlet and outlet of corporation stops, AWWA C800; coupling nut for connection to flared copper tubing, ASME B16.26.

2.2.2.2 Curb or Service Stops

Ground key, round way, inverted key type; made of bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be as appropriate for connection to the service piping. Arrow shall be cast into body of the curb or service stop indicating direction of flow.

2.2.2.3 Dielectric Fittings

Dielectric fittings shall be installed between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains. Dielectric fittings shall prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure.

2.2.2.4 Check Valves

Check valves shall be designed for a minimum working pressure of 150 psi150 psi or as indicated. Valves shall have a clear waterway equal to the full nominal diameter of the valve. Valves shall open to permit flow when inlet pressure is greater than the discharge pressure, and shall close tightly to prevent return flow when discharge pressure exceeds inlet pressure. The size of the valve, working pressure, manufacturer's name, initials, or trademark shall be cast on the body of each valve.

2.2.2.5 Gate Valves 80 mm (3 Inch)3 Inch Size and Larger on Buried Piping

Gate valves 3 inch size and larger on buried piping AWWA C500 or UL 262 and of one manufacturer. Valves, AWWA C500, nonrising stem type with double-disc gates. Valves, UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 1200 kPa 175 psi (175 psi). Materials for UL 262 valves conforming to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals and shall be bolted and constructed so as to permit easy removal of parts for repair. Valves on 80 mm inch and smaller service lines shall have threaded ends. Valves on 80 mm inch or larger service lines shall have ends suitable for joining to the pipe used; push-on joint

ends or mechanical-joint ends for joining to ductile-iron pipe ends, gaskets and pipe ends, pipe fittings AWWA C111/A21.11.

2.2.2.6 Gate Valves Smaller than 80 mm (3 Inch)3 Inch in Size on Buried Piping

Gate valves smaller than 3 inch size on Buried Piping MSS SP-80, Class 150, solid wedge, nonrising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve. Provide handwheel operators.

2.2.2.7 Gate Valve 3 Inch Size and Larger

Gate valves 3 inch size and larger in valve pits and aboveground locations, AWWA C500 or UL 262 and of one make. Valves conforming to: (1) AWWA C500 shall be outside-screw-and-yoke rising-stem type with flanged ends, and (2) UL 262 shall be outside-screw-and-yoke type, shall be designed for a hydraulic working pressure of 175 psi, and shall have flanged ends and solid or one-piece type gate, except that valves inch80 mm and larger shall have solid or one-piece type gate where indicated. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Provide valves with handwheels that open by a counterclockwise rotation of the valve stem. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. Valve pits shall be lockable.

2.2.2.8 Gate Valves Smaller Than 3 Inch Size in Valve Pits

MSS SP-80, Class 150, solid wedge, inside screw, rising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve and a handwheel operator. Valve pits shall be lockable.

2.2.2.9 Curb Boxes

Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint. Curb boxes shall be lockable.

2.2.2.10 Valve Boxes

Provide a valve box for each gate valve on buried pipinhg. Valve boxes shall be cast iron or precast concrete of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Valve boxes shall be lockable.

2.2.2.11 Displacement Type Meters

Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in cubic meters . Meters in sizes 13 through 1/2 through 1 shall be frost-protection design. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C700.

2.2.2.12 Meter Boxes

Meter boxes shall be of cast iron or concrete. Concrete meter boxes shall be manufactured in accordance with Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE. The boxes shall be of sufficient size to completely enclose the meter and shutoff valve or service stop. Meter boxes set in paved areas subject to vehicular traffic shall be cast iron, or concrete with cast iron lid and cast iron meter reader lid. Boxes set in sidewalks, not subject to vehicular traffic, shall be concrete with cast iron lid and cast iron meter reader lid. Box height shall extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

2.2.2.13 Disinfection Agents

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Protection

Where piping is required to be installed within 1 m of existing structures, the pipe shall be sleeved following Section 33 05 27 PIPE SLEEVES FOR UTILITY LINES. The Contractor shall install the pipe and sleeve ensuring that there will be no damage to the structures and no settlement of foundations, footings or pavements.

3.1.1.2 Sewer & Water Line Conflicts

Where water and sewer lines cross, follow criteria in Appendix A "Protection Requirements at Water Line - Sanitary Sewer Crossings" attached to this section.

3.1.1.3 Unclear Site Conditions

Where the location of the pipes are not clearly defined in dimensions on the drawings, the pipes shall not be laid closer horizontally than from other pipes. Where lines cross, the vertical separation shall be not less than.

3.1.1.4 Earthwork

Perform earthwork operations in accordance with Section 31 00 00 EARTHWORK. Submit test reports for compaction and density testing in accordance Section

31 00 00 EARTHWORK. Submit Inspection Reports for daily activities during the installation of the sanitary system. Information in the report shall be detailed enough to describe location of work and amount of pipe laid in place, measured in linear meters. Indicate in reports stockpile locations for bedding used, if any.

3.1.1.5 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated and where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines as per manufacturer's installation instructions. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 900 mm.

3.1.1.6 Installation of Tracer Wire

Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe following Section 31 00 00 Earthwork. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

3.1.1.7 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.1.8 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.2 Special Requirements for Installation of Water Mains (> 100mm)

3.1.2.1 Installation of Ductile-Iron Water Main Pipe

Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

a. Jointing: Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly. Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendations of Appendix A to AWWA C111/A21.11. Make flanged joints with the gaskets, bolts, and nuts specified for this type joint. Make flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without overstraining the flange. When flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified, replace it by one of proper dimensions.

b. Allowable Deflection: The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.

c. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

d. Exterior Protection: Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A polyethylene film, in accordance with AWWA C105/A21.5.

3.1.2.2 Installation of High-Denisty Polyethylene (HDPE) Water Main Pipe

a. General Installation:

PE pipes shall be installed in accordance with ASTM D 2774 and AWWA M55.

a. Cutting:

HDPE pipe shall be cut by personnel making thermal butt fusion joints. Field cut HDPE pipe with proper tool, machine, or tool and machine. Do not cut pipe by burning. Do not crimp HDPE pipe. Pipe ends shall be saw cut square and perpendicular to pipe axis. Examine cut ends for damage caused by cutting.

Finish cut ends of pipe. Finish cut ends of HDPE pipe for thermal butt fusion joints in accordance with manufactuer's recommendations. Finish plain end of HDPE pipe for mechanical joint as follows: Bevel outside of the cut ends of pipe about one-quarter inch (1/4-inch) at an angle of about thirty degrees (30°). Remove sharp and rough edges and burrs which might injure gasket.

b. Jointing:

Jointing shall comply with ASTM D 2657, PPI TR-33 and AWWA M55. Acceptable techniques are Procedure 1, Socket Fusion or Procedure 2, Butt Fusion. Polyethylene pipe shall in no case be joined by hot gas welding, solvent cements, adhesives or threaded connections.

Remove dirt, debris, and other deleterious substances from end of pipe, and wipe end of pipe dry. Make thermal butt fusion joints in accordance with the pipe and fitting manufacturer's recommendations, the fusion equipment manufacturer's written instructions, and as specified in this Section. Prior to making thermal butt fusion joints, determine optimum range of fusion conditions, such as fusion temperature, interface pressure, and cooling time. Thermal fusion shall be conducted only by persons who have received training in the use of fusion equipment in accordance with the recommendations of the pipe and fitting supplier or the fusion equipment supplier.

c. Offsets:

Bring pipe to correct line and grade, make teh fusion joint, then deflect the pipe according to the plans. Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

3.1.2.3 Installation of Valves and Hydrants

a. Installation of Valves: Install gate valves, AWWA C500 and UL 262, in accordance with the material specific joining requirements of this section, AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves, AWWA C509, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

b. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Contracting Officer for further instructions.

3.1.3 Installation of Water Service Piping (< 100mm)

3.1.3.1 Location

Connect water service piping to buildings where building service connections currently exist. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at a point directed by the Contracting Officer with a meter and corporation stop.

3.1.3.2 Service Line Connections to Water Mains

Connect service lines as indicated. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps. Connect service lines to polyethylene pressure pipe water mains in accordance with AWWA C906 and the recommendations of AWWA M55, Chapter 10, "New Service Connections."

3.1.4 Special Requirements for Installation of Water Service Piping

3.1.4.1 Installation of Metallic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of AWWA C600 for pipe installation, unless otherwise specified.

a. Jointing:

(1) Screwed Joints: Make screwed joints up tight with a stiff mixture of graphite and oil, inert filler and oil, or graphite compound; apply to male threads only. Threads shall be full cut; do not leave more than three threads on the pipe exposed after assembling the joint.

(2) Joints for Copper Tubing: Cut copper tubing with square ends; remove fins and burrs. Handle tubing carefully; replace dented, gouged, or otherwise damaged tubing with undamaged tubing. Make solder joints using ASTM B 32, 95-5 tin-antimony or Grade Sn96 solder. Solder and flux shall contain not more than 0.2 percent lead. Before making joint, clean ends of tubing and inside of fitting or coupling with wire brush or abrasive. Apply a rosin flux to the tubing end and on recess inside of fitting or coupling. Insert tubing end into fitting or coupling for the full depth of the recess and solder. For compression joints on flared tubing, insert tubing through the coupling nut and flare tubing.

(3) Flanged Joints: Make flanged joints up tight, taking care to avoid undue strain on flanges, valves, fittings, and accessories.

3.1.4.2 Installation of PVC and UPVC Plastic Service Line Pipe

Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of AWWA C605 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in

AWWA M23, Chapter 7, "Installation" and with the applicable requirements of ASTM D 2774 and ASTM D 2855

a. Jointing Pipe greater equal to 4 inch diameter: Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of AWWA C605 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

b. Threaded Jointing Pipe less than 4 inch diameter: Threaded joints shall be made by wrapping the male threads with approved thread tape or applying an approved lubricant, then threading the joining members together. The joint shall be tightened using strap wrenches to prevent damage to the pipe and/or fitting. To avoid excessive torque, joints shall be tightened no more than one thread past hand-tight. Preformed rubber-ring gaskets for elastomeric-gasket joints shall be made in accordance with ASTM F 477 and as specified. Pipe ends for push-on joints shall be beveled to facilitate assembly and marked to indicate when the pipe is fully seated. The gasket shall be prelubricated to prevent displacement. The gasket and ring groove in the bell or coupling shall match. The manufacturer of the pipe or fitting shall supply the elastomeric gasket. Couplings shall be provided with stops or centering rings to assure that the coupling is centered on the joint.

c. Solvent Jointing Pipe less than 4 inch diameter: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make solvent-cemented joints for plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with the recommendations of the pipe manufacturer, as approved. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer. Solvent cement joints shall use sockets conforming to ASTM D 2467. The solvent cement used shall meet the requirements of ASTM D 2564; the joint assembly shall be made in accordance with ASTM D 2855 and the manufacturer's specific recommendations. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.

d. Offset: Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

e. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) for pipe anchorage as required by geotechnical report. Thrust blocks shall be in accordance with the requirements of AWWA C605 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94/C 94M, having a minimum compressive

strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

f. Fittings: Install in accordance with AWWA C605.

g. Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

3.1.4.3 Service Lines for Sprinkler Supplies

Water service lines used to supply building sprinkler systems for fire protection shall be connected to the water distribution main in accordance with NFPA 24.

3.1.5 CERTIFICATION TESTING FOR NON-POTABLE AND POTABLE WATER

3.1.5.1 General

The water distribution system shall be certified in two parts by testing. The first part shall encompass two tests, described in parts 3.1.5.2 and 3.1.5.3 and shall certify water distribution for non-potable use. The second part shall encompass the tests described in parts 3.1.5.4 and shall certify water distribution for potable use.

The connection of un-certified sections of pipeline to certified sections of pipeline, shall render the combined section of the joined pipelines to the lesser of the certifications attained by the two separate sections. The contractor shall then be responsible to re-certify the entire section for greater disinfection certifications.

3.1.5.2 Chlorination for Bacteriological Disinfection

Before acceptance of the water distribution system, the entire unit of completed waterline and pump systems shall be disinfected as prescribed by AWWA C651 as specified. After initial disenfection tests have been successfully completed, the domestic water chlorinator system shall be calibrated.

After pressure tests have been made, 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. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite, conforming to paragraph Disenfection Systems.

For initial disenfection, 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) pipe lines 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. This disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days.

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 valve on the line shall be opened and closed several times.

After initial disenfection, the chlorinator systems shall begin calibration. Over a 4 week period of normal operation of the attached facilities, tests shall be run to calibrate the chlorination to effect an average residual chlorine level of less than 0.5 ppm at interior valves and no more than 1.0 ppm in the ground storage tanks. Test kits or prepaid laboratory services shall be provided to monitor the potable water on a monthly basis for up to 6 months after acceptance of installation.

Testing of disenfection shall be accomplished from several points in the unit, personnel from the Contractor's commercial laboratory in the presence of the Contracting Officer shall take at least 5 water samples from different points, approved by the Contracting Officer, in proper sterilized containers and perform a bacterial examination. The Contractor shall arrange for an approved laboratory, to conduct all bacterial examinations required by this specification. The unit will not be accepted until satisfactory bacteriological results have been obtained.

3.1.5.3 Detection of Lead Residual

Following the initial bacteriological disinfection and testing, the system shall be flushed with a sufficient velocity of water and sufficient tests performed at each hot and cold water discharge point until no more than 15 ppb lead residuals remain in the system.

All tests and samples shall be performed in accordance with U.S Federal regulations. Samples for testing are to be collected after a 6 hour continuous period of no flushing, and will be considered first draw samples. The commercial laboratory shall be certified by the host nation's ministry of water approving authority for examination of potable water.

Lead residual test results shall be submitted to the Contracting Officer. The system will not be accepted until satisfactory bacteriological results and lead residual test results have been obtained. All flushing and testing for lead residuals, including all costs, are the responsibility of the Contractor.

3.1.5.4 Testing for Certification of Potable Water

The Contractor shall secure samples of the water in suitable containers, and of sufficient quantity, to have bacterial, physical, and chemical analyses made by U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), except that the bacterial analysis may be made directly by the Commander for Operations, Preventive Medicine, Task Force MED, if desired. Water Quality Analysis shall address each item specified in the testing described in the following paragraph. Expenses incident to these analyses shall be borne by the Contractor and the results of the analyses shall be furnished to the Contracting Officer. All sampling and analyses shall be performed using EPA and Army approved methods, procedures, and holding times.

The USACHPPM Deployment Environmental Surveillance Program uses the TG230 methodology and associated Military Exposure Guidelines (MEGs) to assess identified chemicals and estimate risk in a manner consistent with doctrinal risk management procedures and terminology. This method includes identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and associated level of confidence. As part of the hazard identification step, the long-term (1-year) MEGs are used as screening criteria to identify those hazards that are potential health threats. Sample shall also be compared to the TB MED 577 long-term standards to assess the basic potability of the water. Individual sample analytical results that are either not detected or are present only at levels below the 1-year MEGs, are not considered health threats and are thus automatically assigned a low operational risk estimate. Chemicals that are identified above the 1-year MEGs are further evaluated using the methodology (TG 230 Chapter 3) and additional MEGs in TG 230. Sampled water containing concentrations of chemicals and physical parameters above the TB MED 577 standards shall not be certified potable.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

Prior to hydrostatic testing, obtain Contracting Officer approval of the proposed method for disposal of waste water from hydrostatic testing. 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. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete. For pipe diameters 50 mm and less, pressure test shall be conducted at 395 kPa above the rated pressure of the subject pipe.

3.2.2 Leakage Test

For pipe diameter over 50 mm, leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not less than pressure. 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 within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

L = S(P raised to 0.5 power)(715,317)
L = Allowable leakage in liters per hour
S = Length of pipeline tested in meters
D = Nominal diameter of the pipe in millimeters
P = Average test pressure during the leakage test, in KPa

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

3.2.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipelines 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. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

3.2.4 Concurrent Hydrostatic 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 as specified. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government.

a. Pressure test and leakage test may be conducted concurrently.

b. Hydrostatic tests and disinfection may be conducted concurrently, using the 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 reaccomplished.

3.2.5 Testing Procedure

Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains and water service lines in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method. Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of AWWA C605 for pressure and leakage tests. Test water service lines in accordance with applicable requirements of AWWA C600 for hydrostatic testing. No leakage will be allowed at copper pipe joints, copper tubing joints (soldered, compression type, brazed), plastic pipe joints, flanged joints and screwed joints.

3.3 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

3.4 ATTACHMENT

Appendix A - Protection Requirements at Water Line - Sanitary Sewer Crossings

-- End of Section --

347313 - AF TIEDOWN, ARMY MOOR

SECTION 34 73 13
AIR FORCE TIEDOWN, ARMY MOORING AND GROUNDING POINTS FOR AIRCRAFT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARD (ANSI)

ANSI/IEEE Standard 142 (1999 - Revision of IEEE Std 142-1982) IEEE Recommended Practice for Grounding Industrial and Commercial Power Systems - IEEE Green Book (Color Book Series); Correction Sheet - May 1993; Corrected Edition April 1996; Errata 3/22/06

ASTM INTERNATIONAL (ASTM)

ASTM A 436 (1984; R 2006) Standard Specification for Austenitic Gray Iron Castings

ASTM B 371/B 371M (2002) Copper-Zinc-Silicon Alloy Rod

ASTM B 8 (2004) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 407 (2007; Errata 2007) Standard for Aircraft Fuel Servicing

UNDERWRITERS LABORATORIES (UL)

UL 467 (2007) Standard for Grounding and Bonding Equipment

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used,

a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.12 10 SUBMITTAL PROCEDURES FOR DESIGN-BUILD PROJECT:

SD-01 Existing Conditions; G TAC

For each design aircraft, the contractor shall submit a graphical and tabular report of the following items. This report will show the location of:

1. Fueling ports.
2. Engines and subsystems.
3. Doorways, hatches, ladders and cargo hold entrances.
4. Grounding Points
5. Mooring Points

SD-02 Shop Drawings

As-Built Drawings; G RE

Drawings as specified

SD-06 Test Reports

Concrete; G RE

Complete concrete mix design including all cement, aggregate, and concrete tests and compliance certificates.

Tests

An independent testing agency's certified reports of inspections and tests, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and test standards shall be described.

SD-07 Certificates

Mooring Devices

Certificate of compliance stating that the mooring devices meet the specified requirements.

Air Force Tiedowns

Certificate of compliance stating that the tiedown bars meet the specified requirements.

Grounding Rods

Certificate of compliance stating that the grounding rods meet the specified requirements.

Grounding Connectors

Certificate of compliance stating that the grounding connectors meet the specified requirements.

Copper Conductors

Certificate of compliance stating that the copper conductors meet the specified requirements.

1.3 AS-BUILT DRAWINGS

The Contractor shall submit AS-Built Drawings that provide current factual information, including deviations from and amendments to the drawings and changes in the work, concealed and visible.

PART 2 PRODUCTS

2.1 METALS

Combination of materials that forms an electrolytic couple, which accelerates corrosion in the presence of moisture, shall not be used, unless moisture is permanently excluded from the junction of such metals.

2.2 AIRCRAFT ANCHORING SYSTEMS

2.2.1 MOORING DEVICES

Mooring devices shall be cast in ductile iron 80-55-06 conforming to ASTM A 436. The device shall be as shown in the contract drawings. The Contractor shall submit certificates of compliance on the devices.

2.2.2 AIR FORCE TIEDOWNS

The Air Force no longer uses the grounding rod to tiedown parked aircraft. For Air Force tiedowns, refer to the drawings provided. The tiedown bar shall comply with AISI 4130.

2.3 GROUNDING RODS

Grounding rods shall conform to UL 467 and shall be made of copper-clad steel. The rods shall be not less than 19 mm in diameter and not less than 3 m long.

The copper cladding shall conform to the applicable requirements of ASTM B 371/B 371M, Copper Alloy UNS No's. c 69400, c 69430, c 69440 or c 69450. The copper cladding shall be not less than 0.25 mm thick at any point and shall comply with adherence requirements and the banding requirements of UL 467. The Contractor shall submit certificates of compliance on the grounding rods. Rods installed in pavement shall be provided with a closed eye or shepherd's hook bend having an inside diameter of not less than 38 mm. Rods installed inside hangars shall consists of a copperweld rod, attached to a bronze casting with a threaded connection.

The rods shall be pointed unless used for flexible pavement. For flexible pavement, the rods shall have 19 mm American standard rolled threads for attachment of a bottom anchor and shall be equipped with a screw-type bottom having a wing diameter of not less than 152 mm.

2.4 COPPER CONDUCTORS

Copper conductors shall be bare 25 mm square (number 4 AWG) copper wire conforming to ASTM B 8. The Contractor shall submit certificates of compliance on the copper conductors.

2.5 GROUNDING CONNECTORS

Grounding connectors shall comply with UL 467 for the required application. The Contractor shall submit certificates of compliance on the grounding connectors.

2.6 CONCRETE

Concrete shall be in accordance with Section 32 13 11 CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS.

2.7 REINFORCING STEEL

Reinforcing steel shall be in accordance with Section 32 13 11 CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS.

PART 3 EXECUTION

3.1 MOORING POINTS IN NEW RIGID PAVEMENTS OR CONCRETE PADS

The mooring device shall be installed within plus or minus 50 mm of the location shown on the contract drawings. The top of the mooring device shall be set within 6 mm of the plan pavement surface elevation, but not higher than the pavement surface. The mooring device and reinforcing shall be installed prior to placement of the concrete pavement. Concrete and reinforcement shall be placed in accordance with Section 32 13 11 CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS. Hand finishing of the concrete around the mooring devices shall be kept to a minimum.

3.2 AIR FORCE TIEDOWNS IN NEW RIGID PAVEMENTS OR CONCRETE PADS

The tiedowns shall be installed within plus or minus 50 mm of the location shown on the contract drawings. The top of the tiedown bar shall be set within 6 mm of the plan pavement surface elevation, but not higher than the pavement surface. The tiedown bar and reinforcing shall be installed prior to placement of the concrete pavement. Concrete and reinforcement shall be placed in accordance with Section 32 13 11 CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS. Hand finishing of the concrete around the tiedown bar shall be kept to a minimum. A smooth rounded edge shall be provided in the pavement around the tiedown. The shape of the recess shall be as shown on the drawings.

3.3 GROUNDING POINTS

The grounding points shall be located on the Contractor's joint plan. The grounding points shall be located as shown on the contract drawings to within plus or minus 50 mm. However, the Contractor shall relocate the grounding points as required to maintain a minimum distance of 600 mm from any pavement joint or edge of pavement.

3.3.1 Pavement Recess

The top of the grounding rod shall be set at or not more than 6 mm below the pavement surface grade. A recess 75 mm wide, and not more than 150 mm long, with a smooth rounded edge shall be provided in the pavement around the grounding point anchor eye to permit the entrance of lines into the eye and to allow for attachment of the grounding cable. The depth of the recess shall be no deeper than the bottom of the opening of the grounding point eye.

3.3.2 Installation

3.3.2.1 New Rigid Pavement

The grounding rod shall be installed by pushing or driving the rod through the pavement base courses and subgrade prior to concrete placement. The installation technique chosen by the Contractor shall not damage the grounding rod. Hand finishing around the rod shall be kept to a minimum.

3.3.3 Interconnection

Grounding rods within new pavement shall be electrically interconnected\ with not less than a 25 mm square (number 4 AWG) bare copper conductor. Grounding rods installed at fueling hydrant outlets shall be electrically interconnected with the fuel piping with not less than a number 4 AWG bare copper conductor.

3.3.4 TESTS

Resistance to ground tests shall be measured in accordance with ANSI/IEEE Standard 142 and NFPA 407. Test results shall be submitted to the Contracting Officer. Any ground rods that have more than 10,000 ohms of resistance under normal dry conditions, shall be reported to the contracting officer immediately. If this resistance cannot be achieved, the Contractor shall be required to meet the grounding requirements by an alternative method.

-- End of Section --

APPENDIX A
to
Technical Requirements Section 01 80 00.12 10

Topographic Survey

Scope of Work

Kandahar Air Field,
Kandahar, Afghanistan

1. Project Description. The services described hereinafter pertain to surveying and mapping services for the Strategic Airlift Apron, Tactical Airlift Apron, Rotary Wing Ramp & Taxiway Phase II and Secure RSOI projects at Kandahar Airfield, Kandahar, Afghanistan.

2. Work to be Performed. Establish horizontal and vertical control for project site construction and aerial mapping for the duration of the contract. Secure vertical and horizontal benchmarks for the project length to survive all construction activities.

Install and maintain 4 aerial photography panels tied to project control.

Conduct a topographic as-built survey of the project sites upon completion of construction. This is to include all areas where work is to take place. See Attachment 1 for survey requirements.

3. Submittal Requirements.

a. Final Survey and Mapping - All drawings shall be at 1:500 scale and provided in diskettes or CD ROM. Each sheet shall cover an area approximately 250 x 300 meters and shall include a north arrow, legend, survey data, datum data and sheet index plan showing its relationship with the entire project area. In addition, one drawing, at a conventional scale shall show the entire survey area.

b. All field books with computation sheets and sketches for every survey control level loop and traverse.

c. One bound booklet with adjusted coordinates, elevations and detailed descriptions with plots of each concrete survey monument established on site.

d. Diskettes or CD ROM containing digital file(s) of the final adjusted survey, in the format specified in Attachment 2. Files shall contain the individual sectors used to create the 1:500 reproducible sheets.

e. Topographic survey drawings shall be submitted to the Contracting Officer field office representative, for field verification of the survey prior to final submittal to the Corps of Engineers Winchester office.

4. Attachments.

1- Survey Requirements
2- Digital Format
3- Available Benchmarks

ATTACHMENT 1

SURVEY REQUIREMENTS

1. General. The following paragraphs describe the Scope of Work for establishing control, performing as-built surveys and the digitization of the topographic data.

2. Survey Requirements.

2.1 Coordinate Systems. The survey shall be based on the Universal Transverse Mercator Grid Zone 42N, World Geodetic System (WGS84) and the elevation should be height above ellipsoid (WGS84) and sea level (Geiod96). If there has been gravitational surveys performed nearby, these shall be noted. A survey database file for all features should show both ellipsoid height and Geoid height and WGS84 latitude/longitude as well as UTM coordinates. GPS benchmarks shall be documented at ITRF2000 coordinates referenced to the latest epoch year. Basic project control surveys will be performed using precise differential carrier-phase tracking Navstar GPS measurement procedures or electronic data collection total stations.

2.2 Accuracy Requirements. Differential GPS baseline vector observations will be made in strict accordance with the criteria contained in EM 1110-1-1003, except as modified or amplified herein. Conventional survey observations shall be made in accordance with criteria contained in EM 1110-1-1005, except as modified or amplified herein.

The primary level loop shall have an accuracy of second-order class II. The secondary loops shall have an accuracy of third-order class I

2.3 Control Systems. Install a minimum of three survey monuments for every 1,000 meters of survey site following the requirements contained in EM 1110-1-1002. A minimum of two benchmarks must be visible by line of site at each station. Monumentation placed on project site shall be designed to survive proposed construction operations by use of proper location and construction techniques.

Following criteria found in EM 1110-1-1005, Topographic Survey Control, a passive benchmark system shall be established that will survive construction and link existing project datums of airfields and current building construction together using primary and secondary level loops. Level loop benchmarks may utilize traverse control points described above.

Primary and secondary level loop benchmarks systems shall be maintained by the contractor for the duration of the contract. Before completion of the contract is certified, the contractor shall submit to the CO proof of a surviving benchmark system.

2.3.1 All Topographic survey point sets produced with conventional survey instruments shall be referenced directly to horizontal and vertical control points by level loop and closed traverse.

2.3.2 The location of the survey sites shall be shown to the contractor by the Contracting Officer’s Representative (COR). The limits of the survey shall then be identified by temporary markers and a sketch, with coordinates, of the area to be surveyed shall be submitted for approval by the COR before proceeding with the survey.

2.3.3 Install and maintain aerial photography panels at four locations on base. It is suggested that the remaining two be maintained at the

approach stripping of the runway.

3. Topography Requirements.

3.1 A sufficient quantity of horizontal and vertical control data shall be established to provide a detailed topographic survey at 1:500 scale with fifteen (15) centimeter contour intervals. Intermediate elevations shall be provided as necessary to show breaks in grade and changes in terrain.

3.1.1 The contours shall accurately express the relief detail and topographic shapes. There must be a Root Mean Squared Error (RMSE) no greater than 4 cm for 95% of the points ("A foot print on dry earth is 2 cm deep").

3.1.2 The projection grid (which shall be a metric rectangular coordinate system with a grid spacing of fifty (50) meter intervals) and the control points shall be plotted correctly to the nearest three tenths (0.3) of a millimeter. The horizontal position of 90 percent of definitely recognizable points shall be plotted correctly with reference to the nearest control point within six tenths (0.6) of a millimeter.

3.1.3 Where applicable, spot elevations and or finish floor elevations of structures or facilities shall be provided. Specifically, show all break points or control points in grades of terrain such as tops of hills, top and bottom of curbs, bottoms of ditches and gullies, high bank elevations, etc. Ground elevations shall be read to the closest three (3) centimeters. Road elevations shall be read to the closest three (3) millimeters.

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

3.1.5 Manholes and sanitary lines within the survey boundaries shall be located and invert elevations obtained. Water, sanitary, electrical and mechanical utilities within the survey site shall be located and shown on the survey map. Invert elevations will be on the bottom lip of each pipe in the manhole to include the depth of the manhole must be taken also. Water, sanitary, electrical and mechanical utilities within the survey site shall be located and shown on the survey map and provided digitally in the database.

ATTACHMENT 2

DIGITAL FORMAT
SURVEY/MAPPING

1. General Design File Requirements:

a. The topographic data for the entire project, shall be compliant according to the COE Tri-Services Spatial Data For Infrastructure and the Environment Version 2.4 (SDSFIE), and placed into a single AutoCAD Map 3D Version 2005 and ESRI ArcGIS 9.1 personal geodatabase or ESRI ArcGIS 9.1 shapefile format and ASCII text format.

b. Only the topographic feature data (spot elevations and contours) are required to be placed into 3D AutoCAD Map drawing file at their proper elevation. Surface and subsurface features shall be placed in the 3-D file(s) at elevation zero (0). All of the control points established at the site shall be plotted at the correct coordinate point and shall be identified by name or number, and adjusted elevations.

c. A Digital Terrain Model shall be furnished compatible with Trimble Terramodel 10.4.0 and ArcGIS ArcINFO Triangulated Interpolated Network (TIN) file. (AF standard is Trimble, AutoCAD and ESRI GIS). A sufficient number of field acquired data points and breaklines are required to generate the contours of the mapping area through the .DTM file.

d. All information should be included in the AutoCAD Map drawing file and included in the ArcGIS ArcINFO 9.1 geodatabase or shapefile.

e. Each 3-D file shall be checked by viewing a front or side view to detect errors in element elevation.

f. The ASCII text file shall be conveyed including all data points shown in the preceding items of this attachment and the horizontal and vertical control points captured during level loops and closed traverses associated with them.

RUNWAY 05 – 23

POINT / CURVE	POT	NORTHING	EASTING	STATION
100	POT	16333.7544	14391.2397	97+00.000
101	POT	17253.0418	15310.4298	110+00.000
102	POT	19445.1889	17502.3448	141+00.000

NOTE: REFER TO SHEET C-9 OVERALL LOCATION PLAN FOR ALIGNMENT LOCATIONS.

CONTROL POINTS				
POINT NOS	NORTHING	EASTING	ELEVATION	STEEL/NAIL
RW-4	17025.996	14959.998	102.889	NAIL
RW-5	17092.002	15025.663	103.131	NAIL
RW-6	17163.005	15096.15	103.46	NAIL
RW-7	17307.526	15240.985	104.05	NAIL
RW-8	17523.349	15456.626	104.98	NAIL
RW-9	17735.725	15669.368	106	NAIL
RW-10	17893.143	15832.605	106.609	STEEL
RW-11	18107.517	16045.644	107.404	STEEL
RW-12	18323.727	16260.401	108.843	STEEL
RW-13	18540.932	16476.63	109.746	STEEL
RW-14	18714.522	16654.18	110.603	STEEL
RW-16	16955.278	14889.024	102.563	NAIL
RW-17	16872.916	14806.885	102.049	NAIL
RW-18	16812.333	14749.03	101.674	NAIL
RW-19	16742.36	14677.692	101.569	NAIL
RW-20	16672.491	14606.064	101.121	NAIL
RW-21	16601.463	14535.284	101.021	NAIL
RW-25	16524.646	14582.229	101.282	NAIL
TW-3	17044.249	15389.849	103.856	
TW-4	17581.214	15927.668	106.31	
TW-5	18040.907	16387.003	108.447	

E

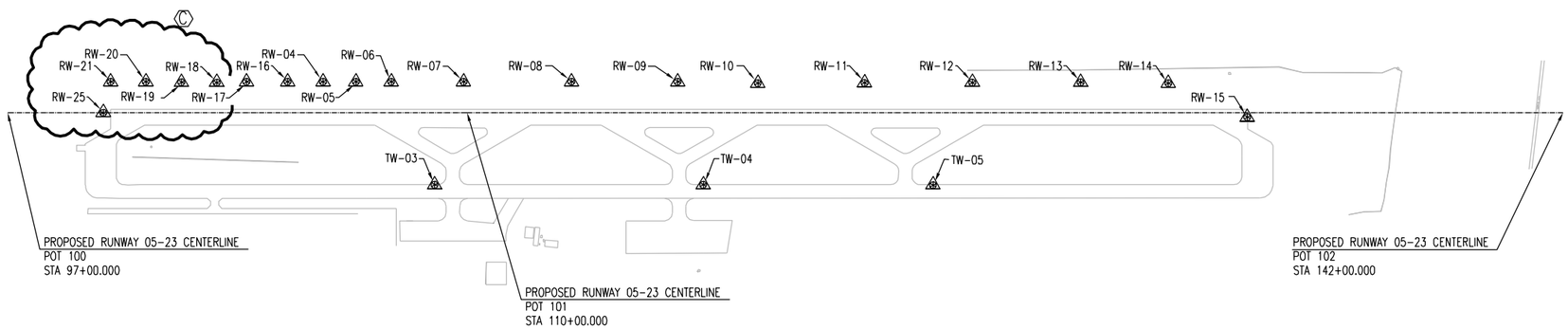
SYMBOL	DESCRIPTION	DATE	APR
E	ADDED TW-3, 4 & 5 DATA TO TABLE	07/11/05	
D	100% DESIGN COMPLETION REVIEW	05/20/05	
C	99% DESIGN REVIEW	04/06/05	
B	CQC REVIEW	03/22/05	
A	PHASE 1 PARTIAL SUBMITTAL	02/11/05	

DESIGNED BY: JAZ
DATE: 05-20-05
DWN BY: LJS
SUBMITTED BY:
CHK BY: XXX
FILE NO.: AE0000-CS03GN

Stanley Consultants INC.
US Army Corps of Engineers
Afghanistan Engineer District

REHABILITATION OF THE KANDAHAR AIRFIELD
KANDAHAR, AFGHANISTAN
SITE DESIGN
SURVEY CONTROL AND ALIGNMENTS

SHEET REFERENCE NUMBER:
C-3



OVERALL SITE PLAN

NOTES:
1. SEE SHEET C-3 FOR CONTROL POINT COORDINATES AND ELEVATIONS.

200 100 0 200 400 600
1:8000

UNLESS OTHERWISE NOTED, LINEAR DIMENSIONS SHOWN ARE IN METERS.

SYMBOL	DESCRIPTION	DATE	APP
C	ADDED PTS RW-18, 19, 20, 21 & 25	07/11/05	
B	100% DESIGN COMPLETION REVIEW	05/20/05	
A	99% DESIGN REVIEW	04/06/05	

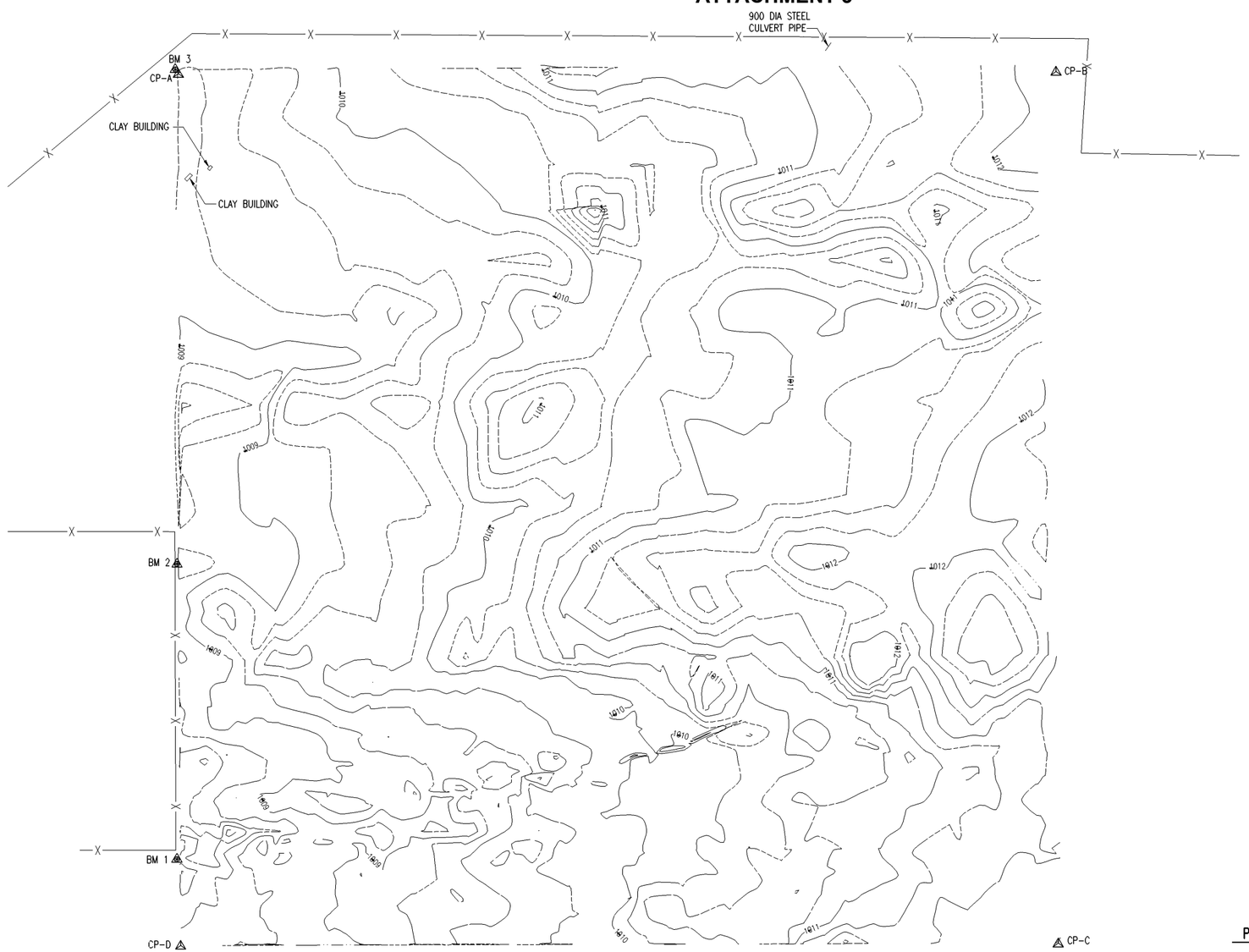
DESIGNED BY: JAZ
DATE: 05-20-05
DWN BY: LJS
SUBMITTED BY:
CHK BY: DET
FILE NO.: AE0000-CIDGPN

Stanley Consultants INC. 225 Iowa Avenue, Muscatine, Iowa 52761-3766 www.stanleyconsultants.com

US Army Corps of Engineers
Afghanistan Engineer District

REHABILITATION OF THE KANDAHAR AIRFIELD
KANDAHAR, AFGHANISTAN
SITE DESIGN
OVERALL LOCATION PLAN

SHEET REFERENCE NUMBER:
C-9



SURVEY CONTROL POINTS BENCHMARKS (BM)

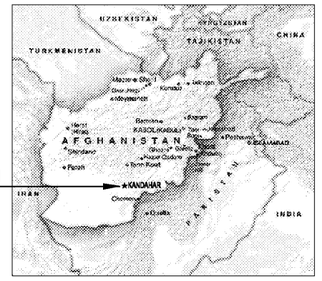
POINT NO.	COORDINATES		ELEV.
	NORTH	EAST	
1	3489205.190	769123.609	1008.594
2	3489453.054	768938.129	1008.900
3	3489867.000	768626.000	1009.435

NOTE:
SURVEY CONTROL POINTS AND BENCHMARKS CONSIST OF 1.000m DIA. X 0.250m THICK CONCRETE SLAB WITH 16mm STEEL REBAR INSERTED INTO SLAB.

CORNER POINTS (CP)

POINT NO.	COORDINATES	
	NORTH	EAST
A	3489865.455	768631.108
B	3490418.816	769366.086
C	3489688.631	769915.837
D	3489135.271	769180.860

PROJECT LOCATION



VICINITY MAP
NO SCALE

EXISTING SITE PLAN
SCALE: 1:2500

500 DIA CONCRETE CULVERT PIPE
2-900 DIA STEEL CULVERT PIPES
6-900 DIA STEEL CULVERT PIPES

100 50 0 100 200
1:2500

UNLESS OTHERWISE NOTED, LINEAR DIMENSIONS SHOWN ARE IN METERS.

US Army Corps of Engineers
AFGHANISTAN ENGINEER DISTRICT

Mark	Description	Date	Appr.
Ⓓ	50% DESIGN SUBMITTAL	04/07/06	
Ⓒ	50% INTERNAL REVIEW	03/31/06	
Ⓑ	35% REVIEW	01/26/06	
Ⓐ	35% DC / QA REVIEW	11/14/05	

PRELIMINARY ONLY - NOT FOR CONSTRUCTION

US Army Corps of Engineers
Afghanistan Engineer District
Kabul Afghanistan

Designed by: DXR
Dwn by: LJS
Ckd by: XXX
Reviewed by:
Submitted by: Chief, Arch. Branch
Date:
Rev. X
Design file no: AF2000-C102PN
Drawing code:
File name:
Plot date: 4/6/2006
Plot scale: 1:8000

Contractor: CONTRACK International Inc.
1001 N 19 Street Suite 1230 Arlington, VA 22209-1710 Tel. (703)558-9000 Fax. (703)558-9005

Designer: Stanley Consultants Inc.

AMMUNITION SUPPLY POINT
KANDAHAR AIRFIELD , AFGHANISTAN
SITE DESIGN
PROJECT LOCATION PLAN, VICINITY MAP AND CONTROL POINT LOCATIONS

Sheet reference number: C-2

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APPENDIX B

24-HOUR PRECIPITATION EXTREME VALUE ANALYSIS

24-Hour Precipitation
EXTREME VALUE ANALYSIS

Kandahar Afghanistan

31.5 N 65.85 E
ELEVATION = 1010 METERS

PERIOD OF RECORD: 1958 - 1973, 1975 - 1977, 2002 - 2007

QUANTILES	0.1	0.2	0.5	0.8	0.9	0.95	0.98	0.99	0.999	0.9999
RETURN PERIOD (YRS)	1.1	1.25	2	5	10	20	50	100	1000	10000
VARIATE 24 Hour Precipitation (inches)	0.46	0.65	1.1	1.64	1.97	2.26	2.61	2.86	3.63	4.33

NOTE: The return period is the average elapsed time between occurrences of an event with a certain magnitude or greater.

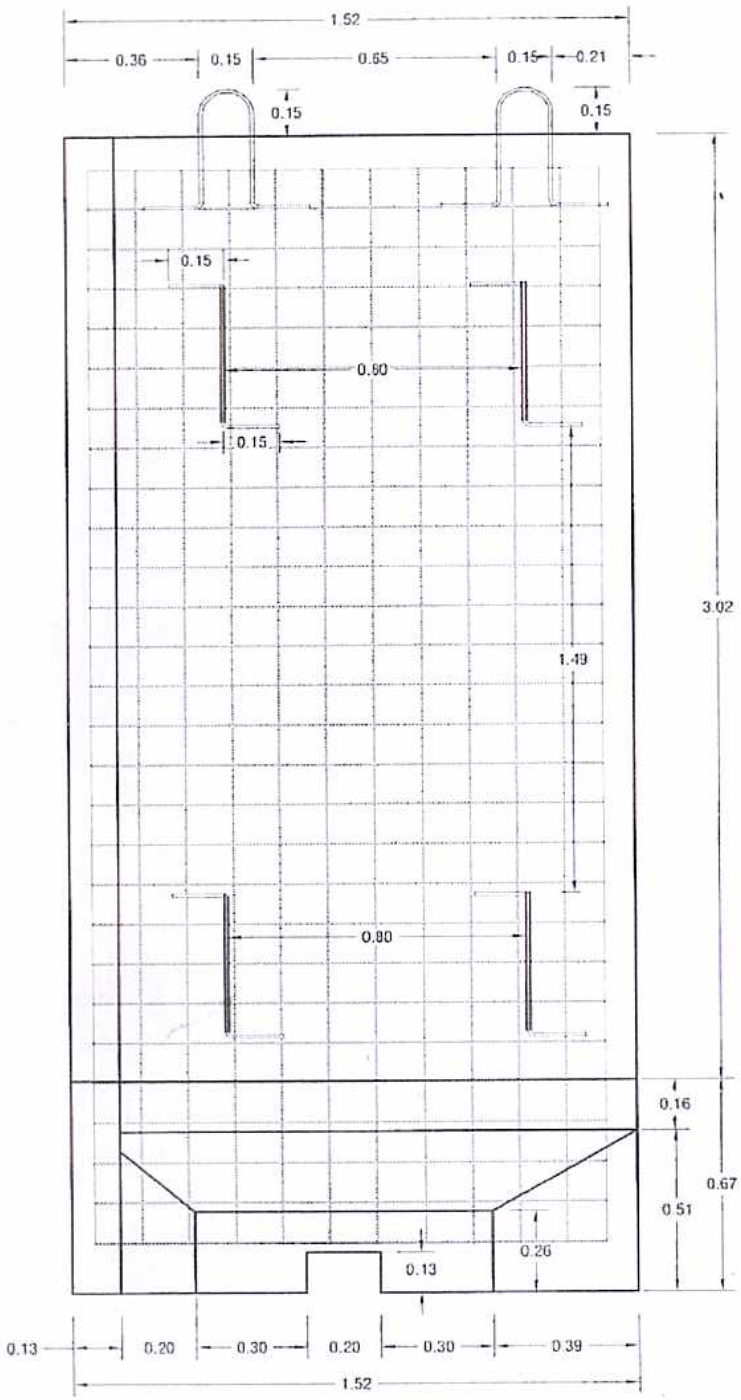
DESIGN CALCULATED RISK

VARIATE 24 Hour Precipitation (inches)	DESIGN LIFE (YEARS)									
	5	10	15	20	25	30	35	40	45	50
0.46	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
0.65	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.10	0.969	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.64	0.672	0.893	0.965	0.988	0.996	0.999	1.000	1.000	1.000	1.000
1.97	0.410	0.651	0.794	0.878	0.928	0.958	0.975	0.985	0.991	0.995
2.26	0.226	0.401	0.537	0.642	0.723	0.785	0.834	0.871	0.901	0.923
2.61	0.096	0.183	0.261	0.332	0.397	0.455	0.507	0.554	0.597	0.636
2.86	0.049	0.096	0.140	0.182	0.222	0.260	0.297	0.331	0.364	0.395
3.63	0.005	0.010	0.015	0.020	0.025	0.030	0.034	0.039	0.044	0.049
4.33	0.000	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005

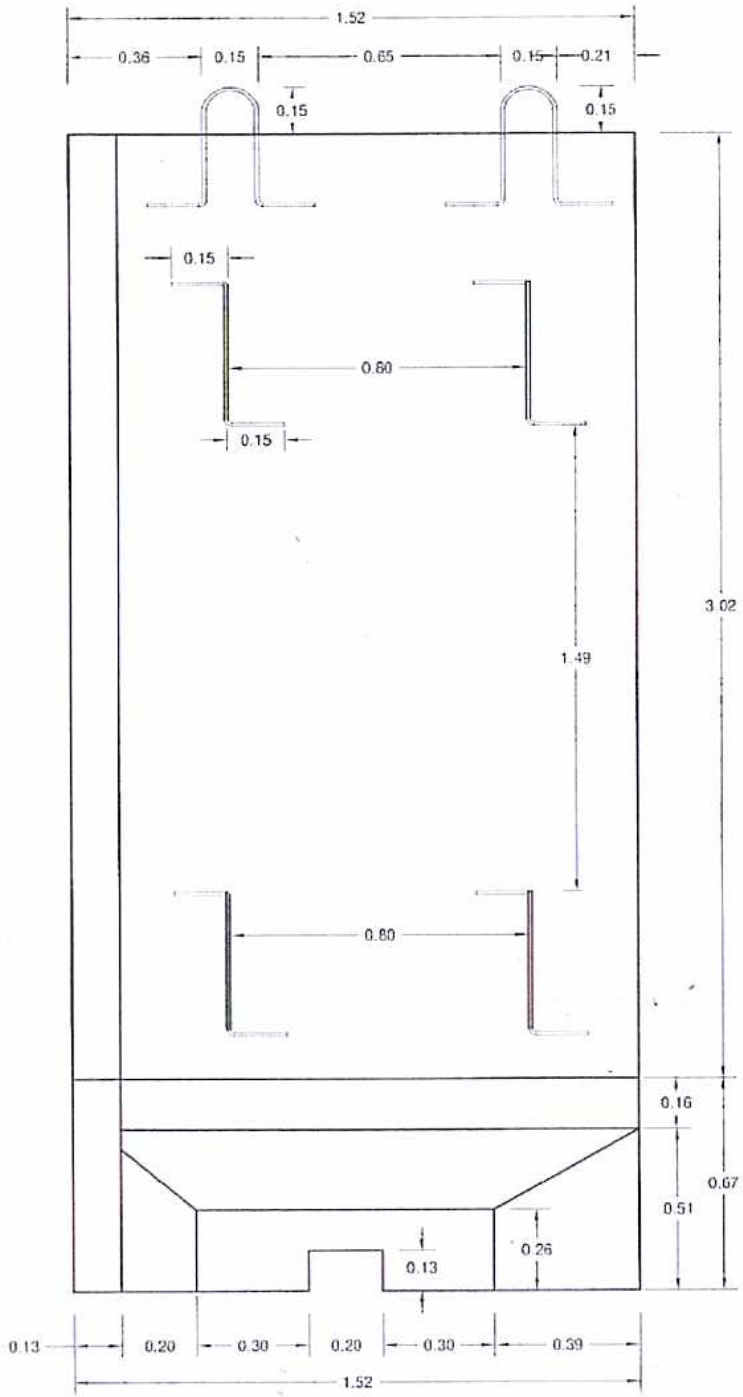
NOTE: Design Calculated Risk is the probability that the weather threshold (variate) will be exceeded at least once within a particular number of years (design life).

APPENDIX C

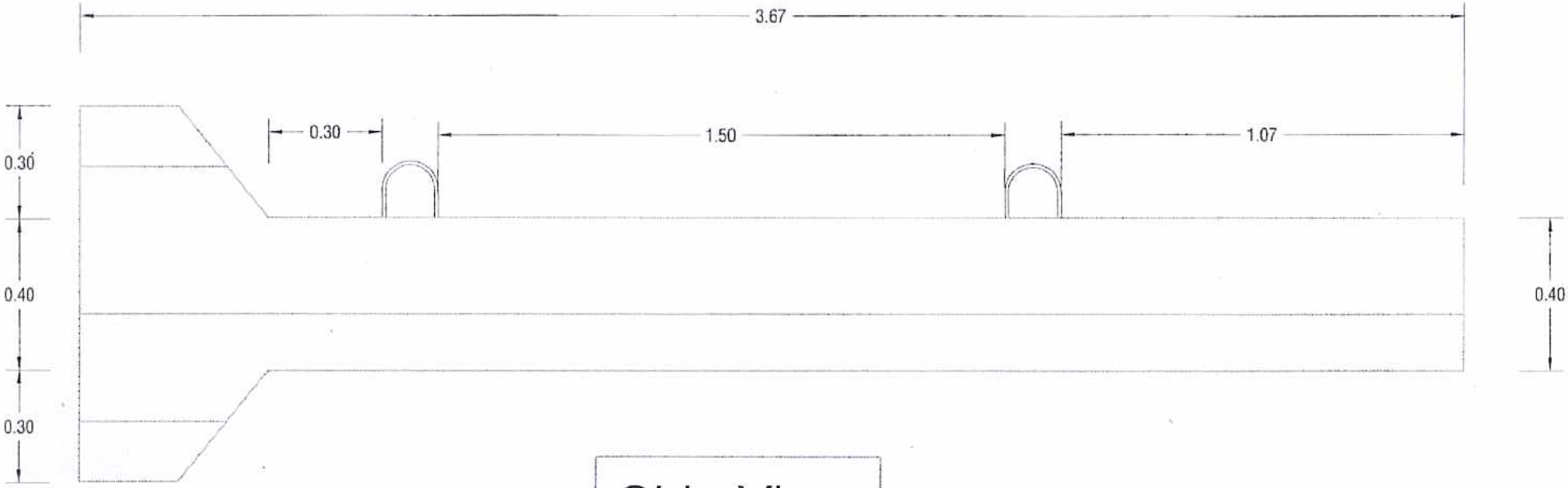
BARRIER WALL DETAILS



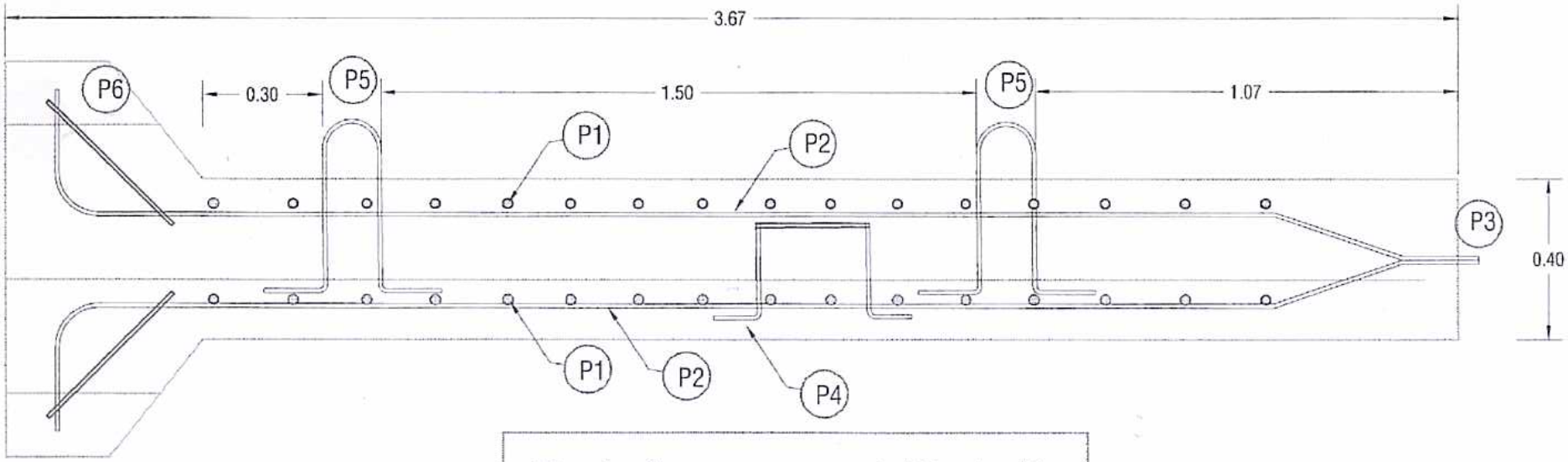
Reinfor. of Front View



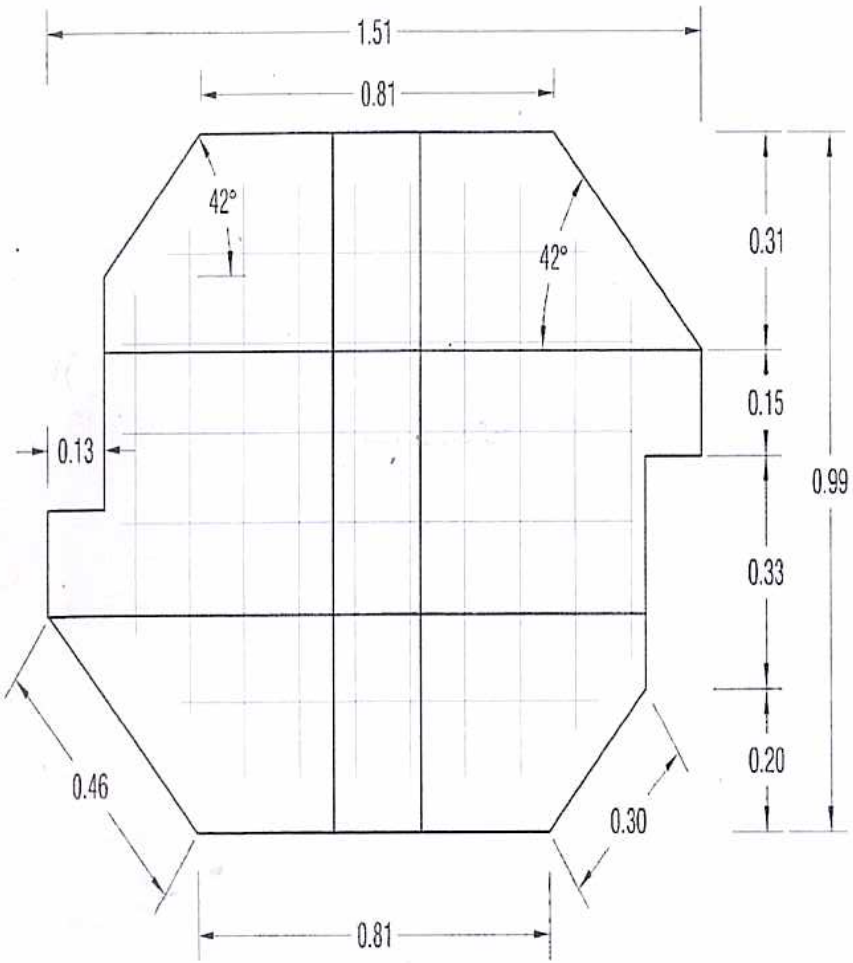
Front View



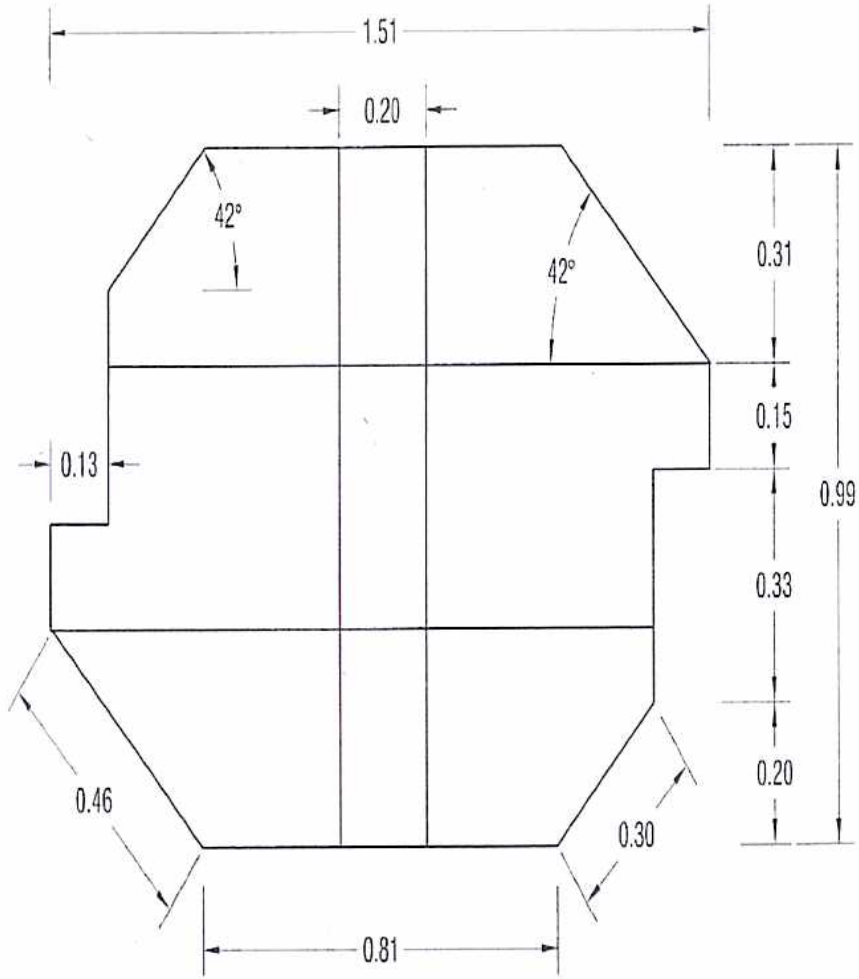
Side View



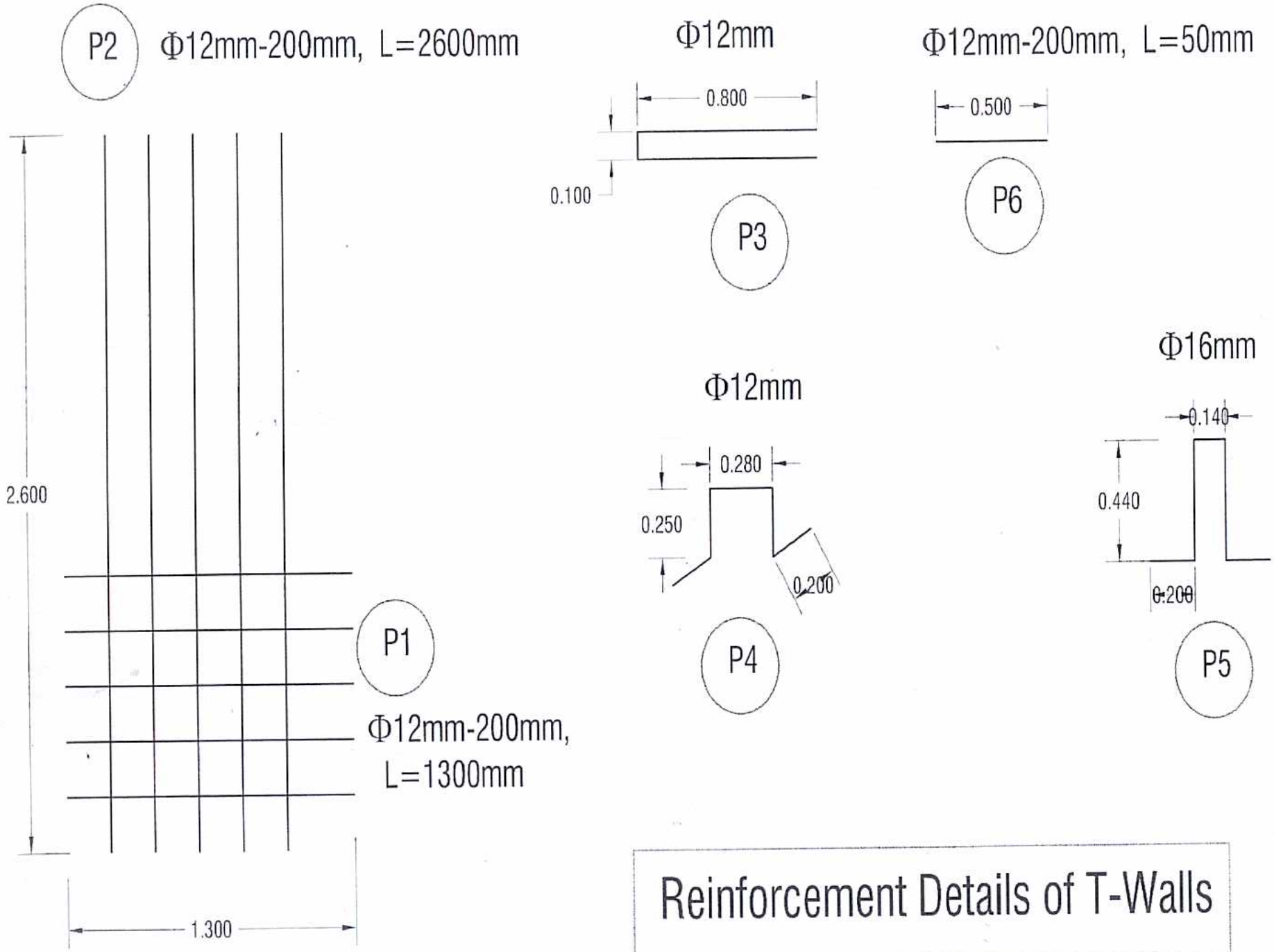
Reinforcement Details



Reinfor. of Bottom



Bottom



Reinforcement Details of T-Walls