REQUEST FOR PROPOSALS (RFP) D-B

DORMITORY

Nellis AFB, Nevada

RFP NO.	DACA05-98-R-0060
SPECIFICATION NO.	9923
DRAWING FILE NO.	229-25-506

JOB HAZARD - asbestos

US ARMY CORPS OF ENGINEERS
Sacramento District/Los Angeles District

PROJECT NO. 993008

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

July 6, 1998

Contracting Division

SUBJECT: Required Central Contractor Registration (CCR)

TO: All PROSPECTIVE OFFERORS AND CONTRACTORS

This solicitation incorporates DFARS Clause 252.204-7004, Required Central Contractor Registration. In accordance with this clause, you must be registered in the Department of Defense (DoD) CCR database in order to be eligible for contract award. If you intend to submit an offer for this procurement and are not already registered, you are urged to do so immediately via the Internet. The DOD CCR World Wide Web home page address is: http://ccr.edi.disa.mil. The Defense Logistics Services Center also has a CCR web site at http://www.ccr.dlsc.dla.mil/ which includes an instructional guide.

A "Data Universal Numbering System" (DUNS) number is a mandatory data element for registering. If you do not have a DUNS number, contact Dun and Bradstreet to obtain one at no charge. An offeror within the United States may call 1-800-333-0505. More information about the DUNS number is available from Dun and Bradstreet's Internet home page at http://www.dnb.com/.

A "Commercial and Government Entity" (CAGE) code is another mandatory data element for being registered in the CCR. However, if registration forms from USA companies are submitted without the CAGE code, one will be assigned.

DoD has established a goal of registering an applicant in the CCR database within 48 hours after receipt of a complete and accurate application via the Internet. However, registration of an applicant through a method other than the Internet may take up to 30 days.

Your prompt attention to this matter is vital. Offerors that are not registered should consider applying for registration immediately upon receipt of this solicitation.

Sincerely,

Ruth Anne Ijames
Chief, Contracting Division

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NOTE: AS A MINIMUM ANY CONTRACT AWARDED AS A RESULT OF THIS SOLICITATION SHALL CONSIST OF THE FOLLOWING DOCUMENTS:

STANDARD FORM 1442, SECTIONS 00010, 00700, 00800, TECHNICAL SPECIFICATIONS AND DRAWINGS, AND ATTACHMENTS AS DESCRIBED IN CONTRACT DOCUMENT.

SECTION 00600, AS COMPLETED BY AWARDEE, IS INCORPORATED INTO ANY RESULTANT CONTRACT BY REFERENCE.

SECTION 00100 IS INCLUDED FOR SOLICITATION PURPOSES ONLY. THIS SECTION WILL BE REMOVED, MAINTAINED IN THE CONTRACT FILE AND NOT MADE PART OF THE CONTRACT.

AMENDMENTS ARE INCORPORATED INTO THE RESULTANT CONTRACT.

SUBCONTRACTING PLAN (IF REQUIRED) BECOMES AN ATTACHMENT TO AND A MATERIAL PART OF THE CONTRACT.

INFORMATION TO OFFERORS OR BIDDERS

COVER SHEET

1. SOLICITATION NUMBER
DACA05-98-R-0060
Spec. No. 9923

2. *(X one)*

	a. SEALED BID
X	b. NEGOTIATED *(RFP)*
	c. NEGOTIATED *(RFQ)*

INSTRUCTIONS

NOTE THE AFFIRMATIVE ACTION REQUIREMENT OF THE EQUAL OPPORTUNITY CLAUSE WHICH MAY APPLY TO THE CONTRACT RESULTING FROM THIS SOLICITATION.

You are cautioned to note the "Certification of Non-Segregated Facilities" in the solicitation. Failure to agree to the certification will render your reply nonresponsive to the terms of solicitations involving awards of contracts exceeding $25,000 which are not exempt from the provisions of the Equal Opportunity clause.

"Fill-ins" are provided on the face and reverse of Standard Form 1442 or other solicitation documents and Sections of Table of Contents in this solicitation and should be examined for applicability.

See the provision of this solicitation entitled either "Late Bids, Modifications of Bids or Withdrawal of Bids" or "Late Proposals, Modifications of Proposals and Withdrawals of Proposals."

When submitting your reply, the envelope used must be plainly marked with the Solicitation Number, as shown above, and the date and local time set forth for bid opening or receipt of proposals in the solicitation document.

If NO RESPONSE is to be submitted, detach this sheet from the solicitation, complete the information requested on reverse, fold, affix postage, and mail. NO ENVELOPE IS NECESSARY.

Replies must set forth full, accurate, and complete information as required by this solicitation *(including attachments)*. The penalty for making false statements is prescribed in 18 U.S.C. 1001.

3. ISSUING OFFICE *(Complete mailing address, including Zip Code)*
DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
ATTN: CONTRACTING DIVISION, PLAN ROOM
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

4. ITEMS TO BE PURCHASED *(Brief description)*

SEE SF-1442, BLOCK 10. TYPE OF CONTRACT: SEE SECTION 00100, FAR CLAUSE 52.216-1

5. PROCUREMENT INFORMATION *(X and complete as applicable)*

X	a. THIS PROCUREMENT IS UNRESTRICTED				
	b. THIS PROCUREMENT IS A _____% SET-ASIDE FOR ONE OF THE FOLLOWING *(X one)*.				
					(3) Combined Small Business/Labor Area Concerns
		(1) Small Business [8(a)]		(2) Labor Surplus Area Concerns	(4) Small Disadvantaged Business Concerns

6. ADDITIONAL INFORMATION

COMPLETE DETAILS FOR PROPER SUBMISSION OF OFFERS ARE FOUND IN SECTIONS 00100, 00600 AND ATTACHMENTS. REMINDER: ACKNOWLEDGE ALL AMENDMENTS (FILL IN BACK PAGE OF SF-1442 OR RETURN SIGNED COPY OF SF-30). IF ANY OF THE AMENDMENTS FURNISHED AMENDED PAGES WHICH ARE PART OF THE OFFER, THE AMENDED PAGES MUST BE USED IN THE OFFER.

OFFER WILL CONSIST OF A PRICE/COST PROPOSAL AND A TECHNICAL PROPOSAL. THE PRICE/COST PROPOSAL WILL CONSIST OF:

A. COMPLETED AND SIGNED SF-1442 (SECTION 00010)
B. COMPLETED PRICING SCHEDULE (SECTION 00010)
C. COMPLETED REPRESENTATIONS/CERTIFICATIONS (SECTION 00600)
D. PRE-AWARD SURVEY (SEE ATTACHMENTS)
E. SUBCONTRACTING PLAN, IF REQUIRED (SEE ATTACHMENTS)
F. DD FORM 2051, CAGE CODE (SEE SECTION 00100, DFARS 252.204-7001, AND ATTACHMENTS). COMPLETE AND SUBMIT IF YOU DO NOT HAVE A CAGE CODE)
G. COMPLIANCE STATEMENT, IF REQUIRED (SEE ATTACHMENTS)
H. NOT USED
I. ACKNOWLEDGMENT OF AMENDMENTS, IF ANY AMENDMENTS WERE ISSUED
J. ANY OTHER DOCUMENTS REQUIRED BY THE SOLICITATION (SEE ATTACHMENTS SECTION)

SEE SECTION 00100 FOR A DISCUSSION OF THE REQUIRED CONTENTS OF THE TECHNICAL PROPOSAL.

7. POINT OF CONTACT FOR INFORMATION

a. NAME (Last, First, Middle Initial) SEE SECTION 00100	b. ADDRESS *(Include Zip Code)*
c. TELEPHONE NUMBER *(Include Area Code and Extension) (NO COLLECT CALLS)* SEE SECTION 00100	SAME AS BLOCK 3 ABOVE

8. REASONS FOR NO RESPONSE *(X all that apply)*			
	a. CANNOT COMPLY WITH SPECIFICATIONS		b. CANNOT MEET DELIVERY REQUIREMENT
	c. UNABLE TO IDENTIFY THE ITEM(S)		d. DO NOT REGULARLY MANUFACTURE OR SELL THE TYPE OF ITEMS INVOLVED
	e. OTHER *(Specify)*		

9. MAILING LIST INFORMATION *(X one)*				
	YES		NO	WE DESIRE TO BE RETAINED ON THE MAILING LIST FOR FUTURE PROCUREMENT OF THE TYPE OF ITEM(S) INVOLVED.

10. RESPONDING FIRM	
a. COMPANY NAME	b. ADDRESS *(Include Zip Code)*

c. ACTION OFFICER			
(1) Typed or Printed Name *(Last, First, Middle Initial)*	(2) Title	(3) Signature	(4) Date Signed *(YYMMDD)*

DD Form 1707 Reverse, MAR 89

FOLD *FOLD*

FOLD *FOLD*

FROM

AFFIX
STAMP
HERE

SOLICITATION NUMBER	
DATE *(YYMMDD)*	LOCAL TIME

TO

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
ATTN: CONTRACTING DIVISION, PLAN ROOM
1325 J STREET
SACRAMENTO, CA 95814-2922

SECTION 00010

SOLICITATION, OFFER AND AWARD (STANDARD FORM 1442) AND PRICING SCHEDULE

SOLICITATION, OFFER, AND AWARD (Construction, Alteration, or Repair)	1. SOLICITATION NO.	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE OF PAGES
	DACA05-98-R-0060	☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)	98 SEP 14	1

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

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.
		993008

7. ISSUED BY CODE	8. ADDRESS OFFER TO
DEPARTMENT OF THE ARMY U.S. ARMY ENGINEER DISTRICT, SACRAMENTO CORPS OF ENGINEERS 1325 J STREET SACRAMENTO, CALIFORNIA 95814-2922	DEPARTMENT OF THE ARMY U.S. ARMY ENGINEER DISTRICT, SACRAMENTO 1325 J STREET SACRAMENTO, CALIFORNIA 95814-2922 ATTN: CONTRACTING DIVISION, PLAN ROOM, FIRST FLOOR

9. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS)
	See SECTION 00100	See SECTION 00100

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):

DORMITORY
NELLIS AFB, NEVADA

Specification No. 9823

Description:This project consists of a 3-story, 84 occupant, concrete masonry dormitory with 42 modules(each module includes 2 bedrooms, a bath and a kitchen with an option for 6 additional modules. Plus Service modules which includes laundry, storage and lounge areas. Demolition of existing dormitories is also included.

This is a design/build project; the offeror chosen will complete the design and construct the facility. The acquisition method is negotiated procurement. A technical and cost proposal will be required. Evaluation by the Government will result in selection of a firm that represents the best advantage to the Government.

Estimated Cost Range of Project: 5,000,000.00 to $10,000,000.00

Any Contract awarded under this solicitation will be made pursuant to Public Law 100-656, Small Business Competitiveness Demonstration Program. See DD Form 1707, Block 5 for unrestricted/set-aside information.

See Section 00800, FAR 52.211-10

11. The Contractor shall begin performance within 10 calendar days and complete it within * calendar days after receiving ☐ award, ☒ notice to proceed. This performance period is ☒ mandatory, ☐ negotiable (See SECTION 00800, FAR 52.211-10 .)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES," indicate within how many calendar days after award in Item 12B.)	12B. CALENDAR DAYS
☒ YES ☐ NO	Ten (10)

13. ADDITIONAL SOLICITATION REQUIREMENTS:

* See Section 00100

A. Sealed offers in original and _____ copies to perform the work required are due at the place specified in Item 8 by 1:00 PM (hour) local time, 98 OCT 14 (date). If this is a sealed bid solicitation, offers will 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, ☐ 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 90 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

STANDARD FORM 1442 (REV. 4-85)
Prescribed by GSA
FAR (48 C F R) 53.236-1(d)

OFFER *(Must be fully completed by offeror)*

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*

15. TELEPHONE NO. *(Include area code)*
( ) FAX ( )

16. REMITTANCE ADDRESS *(Include only if different than Item 14)*

CEC: _____ CAGE CODE: _____
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 requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)*

AMOUNTS ▶ See Pricing Schedule

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

19. ACKNOWLEDGEMENT 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)*

See pg. 3 for 20D

21. ITEMS ACCEPTED:

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN ▶ ITEM
(4 copies unless otherwise specified)

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

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 requirements 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 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)*

30B. SIGNATURE

30C. DATE

31B. UNITED STATES OF AMERICA
BY

31C. AWARD DATE

BLOCK 20D:

(1) IF THE OFFEROR IS A JOINT VENTURE, EACH PARTICIPANT IN THE JOINT VENTURE MUST COMPLETE THE FOLLOWING:

Company Name	Signature	Title
Company Name	Signature	Title
Company Name	Signature	Title

NOTE: If a corporation is participating as a member of a Joint Venture, the certificate below must also be completed and signed.

CORPORATION AUTHORIZATION TO PARTICIPATE IN JOINT VENTURE CERTIFICATE

I, _____, certify that I am the Secretary of the corporation
(name)
named as a participant in a Joint Venture on this offer; that
_____, who signed said offer on behalf of the corporation, was
(name)
then _____ of said corporation; that the signature thereto is
(title)
genuine; that said contract was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing body; and that the corporation is authorized to participate in the Joint Venture on this offer.

_____
(Name of Corporation)

_____
(Secretary)

(2) IF THE OFFEROR IS A PARTNERSHIP, LIST FULL NAME OF ALL PARTNERS BELOW. SIGNATURES BY ALL PARTNERS HERE SIGNIFY THAT THE INDIVIDUAL WHO SIGNED THE OFFER IN BLOCK 20B HAS THE AUTHORITY TO BIND THE PARTNERSHIP.

Name	Signature
Name	Signature
Name	Signature

(3) IF THE OFFEROR IS A CORPORATION, THE OFFER SHALL BE SIGNED IN THE CORPORATE NAME FOLLOWED BY THE WORD "BY" AND THE SIGNATURE OF THE PERSON AUTHORIZED TO SIGN THE OFFER IN BLOCK 20B. PROVIDE PROOF THAT THE PERSON SIGNING FOR THE CORPORATION HAS THE AUTHORITY TO BIND THE CORPORATION BY COMPLETING THE FOLLOWING CERTIFICATE:

CORPORATION AUTHORIZATION CERTIFICATE

I, _____, certify that I am the Secretary of the
(name)
corporation named as offeror in the within offer; that _____,
(name)
who signed said offer on behalf of the corporation, was then

_____ of said corporation, that the signature
(title)
thereto is genuine; that said contract was duly signed, sealed and attested for in behalf of said corporation by authority of its governing body.

_____
(Name of Corporation)

_____
(Secretary)

(4) IF THE OFFEROR IS AN INDIVIDUAL DOING BUSINESS AS A FIRM, THE OFFER SHALL BE SIGNED BY THAT INDIVIDUAL IN BLOCK 20B FOLLOWED BY THE WORDS "AN INDIVIDUAL DOING BUSINESS AS _____ (INSERT NAME OF FIRM).

(5) WHEN AN AGENT SIGNS THE OFFER, PROVIDE PROOF OF THE AGENT'S AUTHORITY TO BIND THE PRINCIPAL.

PRICING SCHEDULE "A"
(1 of 2)

CONTRACTOR SHALL FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, ETC. NECESSARY TO PERFORM ALL WORK IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS SET FORTH IN THE CONTRACT TO INCLUDE ALL ATTACHMENTS THERETO.

ITEM NO.	DESCRIPTION	AMOUNT
0001	Complete Construction and Related Necessary Design of 84 Occupant (42 Modules) Dormitory Facility. (Excluding Option Items Below) (**435 calendar days after NTP**)	$_____
	BASE PRICE	$_____
	OPTION ITEMS	
0002	(OPTION #1) Complete Construction and Related Necessary Design of 12 Occupant (06 Modules) Dormitory Facility. **(435 calendar days after NTP)**	$_____
0003	(OPTION #2) Parking Lot, Complete **(435 calendar days after NTP)**	$_____
0004	(OPTION #3) Basketball Court, Complete. **(435 calendar days after NTP)**	$_____
	TOTAL PRICE (TOTAL OF BASE PRICE PLUS ALL OPTION ITEMS)	$_____

NOTE: **Prices shall be submitted on Schedules "A" and "B".**

1. Notwithstanding any other provision of this solicitation, the award will be made to the successful offeror for either SCHEDULE A or SCHEDULE B whichever is in the best interest of the Government and in accordance with Section 00100. Offerors must submit prices on all items, or both Schedules.

PRICING SCHEDULE “A”
(1 of 2)

2. Prices must be submitted on all individual items of this Pricing Schedule. Failure to do so may cause the proposal to be determined "unacceptable".

3. If a modification to a price is submitted which provides for a lump sum adjustment to the total price, the application of the lump sum adjustment to each item in the Pricing Schedule must be stated. If it is not stated, the bidder/offeror agrees that the lump sum adjustment shall be applied on a pro rata basis to every item in the Pricing Schedule.

4. The bidder/offeror shall distribute his indirect costs (overhead, profit, bond, etc.) over all the items in the Pricing Schedule. The Government will review all submitted Pricing Schedules for any unbalancing of the items. Any submitted Pricing Schedule determined to be unbalanced may cause the proposal to be determined "unacceptable".

5. The successful bidder/offeror grants the options listed in the Pricing Schedule to the Government. The options may be exercised any time up to 60 days after receipt of Notice to Proceed. Exercise of the options occurs upon mailing of written notice to the Contractor's field office or job superintendent. Exercise will be made by contract modification executed by the Contracting Officer. The price for exercise of the option includes all work and effort associated with the scope of that item. For determination of lowest price, see paragraph titled EVALUATION OF OPTIONS in Section 00100 of this solicitation. No additional time for contract completion will be allowed when an option is exercised. The given contract completion time was formulated to include time necessary to perform all option work.

6. EFARS 52.214-5000 APPARENT CLERICAL MISTAKES - ARITHMETIC DISCREPANCIES (DEC 1995)--EFARS

(a) For the purpose of initial evaluation of bids/offers, the following will be utilized in resolving arithmetic discrepancies found on the face of the Pricing Schedule as submitted by bidders/offerors:
(1) Obviously misplaced decimal points will be corrected;
(2) Discrepancy between unit price and extended price, the unit price will govern;
(3) Apparent errors in extension of unit prices will be corrected;
(4) Apparent errors in addition of lump-sum and extended prices will be corrected.
(b) For the purpose of bid/offer evaluation, the Government will proceed on the assumption that the bidder/offeror intends the bid/offer to be evaluated on basis of the unit prices, the total arrived at by resolution of arithmetic discrepancies as provided above and the bid/offer will be so reflected on the abstract of bids/offers.
(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid/offer is low.

7. Current authorized funds for the completion of the design and the construction for this project are approximately $5,700,000.00. Price/Cost Proposals that exceed this amount may be rejected.

PRICING SCHEDULE "B"
(2 of 2)

CONTRACTOR SHALL FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, ETC. NECESSARY TO PERFORM ALL WORK IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS SET FORTH IN THE CONTRACT TO INCLUDE ALL ATTACHMENTS THERETO.

ITEM NO.	DESCRIPTION	AMOUNT
0001	Complete Construction and Related Necessary Design of 84 Occupant (42 Modules) Dormitory Facility. (Excluding Option Items Below) **(360 calendar days after NTP)**	$_____
	BASE PRICE	$_____
	OPTION ITEMS	
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0003	(OPTION #2) Parking Lot, Complete **(360 calendar days after NTP)**	$_____
0004	(OPTION #3) Basketball Court, Complete. **(360 calendar days after NTP)**	$_____
	TOTAL PRICE (TOTAL OF BASE PRICE PLUS ALL OPTION ITEMS)	$_____

NOTE: **Prices shall be submitted on Schedules "A" and "B".**

1. Notwithstanding any other provision of this solicitation, the award will be made to the successful offeror for either SCHEDULE A or SCHEDULE B whichever is in the best interest of the Government and in accordance with Section 00100. Offerors must submit prices on all items, or both Schedules.

PRICING SCHEDULE “B”
(2 of 2)

2. Prices must be submitted on all individual items of this Pricing Schedule. Failure to do so may cause the proposal to be determined "unacceptable".

3. If a modification to a price is submitted which provides for a lump sum adjustment to the total price, the application of the lump sum adjustment to each item in the Pricing Schedule must be stated. If it is not stated, the bidder/offeror agrees that the lump sum adjustment shall be applied on a pro rata basis to every item in the Pricing Schedule.

4. The bidder/offeror shall distribute his indirect costs (overhead, profit, bond, etc.) over all the items in the Pricing Schedule. The Government will review all submitted Pricing Schedules for any unbalancing of the items. Any submitted Pricing Schedule determined to be unbalanced may cause the proposal to be determined "unacceptable".

5. The successful bidder/offeror grants the options listed in the Pricing Schedule to the Government. The options may be exercised any time up to 60 days after receipt of Notice to Proceed. Exercise of the options occurs upon mailing of written notice to the Contractor's field office or job superintendent. Exercise will be made by contract modification executed by the Contracting Officer. The price for exercise of the option includes all work and effort associated with the scope of that item. For determination of lowest price, see paragraph titled EVALUATION OF OPTIONS in Section 00100 of this solicitation. No additional time for contract completion will be allowed when an option is exercised. The given contract completion time was formulated to include time necessary to perform all option work.

6. EFARS 52.214-5000 APPARENT CLERICAL MISTAKES - ARITHMETIC DISCREPANCIES (DEC 1995)--EFARS

(a) For the purpose of initial evaluation of bids/offers, the following will be utilized in resolving arithmetic discrepancies found on the face of the Pricing Schedule as submitted by bidders/offerors:

(1) Obviously misplaced decimal points will be corrected;

(2) Discrepancy between unit price and extended price, the unit price will govern;

(3) Apparent errors in extension of unit prices will be corrected;

(4) Apparent errors in addition of lump-sum and extended prices will be corrected.

(b) For the purpose of bid/offer evaluation, the Government will proceed on the assumption that the bidder/offeror intends the bid/offer to be evaluated on basis of the unit prices, the total arrived at by resolution of arithmetic discrepancies as provided above and the bid/offer will be so reflected on the abstract of bids/offers.

(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid/offer is low.

7. Current authorized funds for the completion of the design and the construction for this project are approximately $5,700,000.00. Price/Cost Proposals that exceed this amount may be rejected.

SECTION 00100

INSTRUCTIONS, CONDITIONS AND NOTICES TO BIDDERS/OFFERORS AND EVALUATION CRITERIA FOR AWARD

SECTION 00600

REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF BIDDERS/OFFERORS

SECTION 00600

REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF BIDDERS/OFFERORS

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SECTION 00600

REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF BIDDERS/OFFERORS

1. SAACONS 52.0201.4801 SUBMITTAL INFORMATION (NOV 1993)

Solicitation Number: _____

Offeror's Name, Address, Telephone Number, and Fax Number:

_____

_____

_____

_____

_____
Name of Person to Contact Telephone Number

_____
Fax Number

Commercial & Government Entity (CAGE) Code, if known (see Section 00100):

_____

DUNS Number, if known:

_____

2. FAR 52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985)

(a) The offeror certifies that--

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory--

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2)(i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above_____
(insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

3. FAR 52.203-11 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (APR 1991)

(a) The definitions and prohibitions contained in the clause, at FAR 52.203-12, Limitation on Payments to Influence Certain Federal Transactions, included in this solicitation, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989,--

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit, with its offer, OMB standard form LLL, Disclosure of Lobbying Activities, to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

4. FAR 52.204-3 TAXPAYER IDENTIFICATION (JUN 1997)

(a) Definitions.

"Common parent," as used in this solicitation provision, means that corporate entity that owns or controls an affiliated group of corporations

that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Corporate status," as used in this solicitation provision, means a designation as to whether the offeror is a corporate entity, an unincorporated entity (e.g., sole proprietorship or partnership), or a corporation providing medical and health care services.

"Taxpayer Identification Number (TIN)," as used in this solicitation provision, means the number required by the IRS to be used by the offeror in reporting income tax and other returns.

(b) All offerors are required to submit the information required in paragraphs (c) through (e) of this solicitation provision in order to comply with reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M and implementing regulations issued by the Internal Revenue Service (IRS). If the resulting contract is subject to the reporting requirements described in FAR 4.903, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) Taxpayer Identification Number (TIN).

/_/ TIN: _____.

/_/ TIN has been applied for.

/_/ TIN is not required because:

/_/ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the U.S. and does not have an office or place of business or a fiscal paying agent in the U.S.;

/_/ Offeror is an agency or instrumentality of a foreign government;

/_/ Offeror is an agency or instrumentality of a Federal, state, or local government;

/_/ Other. State basis. _____

(d) Corporate Status.

/_/ Corporation providing medical and health care services, or engaged in the billing and collecting of payments for such services;

/_/ Other corporate entity;

/_/ Not a corporate entity;

/_/ Sole proprietorship

/_/ Partnership

/_/ Hospital or extended care facility described in 26 CFR 501(c)(3) that is exempt from taxation under 26 CFR 501(a).

(e) Common Parent.

/_/ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this clause.

/_/ Name and TIN of common parent:

Name _____

TIN _____

5. FAR 52.204-5 WOMEN-OWNED BUSINESS (OCT 1995)

(a) Representation. The offeror represents that it ( ) is, ( ) is not a women-owned business concern.

(b) Definition. "Women-owned business concern," as used in this provision, means a concern which is at least 51 percent owned by o ne or more women; or in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

6. FAR 52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (MAR 1996)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that--

(i) The Offeror and/or any of its Principals--

(A) Are / / are not / / presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have / / have not / /, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; and

(C) Are / / are not / / presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision.

(ii) The Offeror has / / has not / /, within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

7. DFARS 252.209-7001 DISCLOSURE OF OWNERSHIP OR CONTROL BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) Definitions.

As used in this provision-

(1) "Government of a terrorist country" includes the state and the government of a terrorist country, as well as any political subdivision, agency, or instrumentality thereof.

(2) "Terrorist country" means a country determined by the Secretary of State, under section 6(j)(1)(A)) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(i)(A)), to be a country the government of which has repeatedly provided support for acts of international terrorism. As of the date of this provision, terrorist countries include: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria.

(3) "Significant interest" means-

(i) Ownership of or beneficial interest in 5 percent or more of the firm's or subsidiary's securities. Beneficial interest includes holding 5 percent or more of any class of the firm's securities in "nominee shares," "street names," or some other method of holding securities that does not disclose the beneficial owner;

(ii) Holding a management position in the firm, such as a director or officer;

(iii) Ability to control or influence the election, appointment, or tenure of directors or officers in the firm;

(iv) Ownership of 10 percent or more of the assets of a firm such as equipment, buildings, real estate, or other tangible assets of the firm; or

(v) Holding 50 percent or more of the indebtedness of a firm.

(b) Prohibition on award.

In accordance with 10 U.S.C. 2327, no contract may be awarded to a firm or a subsidiary of a firm if the government of a terrorist country has a significant interest in the firm or subsidiary [or, in the case of a subsidiary, the firm that owns the subsidiary], unless a waiver is granted by the Secretary of Defense.

(c) Disclosure.

The Offeror shall disclose any significant interest the government of each of the following countries has in the Offeror or a subsidiary of the Offeror. If the Offeror is a subsidiary, it shall also disclose any significant interest the government of a terrorist country has in any firm that owns or controls the subsidiary. The disclosure shall include--

(1) Identification of each government holding a significant interest; and

(2) A description of the significant interest held by each Government.

8. DFARS 252.209-7002 DISCLOSURE OF OWNERSHIP OR CONTROL BY A FOREIGN GOVERNMENT (SEP 1994)

(a) Definitions.

As used in this provision--

(1) "Effectively owned or controlled" means that a foreign government or any entity controlled by a foreign government has the power, either directly or indirectly, whether exercised or exercisable, to control the election, appointment, or tenure of the Offeror's officers or a majority of the Offeror's board of directors by any means, e.g., ownership, contract, or operation of law (or equivalent power for unincorporated organizations).

(2) "Entity controlled by a foreign government"-

(i) Means--

(A) Any domestic or foreign organization or corporation that is effectively owned or controlled by a foreign government; or

(B) Any individual acting on behalf of a foreign government.

(ii) Does not include an organization or corporation that is owned, but is not controlled, either directly or indirectly, by a foreign government if the ownership of that organization or corporation by that foreign government was effective before October 23, 1992.

(3) "Foreign government" includes the state and the government of any country (other than the United States and its possessions and trust territories) as well as any political subdivision, agency, or instrumentality thereof.

(4) "Proscribed information" means--

(i) Top Secret information;

(ii) Communications Security (COMSEC) information, except classified keys used to operate secure telephone units (STU IIIs);

(iii) Restricted Data as defined in the U.S. Atomic Energy Act of 1954, as amended;

(iv) Special Access Program (SAP) information; or

(v) Sensitive Compartmented Information (SCI).

(b) Prohibition on award.

No contract under a national security program may be awarded to an entity controlled by a foreign government if that entity requires access to proscribed information to perform the contract, unless the Secretary of Defense or a designee has waived application of 10 U.S.C. 2536(a).

(c) Disclosure.

The Offeror shall disclose any interest a foreign government has in the Offeror when that interest constitutes control by a foreign government as defined in this provision. If the Offeror is a subsidiary, it shall also disclose any reportable interest a foreign government has in any entity that owns or controls the subsidiary, including reportable interest concerning the Offeror's immediate parent, intermediate parents, and the ultimate parent. Use separate paper as needed, and provide the information in the following format:

Offeror's Point of Contact for Questions about Disclosure (Name and Phone Number with Country Code, City Code and Area Code, as applicable)

Name and Address of Offeror

Name and Address of Entity Description of Interest,
Controlled by a Foreign Ownership Percentage, and
Government Identification of Foreign Government

9. DFARS 252.209-7003 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (MAR 1998)

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 37 U.S.C. 4212(d) (i.e., the VETS-100 report required by Federal Acquisition Regulation clause 52.222-37, Employment Reports on Disabled Veterans and Veterans of the Vietnam Era), it has submitted the more recent report required by 37 U.S.C. 4212(d)).

10. FAR 52.215-4 TYPE OF BUSINESS ORGANIZATION (OCT 1997)

The offeror or respondent, by checking the applicable box, represents that--

(a) It operates as /_/ an individual, /_/ a partnership, /_/ a nonprofit organization, /_/ a joint venture, or /_/ a corporation incorporated under the laws of the State of _____.

(b) If the offeror or respondent is a foreign entity, it operates as /_/ an individual, /_/ a partnership, /_/ a nonprofit organization, /_/ a joint venture, or /_/ a corporation, registered for business in _____(country).

11. FAR 52.219-1 SMALL BUSINESS PROGRAM REPRESENTATION (FEB 1998)

(a)(1) The standard industrial classification (SIC) code for this acquisition is 1522 - General Contractors-Residential Buildings, Other Than Single-Family.

(2) The small business size standard is $17,000,000.

(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) *Representations*. (1) The offeror represents as part of its offer that it / / is, / / is not a small business concern.

(2) (Complete only if offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it / / is, / / is not a small disadvantaged business concern.

(3) (Complete only if offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it / / is, / / is not a women-owned small business concern.

(c) *Definition*s.

"Joint venture," for purposes of a small disadvantaged business (SDB) set-aside or price evaluation preference (as prescribed at 13 CFR 124.321), is a concern that is owned and controlled by one or more socially and economically disadvantaged individuals entering into a joint venture agreement with one or more business concerns and is considered to be affiliated for size purposes with such other concern(s). The combined annual receipts or employees of the concerns entering into the joint venture must meet the applicable size standard corresponding to the SIC code designated for the contract. The majority of the venture's earnings must accrue directly to the socially and economically disadvantaged individuals in the SDB concern(s) in the joint venture. The percentage of the ownership involvement in a joint venture by disadvantaged individuals must be at least 51 percent.

"Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

"Small disadvantaged business concern," as used in this provision, means a small business concern that (1) is at least 51 percent unconditionally owned by one or more individuals who are both socially and economically disadvantaged, or a publicly owned business having at least 51 percent of its stock unconditionally owned by one or more socially and economically disadvantaged individuals, and (2) has its management and daily business controlled by one or more such individuals. This term also means a small business concern that is at least 51 percent unconditionally owned by an economically disadvantaged Indian tribe or Native Hawaiian Organization, or a publicly owned business having at least 51 percent of its stock unconditionally owned by one or more of these entities, which has its management and daily business controlled by members of an economically disadvantaged Indian tribe or Native Hawaiian Organization, and which meets the requirements of 13 CFR Part 124.

"Woman-owned small business concern," as used in this provision, means a small business concern--

(1) Which is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) *Notice*. (1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small or small disadvantaged business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

12. FAR 52.219-19 SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (JAN 1997)

(a) Definition.

"Emerging small business" as used in this solicitation, means a small business concern whose size is no greater than 50 percent of the numerical size standard applicable to the standard industrial classification code assigned to a contracting opportunity.

(b) (Complete only if the Offeror has represented itself under the provision at 52.219-1 as a small business concern under the size standards of this solicitation.)

The Offeror represents and certifies as part of its offer that it /__/ is, /__/ is not an emerging small business.

(c) (Complete only if the Offeror is a small business or an emerging small business, indicating its size range.)

Offeror's number of employees for the past 12 months (check this column if size standard stated in solicitation is expressed in terms of number of employees) or Offeror's average annual gross revenue for the last 3 fiscal years (check this column if size standard stated in solicitation is expressed in terms of annual receipts). (Check one of the following.)

No. of Employees	Avg. Annual Gross Revenues
____50 or fewer	_____$1 million or less
____51-100	_____$1,000,001-$2 million
____101-250	_____$2,000,001-$3.5 million
____251-500	_____$3,500,001-$5 million
____501-750	_____$5,000,001-$10 million
____751-1,000	_____$10,000,001-$17 million
____Over 1,000	_____Over $17 million

13. DFARS 252.219-7000 SMALL DISADVANTAGED BUSINESS CONCERN REPRESENTATION (DOD CONTRACTS (JUN 1997)

(a) Definition.

"Small disadvantaged business concern," as used in this provision, means a small business concern, owned and controlled by individuals who are both socially and economically disadvantaged, as defined by the Small Business

Administration at 13 CFR Part 124, the majority of earnings of which directly accrue to such individuals. This term also means a small business concern owned and controlled by an economically disadvantaged Indian tribe or Native Hawaiian organization which meets the requirements of 13 CFR 124.112 or 13 CFR 124.113, respectively. In general, 13 CFR Part 124 describes a small disadvantaged business concern as a small business concern--

(1) Which is at least 51 percent unconditionally owned by one or more socially and economically disadvantaged individuals; or

(2) In the case of any publicly owned business, at least 51 percent of the voting stock is unconditionally owned by one or more socially and economically disadvantaged individuals; and

(3) Whose management and daily business operations are controlled by one or more such individuals.

(b) Representations. Check the category in which your ownership falls--

_____ Subcontinent Asian (Asian-Indian) American (U.S. citizen with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal)

_____ Asian-Pacific American (U.S. citizen with origins from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, U.S. Trust Territory of the Pacific Islands (Republic of Palau), the Northern Mariana Islands, Laos, Kampuchea (Cambodia), Taiwan, Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Republic of the Marshall Islands, the Federated States of Micronesia, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru)

_____ Black American (U.S. citizen)

_____ Hispanic American (U.S. citizen with origins from South America, Central America, Mexico, Cuba, the Dominican Republic, Puerto Rico, Spain, or Portugal)

_____ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians, including Indian tribes or Native Hawaiian organizations)

_____ Individual/concern, other than one of the preceding, currently certified for participation in the Minority Small Business and Capital Ownership Development Program under Section 8(a) of the Small Business Act

_____ Other

(c) Complete the following--

(1) The offeror is_____ is not _____a small disadvantaged business concern.

(2) The Small Business Administration (SBA) has_____has not _____made a determination concerning the offeror's status as a small disadvantaged business concern. If the SBA has made a determination, the date of the determination was_____and the offeror--

_____ Was found by SBA to be socially and economically disadvantaged and no circumstances have changed to vary that determination.

_____ Was found by SBA not to be socially and economically disadvantaged but circumstances which caused the determination have changed.

(d) Penalties and Remedies. Anyone who misrepresents the status of a concern as a small disadvantaged business for the purpose of securing a contract or subcontract shall--

(1) Be punished by imposition of a fine, imprisonment, or both;

(2) Be subject to administrative remedies, including suspension and debarment; and

(3) Be ineligible for participation in programs conducted under authority of the Small Business Act.

14. FAR 52.222-21 CERTIFICATION OF NONSEGREGATED FACILITIES (APR 1984)

(a) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating

areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(b) By the submission of this offer, the offeror certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The offeror agrees that a breach of this certification is a violation of the Equal Opportunity clause in the contract.

(c) The offeror further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will--

(1) Obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the Equal Opportunity clause;

(2) Retain the certifications in the files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES.

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract under which the subcontractor will be subject to the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

15. FAR 52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (APR 1984)

The offeror represents that--

(a) It /_/ has, /_/ has not, participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the clause originally contained in Section 310 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114;

(b) It /_/ has, /_/ has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

16. FAR 52.223-1 CLEAN AIR AND WATER CERTIFICATION (APR 1984)

The Offeror certifies that--

(a) Any facility to be used in the performance of this proposed contract is /_/ is not /_/ listed on the Environmental Protection Agency (EPA) List of Violating Facilities;

(b) The Offeror will immediately notify the Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the EPA, indicating that any facility that the Offeror proposes

to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and

(c) The Offeror will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

17. FAR 52.223-3 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA (JAN 1997)

(a) "Hazardous material," as used in this clause, includes any material defined as hazardous under the latest version of Federal Standard No. 313 (including revisions adopted during the term of the contract).

(b) The Offeror must list any hazardous material, as defined in paragraph (a) of this clause, to be delivered under this contract. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. This information shall also be included on the Material Safety Data Sheet submitted under this contract.

Material (If none, insert None)	Identification No.

(c) This list must be updated during performance of the contract whenever the Contractor determines that any other material to be delivered under this contract is hazardous.

(d) The apparently successful Offeror agrees to submit, for each item as required prior to award, a Material Safety Data Sheet, meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous material identified in paragraph (b) of this clause. Data shall be submitted in accordance with Federal Standard No. 313, whether or not the apparently successful Offeror is the actual manufacturer of these items. Failure to submit the Material Safety Data Sheet prior to award may result in the apparently successful Offeror being considered nonresponsible and ineligible for award.

(e) If, after award, there is a change in the composition of the item(s) or a revision to Federal Standard No. 313, which renders incomplete or inaccurate the data submitted under paragraph (d) of this clause or the certification submitted under paragraph (c) of this clause, the Contractor shall promptly notify the Contracting Officer and resubmit the data.

(f) Neither the requirements of this clause nor any act or failure to act by the Government shall relieve the Contractor of any responsibility or liability for the safety of Government, Contractor, or subcontractor personnel or property.

(g) Nothing contained in this clause shall relieve the Contractor from complying with applicable Federal, State, and local laws, codes, ordinances, and regulations (including the obtaining of licenses and permits) in connection with hazardous material.

(h) The Government's rights in data furnished under this contract with respect to hazardous material are as follows:

(1) To use, duplicate and disclose any data to which this clause is applicable. The purposes of this right are to--

(i) Apprise personnel of the hazards to which they may be exposed in using, handling, packaging, transporting, or disposing of hazardous materials;

(ii) Obtain medical treatment for those affected by the material; and

(iii) Have others use, duplicate, and disclose the data for the Government for these purposes.

(2) To use, duplicate, and disclose data furnished under this clause, in accordance with subparagraph (h)(1) of this clause, in precedence over any other clause of this contract providing for rights in data.

(3) The Government is not precluded from using similar or data acquired from other sources.

18. FAR 52.223-5 POLLUTION PREVENTION AND RIGHT-TO-KNOW INFORMATION (APR 1998)

(a) Executive Order 12856 of August 3, 1993, requires Federal facilities to comply with the provisions of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11001-11050) and the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13101-13109).

(b) The Contractor shall provide all information needed by the Federal facility to comply with the emergency planning reporting requirements of Section 302 of EPCRA; the emergency notice requirements of Section 304 of EPCRA; the list of Material Safety Data Sheets required by Section 311 of EPCRA; the emergency and hazardous chemical inventory forms of Section 312 of EPCRA; the toxic chemical release inventory of Section 313 of EPCRA, which includes the reduction and recycling information required by Section 6607 of PPA; and the toxic chemical reduction goals requirements of Section 3-302 of Executive Order 12856.

19. FAR 52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 1996)

(a) Submission of this certification is a prerequisite for making or entering into this contract imposed by Executive Order 12969, August 8, 1995.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: [*Check each block that is applicable*.]

/_/ (i) The facility does not manufacture, process, or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

/_/ (ii) The facility does not have 10 or more full-time employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

/_/ (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

/_/ (iv) The facility does not fall within Standard Industrial Classification Code (SIC) designations 20 through 39 as set forth in section 19.102 of the Federal Acquisition Regulation; or

/_/ (v) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

20. DFARS 252.223-7001 HAZARD WARNING LABELS (DEC 1991)

(a) "Hazardous material," as used in this clause, is defined in the Hazardous Material Identification and Material Safety Data clause of this contract.

(b) The Contractor shall label the item package (unit container) of any hazardous material to be delivered under this contract in accordance with the Hazard Communication Standard (29 CFR 1910.1200 et seq.). The Standard requires that the hazard warning label conform to the requirements of the standard unless the material is otherwise subject to the labeling requirements of one of the following statutes:

(1) Federal Insecticide, Fungicide and Rodenticide Act;
(2) Federal Food, Drug and Cosmetics Act;
(3) Consumer Product Safety Act;
(4) Federal Hazardous Substances Act; or
(5) Federal Alcohol Administration Act.

(c) The Offeror shall list which hazardous material listed in the Hazardous Material Identification and Material Safety Data clause of this contract will be labeled in accordance with one of the Acts in paragraphs (b)(1) through (5) of this clause instead of the Hazard Communication Standard. Any hazardous material not listed will be interpreted to mean that a label is required in accordance with the Hazard Communication Standard.

Material (if none, insert "none.")	Act

(d) The apparently successful Offeror agrees to submit, before award, a copy of the hazard warning label for all hazardous materials not listed in paragraph (c) of this clause. The Offeror shall submit the label with the Material Safety Data Sheet being furnished under the Hazardous Material Identification and Material Safety Data clause of this contract.

(e) The Contractor shall also comply with MIL-STD-129, Marking for Shipment and Storage (including revisions adopted during the term of this contract).

21. FAR 52.236-28 PREPARATION OF PROPOSALS -- CONSTRUCTION (OCT 1997)

(a) Proposals must be (1) submitted on the forms furnished by the Government or on copies of those forms; and (2) manually signed. The person signing a proposal must initial each erasure or change appearing on any proposal form.

(b) The proposal form may require offerors to submit proposed prices for one or more items on various bases, including--

(1) Lump sum price;
(2) Alternate prices;

(3) Units of construction; or

(4) Any combination of paragraphs (b)(1) through (b)(3) of this provision.

(c) If the solicitation requires submission of a proposal on all items, failure to do so may result in the proposal being rejected without further consideration. If a proposal on all items is not required, offerors should insert the words "no proposal" in the space provided for any item on which no price is submitted.

(d) Alternate proposals will not be considered unless this solicitation authorizes their submission.

22. DFARS 252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph (b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term supplies is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) Representation.

The Offeror represents that it--

_____ Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

_____ Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

END OF SECTION

SECTION 00700

CONSTRUCTION CONTRACT CLAUSES

SECTION 00700

CONTRACT CLAUSES

FAR 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/References/References.html

CONTRACT CLAUSES BY REFERENCE:

1.	DFARS 252.201-7000	CONTRACTING OFFICER'S REPRESENTATIVE (DEC 1991)
2.	FAR 52.202-1 I	DEFINITIONS (OCT 1995)--ALTERNATE I (APR 1984)
3.	FAR 52.203-3	GRATUITIES (APR 1984)
4.	FAR 52.203-5	COVENANT AGAINST CONTINGENT FEES (APR 1984)
5.	FAR 52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT (JUL 1995)
6.	FAR 52.203-7	ANTI-KICKBACK PROCEDURES (JUL 1995)
7.	FAR 52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)
8.	FAR 52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JUN 1997) (APPLICABLE OVER $100,000)
9.	DFARS 252.203-7001	SPECIAL PROHIBITION ON EMPLOYMENT (JUN 1997)
10.	DFARS 252.203-7002	DISPLAY OF DOD HOTLINE POSTER (DEC 1991) (APPLICABLE OVER $5 MILLION)
11.	FAR 52.204-2 II	SECURITY REQUIREMENTS (AUG 1996)--ALTERNATE II (APR 1984) (APPLICABLE IF CONTRACTOR HAS ACCESS TO CLASSIFIED INFORMATION)
12.	DFARS 252.204-7000	DISCLOSURE OF INFORMATION (DEC 1991) (APPLICABLE IF CONTRACTOR HAS ACCESS TO INFORMATION INAPPROPRIATE FOR RELEASE)
13.	DFARS 252.205-7000	PROVISION OF INFORMATION TO COOPERATIVE AGREEMENT HOLDERS (DEC 1991) (APPLICABLE OVER $500,000)
14.	FAR 52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED OR PROPOSED FOR DEBARMENT (JUL 1995)

15.	DFARS 252.209-7000	ACQUISITION FROM SUBCONTRACTORS SUBJECT TO ON-SITE INSPECTION UNDER THE INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY (NOV 1995)
16.	DFARS 252.209-7004	SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)
17.	FAR 52.211-15	DEFENSE PRIORITY AND ALLOCATION REQUIREMENTS (SEP 1990)
18.	FAR 52.211-18	VARIATION IN ESTIMATED QUANTITY (APR 1984) (APPLICABLE IF THERE ARE ESTIMATED-QUANTITY LINE ITEMS IN PRICING SCHEDULE)
19.	FAR 52.214-26	AUDIT AND RECORDS--SEALED BIDDING (OCT 1997) (APPLICABLE IF SEALED BIDDING - SEE BLOCK 2, SF1442 - AND OVER $500,000)
20.	FAR 52.214-27	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA-MODIFICATIONS-SEALED BIDDING (OCT 1997) (APPLICABLE IF SEALED BIDDING - SEE BLOCK 2, SF1442 - AND OVER $500,000)
21.	FAR 52.214-28	SUBCONTRACTOR COST OR PRICING DATA--MODIFICATIONS--SEALED BIDDING (OCT 1997) (APPLICABLE IF SEALED BIDDING - SEE BLOCK 2, SF1442 - AND OVER $500,000)
22.	FAR 52.214-29	ORDER OR PRECEDENCE--SEALED BIDDING (JAN 1986) (APPLICABLE IF SEALED BIDDING - SEE BLOCK 2, SF1442)
23.	FAR 52.215-2	AUDIT AND RECORDS--NEGOTIATION (AUG 1996) (APPLICABLE IF CONTRACTING BY NEGOTIATIONS)
24.	FAR 52.215-10	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA (OCT 1997) (APPLICABLE IF CONTRACTING BY NEGOTIATIONS AND COST OR PRICING DATA IS REQUIRED)
25.	FAR 52.215-11	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA -- MODIFICATIONS (OCT 1997) (APPLICABLE IF CONTRACTING BY NEGOTIATIONS AND COST OR PRICING DATA IS REQUIRED FOR PRICING OF MODIFICATIONS)
26.	FAR 52.215-12	SUBCONTRACTOR COST OR PRICING DATA (OCT 1997) (APPLICABLE FAR 52.215-10 APPLIES)
27.	FAR 52.215-13	SUBCONTRACTOR COST OR PRICING DATA - MODIFICATIONS (OCT 1997) (APPLICABLE FAR 52.215-11 APPLIES)
28.	FAR 52.215-15	TERMINATION OF DEFINED BENEFIT PENSION PLANS (OCT 1997) (APPLICABLE IF COST OR PRICING DATA IS REQUIRED AND FOR WHICH ANY PREAWARD OR POSTAWARD COST DETERMINATIONS WILL BE SUBJECT TO FAR SUBPART 31.2)

29.	FAR 52.215-17	WAIVER OF FACILITIES CAPITAL COST OF MONEY (OCT 1997) (APPLICABLE ANY TIME THE COST PRINCIPLES OF FAR 31.2 APPLY - MODIFICATIONS - AND ORIGINAL BID/OFFER DID NOT INCLUDE FACILITIES CAPITAL COST OF MONEY)
30.	FAR 52.215-18	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS (OCT 1997) (APPLICABLE IF COST OR PRICING DATA WILL BE REQUIRED OR FOR WHICH ANY PREAWARD OR POSTAWARD COST DETERMINATIONS WILL BE SUBJECT TO FAR SUBPART 31.2)
31.	DFARS 252.215-7000	PRICING ADJUSTMENTS (DEC 1991) (APPLICABLE IF FAR 52.215-12 APPLIES)
32.	DFARS 252.215-7002	COST ESTIMATING SYSTEM REQUIREMENTS (JUL 1997) (APPLICABLE IF NEGOTIATED - SEE BLOCK 2, SF 1442 - AND CONTRACT AWARD IS MADE ON THE BASIS OF CERTIFIED COST OR PRICING DATA)
33.	FAR 52.219-6	NOTICE OF TOTAL SMALL BUSINESS SET-ASIDE (JUL 1996) (APPLICABLE IF SET ASIDE FOR SMALL BUSINESS - SEE DD FORM 1707)
34.	FAR 52.219-8	UTILIZATION OF SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS CONCERNS (JUN 1997)
35.	FAR 52.219-16	LIQUIDATED DAMAGES--SUBCONTRACTING PLAN (OCT 1995) (APPLICABLE IF FAR 52.219-9 IS APPLICABLE)
36.	DFARS 252.219-7003	SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS) (APR 1996) (APPLICABLE IF FAR 52.219-9 IS APPLICABLE)
37.	FAR 52.222-3	CONVICT LABOR (AUG 1996)
38.	FAR 52.222-4	CONTRACT WORK HOURS AND SAFETY STANDARDS ACT-OVERTIME COMPENSATION (JUL 1995)
39.	FAR 52.222-6	DAVIS-BACON ACT (FEB 1995)
40.	FAR 52.222-7	WITHHOLDING OF FUNDS (FEB 1988)
41.	FAR 52.222-8	PAYROLLS AND BASIC RECORDS (FEB 1988)
42.	FAR 52.222-9	APPRENTICES AND TRAINEES (FEB 1988)
43.	FAR 52.222-10	COMPLIANCE WITH COPELAND ACT REQUIREMENTS (FEB 1988)
44.	FAR 52.222-11	SUBCONTRACTS (LABOR STANDARDS) (FEB 1988)
45.	FAR 52.222-12	CONTRACT TERMINATION--DEBARMENT (FEB 1988)

46.	FAR 52.222-13	COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS (FEB 1988)
47.	FAR 52.222-14	DISPUTES CONCERNING LABOR STANDARDS (FEB 1988)
48.	FAR 52.222-15	CERTIFICATION OF ELIGIBILITY (FEB 1988)
49.	FAR 52.222-26	EQUAL OPPORTUNITY (APR 1984)
50.	FAR 52.222-27	AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (APR 1984)
51.	FAR 52.222-35	AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (APR 1998)
52.	FAR 52.222-36	AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS (APR 1984)
53.	FAR 52.222-37	EMPLOYMENT REPORTS ON DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (APR 1998)
54.	FAR 52.223-2	CLEAN AIR AND WATER (APR 1984) (APPLICABLE OVER $100,000 AND THE ANSWER TO SECTION 00600, 52.223-1, IS YES)
55.	FAR 52.223-6	DRUG-FREE WORKPLACE (JAN 1997)
56.	DFARS 252.223-7002	SAFETY PRECAUTIONS FOR AMMUNITION AND EXPLOSIVES (MAY 1994) (APPLICABLE IF EXPLOSIVES ARE USED)
57.	DFARS 252.223-7003	CHANGE IN PLACE OF PERFORMANCE--AMMUNITION AND EXPLOSIVES (DEC 1991) (APPLICABLE IF EXPLOSIVES ARE USED)
58.	FAR 52.225-11	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (OCT 1996)
59.	DFARS 252.225-7012	PREFERENCE FOR CERTAIN DOMESTIC COMMODITIES (SEP 1997)
60.	FAR 52.226-1	UTILIZATION OF INDIAN ORGANIZATIONS AND INDIAN-OWNED ECONOMIC ENTERPRISES (SEP 1996) (APPLICABLE IF FAR 52.219-9 IS APPLICABLE)
61.	FAR 52.227-1	AUTHORIZATION AND CONSENT (JUL 1995)
62.	FAR 52.227-4	PATENT INDEMNITY--CONSTRUCTION CONTRACTS (APR 1984)
63.	FAR 52.227-11	PATENT RIGHTS--RETENTION BY THE CONTRACTOR (SHORT FORM) (JUN 1997) (APPLICABLE IF NONSTANDARD WORK AND SMALL BUSINESS - SEE FAR 27.304-3)
64.	FAR 52.227-12	PATENT RIGHTS--RETENTION BY THE CONTRACTOR (LONG FORM) (JAN 1997) (APPLICABLE IF NONSTANDARD WORK AND LARGE BUSINESS - SEE FAR 27.304-3)
65.	DFARS 252.227-7000	NON-ESTOPPEL (OCT 1966)

66.	DFARS 252.227-7022	GOVERNMENT RIGHTS (UNLIMITED) (MAR 1979) (APPLICABLE TO CONSTRUCTION INVOLVING DESIGN SERVICES)
67.	DFARS 252.227-7023	DRAWINGS AND OTHER DATA TO BECOME PROPERTY OF GOVERNMENT (MAR 1979) (APPLICABLE TO CONSTRUCTION INVOLVING DESIGN SERVICES)
68.	DFARS 252.227-7024	NOTICE AND APPROVAL OF RESTRICTED DESIGNS (APR 1984) (APPLICABLE TO CONSTRUCTION INVOLVING DESIGN SERVICES)
69.	DFARS 252.227-7033	RIGHTS IN SHOP DRAWINGS (APR 1966)
70.	DFARS 252.227-7034	PATENTS--SUBCONTRACTS (APR 1984)
71.	DFARS 252.227-7039	PATENTS--REPORTING OF SUBJECT INVENTIONS (APR 1990) (APPLICABLE IF FAR 52.227-11 ABOVE IS APPLICABLE)
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73.	FAR 52.228-2	ADDITIONAL BOND SECURITY (OCT 1997)
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98.	DFARS 252.236-7000	MODIFICATION PROPOSALS--PRICE BREAKDOWN (DEC 1991)
99.	DFARS 252.236-7008	CONTRACT PRICES-BIDDING SCHEDULES (DEC 1991) (APPLICABLE IF THERE ARE UNIT PRICES)
100.	FAR 52.242-13	BANKRUPTCY (JUL 1995)
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105.	DFARS 252.243-7002	REQUESTS FOR EQUITABLE ADJUSTMENT (MAR 1998)
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107.	FAR 52.245-1	PROPERTY RECORDS (APR 1984) (APPLICABLE IF GOVERNMENT-FURNISHED PROPERTY (GFP) IS INVOLVED AND THE GOVERNMENT WILL MAINTAIN OFFICIAL PROPERTY RECORDS-IF THERE IS ANY GFP SECTION 00800 WILL CONTAIN A LIST OF THE GFP)
108.	FAR 52.245-2	GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS (DEC 1989) (APPLICABLE IF GOVERNMENT-FURNISHED PROPERTY IS INVOLVED WORTH OVER $100,000-SEE SECTION 00800)
109.	FAR 52.245-4	GOVERNMENT-FURNISHED PROPERTY (SHORT FORM) (APR 1984)

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110. DFARS 252.245-7001	REPORTS OF GOVERNMENT PROPERTY (MAY 1994) (APPLICABLE IF FAR 52.245-2 IS APPLICABLE)
111. FAR 52.246-21	WARRANTY OF CONSTRUCTION (MAR 1994) (NOT APPLICABLE TO CONTRACTS SOLELY FOR DREDGING, EXCAVATION, GRUBBING OR CLEARING; EFARS 46.710)

112. DFARS 252.247-7024	NOTIFICATION OF TRANSPORTATION OF SUPPLIES BY SEA (NOV 1995) (APPLICABLE IF THE ANSWER TO SECTION 00600, DFARS 52.247-7022, IS NEGATIVE)
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SECTION 00800

SPECIAL CONTRACT REQUIREMENTS

SECTION 00800

SPECIAL CONTRACT REQUIREMENTS

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SECTION 00800

SPECIAL CONTRACT REQUIREMENTS

1. DFARS 252.203-7003 PROHIBITION AGAINST RETALIATORY PERSONNEL ACTIONS (APR 1992)

(a) Definitions. As used in this clause--

(1) "Appropriate Government official" means

(i) An officer or employee of the Department of Defense responsible for command, direct staff assistance to a commander, contract administration, program management, audit, inspection, investigation, or enforcement of any law or regulation relating to Government procurement or the subject matter of the contract;

(ii) A Member of Congress or an officer or employee of Congress, the General Accounting Office, the Congressional Budget Office, or the Office of Technology Assessment; and

(iii) Any other officer or employee of the United States whose duties include the investigation or enforcement of any law, rule, or regulation relating to Government procurement or the subject matter of the contract.

(2) "Information concerning a contract" means information about cost, price, compliance with specifications, meeting the user's requirements, user safety, use or disposition of services, real property or personal property acquired under the contract, the procurement process (including competition, negotiation, award, and administration), and relationships with Government personnel, competitors, or subcontractors.

(b) Prohibition. In accordance with 10 U.S.C. 2409a, the Contractor shall not discharge or otherwise discriminate against any employee with respect to the employee's compensation or terms and conditions of employment because the employee (or any person acting pursuant to a request of the employee) discloses to an appropriate Government official information concerning a defense contract, which information the employee reasonably believe evidences a violation of any Federal law or regulation relating to defense procurement or the subject matter of this contract.

(c) The Government will notify the Contractor upon receipt of any complaint filed under the provisions of this clause and Subpart 203.71 of the Defense FAR Supplement. The Contractor agrees to cooperate with the Government during its investigation of any such complaint.

(d) The Contractor shall inform all employees of--

(1) The prohibitions of this clause;

(2) Employees' rights under 10 U.S.C. 2409a; and

(3) Availability of procedures implementing the statute.

2. FAR 52.204-4 PRINTING/COPYING DOUBLE-SIDED ON RECYCLED PAPER (MAY 1995)

(a) In accordance with Executive Order 12873, dated October 20, 1993, the Offeror/Contractor is encouraged to submit paper documents, such as offers, letters, or reports, that are printed/copied double-sided on recycled paper that has at least 20% postconsumer material.

(b) The 20% standard applies to high-speed copies paper, offset paper, forms bond, computer printout paper, and carbonless paper. A higher standard of 50% recovered material, with 20% postconsumer material, applies to other uncoated printing and writing papers such as writing and office paper, book paper, cotton fiber paper, and cover stock. An alternative standard for either of the standards specified in this clause if 50% recovered material content of certain industrial by-products.

3. DFARS 252.204-7003 CONTROL OF GOVERNMENT PERSONNEL WORK PRODUCT (APR 1992)

The Contractor's procedures for protecting against unauthorized disclosure of information shall not require Department of Defense employees or members of the Armed Forces to relinquish control of their work products, whether classified or not, to the Contractor.

4. FAR 52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1994)

The Contractor shall be required to (a) commence work under this contract within **10** calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than **(SEE COMPLETION SCHEDULE) 435/360** calendar days after receipt of notice to proceed. The time stated for completion shall include final cleanup of the premises.

5. FAR 52.212-5 LIQUIDATED DAMAGES--CONSTRUCTION (APR 1984)

(a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of **$1117.00** for each day of delay.

(b) If the Government terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

(c) If the Government does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

6. FAR 52.211-13 TIME EXTENSIONS (APR 1984)

Notwithstanding any other provisions of this contract, it is mutually understood that the time extensions for changes in the work will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of CONSTRUCTION. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements so delayed and that the remaining contract completion dates for all other portions of the work will not be altered and may further provide for an equitable readjustment of liquidated damages under the new completion schedule. No extension of time will be granted for any design resubmittal required when, in the opinion of the Contracting Officer, the initial submittal failed to meet the minimum quality requirements as set forth in the other portions of this document.

7. SAACONS 52.0211-4852 PERFORMANCE PERIOD (OCT 1992)

The Contractor shall complete the entire work ready for use not later than the number of calendar days after the date of receipt of Notice to Proceed as set out in the Completion Schedule below (calendar days are not to be added together):

Completion Schedule
(SEE PRICING SCHEDULE "A")

Completion Schedule:

	Description	Calendar Days After Date of Receipt of Notice To Proceed
(1)	Submit Demolition Plan for Bldg. 765	**20**
(2)	Compliance Check of Demolition Plan by Government. (**10 days**)	**30**
(3)	Submit 65% Design Submittal for Dormitory Bldg. & 90% Design Submittal for Site/ Utility/Geotechnical Investigation (**15 days)**	**45**
(4)	Compliance Check by Government of 90% Design Submittal for Site/Utility/ Geotechnical Investigation. (**15 days**)	**60**
(5)	Submit 100% Design Submittal for Site/Utility/Geotechnical Investigation. (**10 Days**)	**70**
(6)	Demolition of Existing Dormitory (Bldg. 765)(Including 30 day minimum Advance Notice)	**75**
(7)	Compliance Check by Government 100% Design Submittal for Site/Utility/ Geotechnical Investigation. **(05 days)**	**75**
(8)	"Over-the-Shoulder" Compliance Check by the Government of 65% Design Submittal for Dormitory Building. **(30 days)**	75
(9)	Submit 90% Design Submittal for Dormitory Bldg. (**30 days**)	**90**
(10)	Compliance Check by Government of 90% Design Submittal for Dormitory Bldg. (30 days)	**120**
(11)	Submit 100% Design Submittal for Dormitory Bldg. (**10 days**)	**130**
(12)	Compliance Check by Government of 100% Design **Submittal for Dormitory Bldg. (**05 days)	**135**
(13)	Construction of Site Work/Utilities **(60 days)**	**135**
(14)	Construction of Dormitory Building. (**300 days**)	**435**

Completion Schedule
(SEE PRICING SCHEDULE "B")

Completion Schedule:

	Description	Calendar Days After Date of Receipt of Notice To Proceed
(1)	Submit Demolition Plan for Bldg. 765	**20**
(2)	Compliance Check of Demolition Plan by Government. (**10 days**)	**30**
(3)	Submit 65% Design Submittal for Dormitory Bldg. & 90% Design Submittal for Site/ Utility/Geotechnical Investigation (**10 days)**	**40**
(4)	Compliance Check by Government of 90% Design Submittal for Site/Utility/ Geotechnical Investigation. (**10 days**)	**50**
(5)	Submit 100% Design Submittal for Site/Utility/Geotechnical Investigation. (**05 Days**)	**55**
(6)	Demolition of Existing Dormitory (Bldg. 765)(Including 30 day minimum Advance Notice)	**60**
(7)	Compliance Check by Government 100% Design Submittal for Site/Utility/ Geotechnical Investigation. **(05 days)**	**60**
(8)	"Over-the-Shoulder" Compliance Check by the Government of 65% Design Submittal for Dormitory Building. **(20 days)**	**60**
(9)	Submit 90% Design Submittal for Dormitory Bldg. (**35 days**)	**75**
(10)	Compliance Check by Government of 90% Design Submittal for Dormitory Bldg. (**15 days**)	**90**
(11)	Submit 100% Design Submittal for Dormitory Bldg. (**10 days**)	**100**
(12)	Compliance Check by Government of 100% Design **Submittal for Dormitory Bldg. (05 days**)	**105**
(13)	Construction of Site Work/Utilities **(45 days)**	**105**
(14)	Construction of Dormitory Building. (**255 days**)	**360**

Actual construction work (except mobilization and site preparation) shall not begin until approval of the corrected 100% design submittal by the Government.

To obtain approval of the design to begin construction, the Contractor must (1) conduct review meeting to discuss the comments and his responses; (2) distribute responses to reviewers; (3) correct the design, and (4) conduct a back check of the agreed upon corrections to demonstrate to the Government that all corrections have been made. All meetings will be at the Resident Office.

The Base (Contracting Officer) shall receive a 30 day notice of the Contractor’s intent to start demolition on Dormitory Building 765.

8. SAACONS 52.0211.4853 WORK DAYS AND HOURS (APR 1992)

The normal work days and hours for this project will be Monday through Friday, excluding federal holidays, from **7:00 a.m. to 3:30 p.m.** Access to the work site may be restricted to these hours and days. Work during other than normal hours and days must be coordinated in advance with the Administrative Contracting Officer.

9. SAACONS 52.0215-4101 ALTERNATE STRUCTURED APPROACH TO WEIGHTED GUIDELINE METHOD FOR CONSTRUCTION CONTRACTS (EFARS 15.973-100) (MAY 1995)

The following alternate structured approach shall be used for all fixed-price construction contract actions.

Factor	Rate	Weight	Value
Degree of risk	20		
Relative difficulty of work	15		
Size of job	15		
Period of performance	15		
Contractor's investment	5		
Assistance by Government	5		
Subcontracting	25		
Total	100%		

Based on the circumstances of the procurement action, each of the above factors shall be weighted from .03 to .12 as indicated below. "Value shall be obtained by multiplying the rate by the weight. The Value column when totaled indicates the fair and reasonable profit percentage under the circumstances of the particular procurement. The profit percentage should be multiplied by the total contract costs, including general and administrative costs.

(1) Degree of risk. Where the work involves no risk or the degree of risk is very small, the weighting should be .03; as the degree of risk increases, the weighting should be increased up to a maximum of .12. Lump sum items shall generally have a higher weight than unit price items; other things to consider include the nature of the work and where it is to be performed. Consider the portion of the work to be done by subcontractors, amount and type of labor included in costs, whether the negotiation is before or after performance of the work, etc. Modifications settled before the fact have much greater risk than those settled after the fact. A weight of .03 is appropriate for after the fact equitable adjustments and/or settlements.

(2) Relative Difficulty of Work: If the work is difficult and complex, the weight should be .12 and should be proportionately reduced to .03 on the simplest of jobs. This factor is tied in to some extent with the degree of risk. Some other things to consider are the nature of the work, by whom it is to be done (i.e., subcontractors, consultants), what is the time schedule.

(3) Size of Job. Work of $100,000 or less shall be weighted at .12. Work estimated between $100,000 and $5,000,000 shall be proportionately weighted from .12 to .05. Work from $5,000,000 to $10,000,000 shall be weighted at .04. Work in excess of $10,000,000 shall be weighted at .03. It should be noted that control of fixed expenses generally improves with increased job magnitude.

(4) Period of Performance. Work not to exceed one month is to be proportionately weighted at .03. Work in excess of 24 months is to be weighted at .12. Durations between one month and 24 months are to be proportionately weighted between .03 and .12.

(5) Contractor's Investment. To be weighted from .03 to .12 on the basis of below average, average and above average. Things to consider include amount of subcontracting, Government-furnished property or data such as surveys, soil tests, method of making progress payments, and any mobilization payment items.

(6) Assistance by Government. To be weighted from .12 to .03 on the basis of average to above average. Consider use of Government-owned property, equipment and facilities, and expediting assistance.

(7) Subcontracting. To be weighted inversely proportional to the amount of subcontracting. Where 80% or more of the work is to be subcontracted use .03. The weighting should be increased proportionately to .12 where all the work is performed by the contractor's own forces.

10. SAACONS 52.0219-4509 SUBCONTRACTING WITH SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESSES (JAN 1996)

Contractors are cautioned that failure of any Contractor to comply in good faith with the Contract Clauses titled (1) Utilization of Small, Small Disadvantaged and Women-Owned Small Business Concerns or (2) Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, when applicable, will be a material breach of contract. In order to assist contractors in developing a source list of small, small disadvantaged and/or women-owned small business concerns you are encouraged to contact your minority contractor associates, the local Minority Business Development Agency and the appropriate General Business Service Centers in your Standard Metropolitan Statistical Area. Contractors may obtain addresses of these sources from:

Contractors are cautioned that failure of any Contractor to comply in good faith with the Contract Clauses titled (1) Utilization of Small Business Concerns and Small Disadvantaged Business Concerns or (2) Small Business and Small Disadvantaged Business Subcontracting Plan, when applicable, will be a material breach of contract. In order to assist contractors in developing a source list of small and/or small disadvantaged business concerns you are encouraged to contact your minority contractor associates, the local Minority Business Development Agency and the appropriate General Business Service Centers in your Standard Metropolitan Statistical Area. Contractors may obtain addresses of these sources from:

Write: US Army Engineer District, Los Angeles
ATTN: Contracting Office, Deputy for Small Business
P.O. Box 2711
Los Angeles, California 90053-2325

Or Contact: Mr. Daniel Hanas
Deputy for Small Business
Telephone: (213) 452-3839

11. FAR 52.223-14 TOXIC CHEMICAL RELEASE REPORTING (OCT 1995)

(a) Unless otherwise exempt, the Contractor owned or operated facilities used in the performance of this contract shall file by July 1 for the prior calendar year an annual Toxic Chemical Release Inventory Form (Form R as described in sections 313(a) and (g) of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023(a) and (g)), and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106). Such Contractor facilities shall file the annual Form R throughout the life of the contract.

(b) A Contractor is exempt from the requirement to file an annual Form R if none of the Contractor owned or operated facilities used in the performance of this contract--

(1) Manufacture, process or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

(2) Have 20 or more full-time employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

(3) Meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA); or

(4) Fall within Standard Industrial Classification Code (SIC) designations 20 through 39 as set forth in FAR 19.102.

(c) If the Contractor has certified to be exempt in accordance with one or more of the criteria in paragraph (b) of this clause, and after award of the contract circumstances change so that any one of its owned or operated facilities used in the performance of this contract is no longer exempt--

(1) The Contractor shall notify the Contracting Officer, and

(2) The Contractor owned and operated facilities used in the performance of this contract, unless otherwise exempt, shall (i) submit a Toxic Chemical Release Inventory Form (Form R) on or before July 1 for the prior calendar year during which the Contractor becomes eligible; and (ii) continue to file the annual Form R for the life of the contract.

(d) The Contracting Officer may terminate this contract or take other action as appropriate, if the Contractor fails to comply accurately and fully with the EPCRA and PPA toxic chemical release filing and reporting requirements.

(e) Except for acquisitions for commercial items, as defined in FAR Part 12, the Contractor shall--

(1) For competitive subcontracts expected to exceed $100,000 (including all options), include a solicitation provision substantially the same as the provision at FAR 52.223-13, Certification of Toxic Chemical Release Reporting; and

(2) Include in any resultant subcontract exceeding $100,000 (including all options), with subcontractors having SIC designations of major groups 20 through 39 as set forth in FAR 19.102, the substance of this clause, except this paragraph (e).

12. DFARS 252.223-7006 PROHIBITION ON STORAGE AND DISPOSAL OF TOXIC AND HAZARDOUS MATERIALS (APR 1993)

(a) Definitions. As used in this clause--

(1) "Storage" means a non-transitory, semi-permanent or permanent holding, placement, or leaving of material. It does not include a temporary accumulation of a limited quantity of a material used in or a waste generated or resulting from authorized activities, such as servicing, maintenance, or repair of Department of Defense (DoD) items, equipment, or facilities.

(2) "Toxic or hazardous materials" means:

(i) Materials referred to in section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. 9601(14)) and materials designated under section 102 of CERCLA (42. U.S.C. 9602 (40 CFR Part 302);

(ii) Materials that are of an explosive, flammable, or pyrotechnic nature; or

(iii) Materials otherwise identified by the Secretary of Defense as specified in DoD regulations.

(b) In accordance with 10 U.S.C. 2692, the Contractor is prohibited from storing or disposing of non-DoD-owned toxic or hazardous materials on a DoD installation, except to the extent authorized by a statutory exception to 10 U.S.C. 2692 or as authorized by the Secretary of Defense or his designee.

13. SAACONS 52.0223-4803 HAZARDOUS MATERIALS DELIVERED UNDER THIS CONTRACT (MAY 1993)

(a) If any hazardous materials will be delivered under this contract (see Section 00600, FAR 52.223-3, and DFARS 252.223-7001), the Material Safety Data Sheets (MSDS) for locally purchased, nonstandard stock hazardous material will be submitted to the Corps of Engineers Contracting Officer or Contracting Officer's Representative. For all other materials, the MSDS will also be submitted to U.S. Army Environmental Hygiene Agency, ATTN: HSE-OI, Aberdeen Proving Grounds MD 21010.

(b) Hazardous material is defined in Federal Standard No. 313, sold by the General Services Administration Specifications Unit (3FBP-W), 7th & D Streets, SW, Washington DC 20407.

14. FAR 52.228-5 INSURANCE--WORK ON A GOVERNMENT INSTALLATION (SEP 1989)

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance of this contract, at least the kinds and minimum amounts of insurance required in the Schedule or elsewhere in the contract.

(b) Before commencing work under this contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective (1) for such period as the laws of the State in which this contract is to be performed prescribe, or (2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

(c) The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

15. SAACONS 52.0228-4502 MINIMUM INSURANCE REQUIRED (MAY 1993)

The contract clause, FAR 52.228-5, applies to this contract even if the work or any portion of the work is not performed on a Government installation. In accordance with FAR 52.228-5 and FAR 28.307-2, the contractor shall procure and thereafter maintain during the entire period of this performance under this contract the following minimum insurance.

TYPE	AMOUNT
Worker's Compensation and Employer's Liability	Comply with Federal and State worker's comp and occupational disease statutes. Employer's liability of at least $100,000
General Liability (Comprehensive)	Bodily injury liability of at least $500,000 per occurrence.
Automobile Liability (Comprehensive):	
Bodily Injury & Property Damage	At least $200,000 per person and $500,000 per occurrence. At least $20,000 per occurrence.
Longshoremen's and Harbor Worker's Compensation (When applicable by location of contract performance)	Coverage complying with applicable Federal statute (33 USC 901 et seq).

16. DFARS 252.228-7006 PROSPECTIVE SUBCONTRACTOR REQUESTS FOR BONDS (OCT 1995)

In accordance with section 806(a)(3) of Pub.L. 102-190, as amended by Sections 2091 and 8105 of Pub.L. 103-355, upon the request of a prospective subcontractor or supplier offering to furnish labor or material for the performance of this contract for which a payment bond has been furnished to the Government pursuant to the Miller Act, the Contractor shall promptly provide a copy of such payment bond to the requestor.

17. EFARS 52.231-5000 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)--EFARS

(a) This statement shall become operative only for negotiated contracts where cost or pricing data is requested, and for modifications to sealed bid or negotiated contracts where cost or pricing data is requested. This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals, and FAR Part 49.

(b) Allowable cost for CONSTRUCTION and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, CONSTRUCTION Equipment Ownership and Operating Expense Schedule, Region VII. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

NOTE: See also, Specification Section 01500. A copy of the EP 1110-1-8 is available for review in the Corps of Engineers, Sacramento District Office, 1325 J Street, Library, 8th floor, telephone (916) 557-6657. Copies are available for a nominal charge from the Government Printing Office, telephone (202) 783-3238.

18. FAR 52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (MAR 1994)

Notwithstanding any other payment terms in this contract, the Government will make invoice payments and contract financing payments under the terms and conditions specified in this clause. Payment shall be considered as being made on the day a check is dated or an electronic funds transfer is made. Definitions of pertinent terms are set forth in 32.902. All days referred to in this clause are calendar days, unless otherwise specified. The term "foreign vendor" means an incorporated concern not incorporated in the United States or an unincorporated concern having its principal place of business outside the United States.

(a) Invoice Payments.

(1) For purposes of this clause, there are several types of invoice payments which may occur under this contract, as follows:

(i) Progress payments, if provided for elsewhere in this contract, based on Contracting Officer approval of the estimated amount and value of work or services performed, including payments for reaching milestones in any project:

(A) The due date for making such payments shall be 14 days after receipt of the payment request by the designated billing office. However, if the designated billing office fails to annotate the payment request with the actual date of receipt, the payment due date shall be deemed to be the 14th day after the date the Contractor's payment request is dated, provided a proper payment request is received and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(B) The due date for payment of any amounts retained by the Contracting Officer in accordance with the clause at 52.232-5, Payments Under Fixed-Price CONSTRUCTION Contracts, shall be as specified in the contract or, if not specified, 30 days after approval for release to the Contractor by the Contracting Officer.

(ii) Final payments based on completion and acceptance of all work and presentation of release of all claims against the Government arising by virtue of the contract, and payments for partial deliveries that have been accepted by the Government (e.g., each separate building, public work, or other division of the contract for which the price is stated separately in the contract):

(A) The due date for making such payments shall be either the 30th day after receipt by the designated billing office of a proper invoice from the Contractor, or the 30th day after Government acceptance of the work or services completed by the Contractor, whichever is later. However, if the designated billing office fails to annotate the invoice with the date of actual receipt, the invoice payment due date shall be deemed to be the 30th day after the date the Contractor's invoice is dated, provided a proper invoice is received and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(B) On a final invoice where the payment amount is subject to contract settlement actions (e.g., release of claims), acceptance shall be deemed to have occurred on the effective date of the contract settlement.

(2) An invoice is the Contractor's bill or written request for payment under the contract for work or services performed under the contract. An invoice shall be prepared and submitted to the designated billing office. A proper invoice must include the items listed in subdivisions (a)(2)(i) through (a)(2)(ix) of this clause. If the invoice does not comply with these requirements, the Contractor will be notified of the defect within 7 days after receipt of the invoice at the designated billing office. Untimely notification will be taken into account in the computation of any interest penalty owed the Contractor in the manner described in subparagraph (a)(4) of this clause:

(i) Name and address of the Contractor.

(ii) Invoice date.

(iii) Contract number or other authorization for work or services performed (including order number and contract line item number).

(iv) Description of work or services performed.

(v) Delivery and payment terms (e.g., prompt payment discount terms).

(vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment).

(vii) Name (where practicable), title, phone number, and mailing address of person to be notified in event of a defective invoice.

(viii) For payments described in subdivision (a)(1)(i) of this clause, substantiation of the amounts requested and certification in accordance with the requirements of the clause at 52.232-5, Payments Under Fixed-Price CONSTRUCTION Contracts.

(ix) Any other information or documentation required by the contract.

(3) An interest penalty shall be paid automatically by the designated payment office, without request from the Contractor, if payment is not made by the due date and the conditions listed in subdivisions (a)(3)(i) through (a)(3)(iii) of this clause are met, if applicable.

(i) A proper invoice was received by the designated billing office.

(ii) A receiving report or other Government documentation authorizing payment was processed and there was no disagreement over quantity, quality, Contractor compliance with any contract term or condition, or requested progress payment amount.

(iii) In the case of a final invoice for any balance of funds due the Contractor for work or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor.

(4) The interest penalty shall be at the rate established by the Secretary of the Treasury under section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) that is in effect on the day after the due date, except where the interest penalty is prescribed by other governmental authority. This rate is referred to as the "Renegotiation Board Interest Rate," and it is published in the Federal Register semiannually on or about January 1 and July 1. The interest penalty shall accrue daily on the invoice payment amount approved by the Government and be compounded in 30-day increments inclusive from the first day after the due date through the payment date. That is, interest accrued at the end of any 30-day period will be added to the approved invoice payment amount and be subject to interest penalties if not paid in the succeeding 30-day period. If the designated billing office failed to notify the Contractor of a defective invoice within the periods prescribed in subparagraph (a)(2) of this clause, then the due date on the corrected invoice will be adjusted by subtracting the number of days taken beyond the prescribed notification of defects period. Any interest penalty owed the Contractor will be based on this adjusted due date. Adjustments will be made by the designated payment office for errors in calculating interest penalties, if requested by the Contractor.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor for payments described in subdivision (a)(1)(ii) of this clause, Government acceptance or approval shall be deemed to have occurred constructively on the 7th day after the Contractor has completed the work or services in accordance with the terms and conditions of the contract. In the event that actual acceptance or approval occurs within the constructive acceptance or approval period, the determination of an interest penalty shall be based on the actual date of acceptance or approval. Constructive acceptance or constructive approval requirements do not apply if there is a disagreement over quantity, quality, or Contractor compliance with a contract provision. These requirements also do not compel Government officials to accept work or services, approve Contractor estimates, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The following periods of time will not be included in the determination of an interest penalty:

(A) The period taken to notify the Contractor of defects in invoices submitted to the Government, but this may not exceed 7 days.

(B) The period between the defects notice and resubmission of the corrected invoice by the Contractor.

(iii) Interest penalties will not continue to accrue after the filing of a claim for such penalties under the clause at 52.233-1, Disputes, or for more than 1 year. Interest penalties of less than $1.00 need not be paid.

(iv) Interest penalties are not required on payment delays due to disagreement between the Government and Contractor over the payment amount or other issues involving contract compliance, or on amounts temporarily withheld or retained in accordance with the terms of the contract. Claims involving disputes, and any interest that may be payable, will be resolved in accordance with the clause at 52.233-1, Disputes.

(5) An interest penalty shall also be paid automatically by the designated payment office, without request from the Contractor, if a discount for prompt payment is taken improperly. The interest penalty will be calculated on the amount of discount taken for the period beginning with the first day after the end of the discount period through the date when the Contractor is paid.

(6) If this contract was awarded on or after October 1, 1989, a penalty amount, calculated in accordance with regulations issued by the Office of Management and Budget, shall be paid in addition to the interest penalty amount if the Contractor--

(i) Is owed an interest penalty;

(ii) Is not paid the interest penalty within 10 days after the date the invoice amount is paid; and

(iii) Makes a written demand, not later than 40 days after the date the invoice amount is paid, that the agency pay such a penalty.

(b) Contract Financing Payments.

(1) For purposes of this clause, if applicable, "contract financing payment" means a Government disbursement of monies to a Contractor under a contract clause or other authorization prior to acceptance of supplies or services by the Government, other than progress payments based on estimates of amount and value of work performed. Contract financing payments include advance payments and interim payments under cost-type contracts.

(2) If this contract provides for contract financing, requests for payment shall be submitted to the designated billing office as specified in this contract or as directed by the Contracting Officer. Contract financing payments shall be made on the 30th day after receipt of a proper contract financing request by the designated billing office. In the event that an audit or other review of a specific financing request is required to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the due date specified. For advance payments, loans, or other arrangements that do not involve recurrent submissions of contract financing requests, payment shall be made in accordance with the corresponding contract terms or as directed by the Contracting Officer. Contract financing payments shall not be assessed an interest penalty for payment delays.

(c) The Contractor shall include in each subcontract for property or services (including a material supplier) for the purpose of performing this contract the following:

(1) A payment clause which obligates the Contractor to pay the subcontractor for satisfactory performance under its subcontract not later than 7 days from receipt of payment out of such amounts as are paid to the Contractor under this contract.

(2) An interest penalty clause which obligates the Contractor to pay to the subcontractor an interest penalty for each payment not made in accordance with the payment clause--

(i) For the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and

(ii) Computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(3) A clause requiring each subcontractor to include a payment clause and an interest penalty clause conforming to the standards set forth in subparagraphs (c)(1) and (c)(2) of this clause in each of its subcontracts, and to require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

(d) The clauses required by paragraph (c) of this clause shall not be construed to impair the right of Contractor or a subcontractor at any tier to negotiate, and to include in their subcontract, provisions which--

(1) Permit the Contractor or a subcontractor to retain (without cause) a specified percentage of each progress payment otherwise due to a subcontractor for satisfactory performance under the subcontract without incurring any obligation to pay a late payment interest penalty, in accordance with terms and conditions agreed to by the parties to the subcontract, giving such recognition as the parties deem appropriate to the ability of a subcontractor to furnish a performance bond and a payment bond;

(2) Permit the Contractor or subcontractor to make a determination that part or all of the subcontractor's request for payment may be withheld in accordance with the subcontract agreement; and

(3) Permit such withholding without incurring any obligation to pay a late payment penalty if--

(i) A notice conforming to the standards of paragraph (g) of this clause has been previously furnished to the subcontractor; and

(ii) A copy of any notice issued by a Contractor pursuant to subdivision (d)(3)(i) of this clause has been furnished to the Contracting Officer.

(e) If a Contractor, after making a request for payment to the Government but before making a payment to a subcontractor for the subcontractor's performance covered by the payment request, discovers that all or a portion of the payment otherwise due such subcontractor is subject to withholding from the subcontractor in accordance with the subcontract agreement, then the Contractor shall--

(1) Furnish to the subcontractor a notice conforming to the standards of paragraph (g) of this clause as soon as practicable upon ascertaining the cause giving rise to a withholding, but prior to the due date for subcontractor payment;

(2) Furnish to the Contracting Officer, as soon as practicable, a copy of the notice furnished to the subcontractor pursuant to subparagraph (e)(1) of this clause;

(3) Reduce the subcontractor's progress payment by an amount not to exceed the amount specified in the notice of withholding furnished under subparagraph (e)(1) of this clause;

(4) Pay the subcontractor as soon as practicable after the correction of the identified subcontract performance deficiency, and--

(i) Make such payment within--

(A) Seven days after correction of the identified subcontract performance deficiency (unless the funds therefor must be recovered from the Government because of a reduction under subdivision (e)(5)(i)) of this clause; or

(B) Seven days after the Contractor recovers such funds from the Government; or

(ii) Incur an obligation to pay a late payment interest penalty computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contracts Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty;

(5) Notify the Contracting Officer upon--

(i) Reduction of the amount of any subsequent certified application for payment; or

(ii) Payment to the subcontractor of any withheld amounts of a progress payment, specifying--

(A) The amounts withheld under subparagraph (e)(1) of this clause; and

(B) The dates that such withholding began and ended; and

(6) Be obligated to pay to the Government an amount equal to interest on the withheld payments (computed in the manner provided in 31 U.S.C. 3903(c)(1)), from the 8th day after receipt of the withheld amounts from the Government until--

(i) The day the identified subcontractor performance deficiency is corrected; or

(ii) The date that any subsequent payment is reduced under subdivision (e)(5)(i) of this clause.

(f)(1) If a Contractor, after making payment to a first-tier subcontractor, receives from a supplier or subcontractor of the first-tier subcontractor (hereafter referred to as a "second-tier subcontractor") a written notice in accordance with section 2 of the Act of August 24, 1935 (40 U.S.C. 270b, Miller Act), asserting a deficiency in such first-tier subcontractor's performance under the contract for which the Contractor may be ultimately liable, and the Contractor determines that all or a portion of future payments otherwise due such first-tier subcontractor is subject to withholding in accordance with the subcontract agreement, then the Contractor may, without incurring an obligation to pay an interest penalty under subparagraph (e)(6) of this clause--

(i) Furnish to the first-tier subcontractor a notice conforming to the standards of paragraph (g) of this clause as soon as practicable upon making such determination; and

(ii) Withhold from the first-tier subcontractor's next available progress payment or payments an amount not to exceed the amount specified in the notice of withholding furnished under subdivision (f)(1)(i) of this clause.

(2) As soon as practicable, but not later than 7 days after receipt of satisfactory written notification that the identified subcontract performance deficiency has been corrected, the Contractor shall pay the amount withheld under subdivision (f)(1)(ii) of this clause to such first-tier subcontractor, or shall incur an obligation to pay a late payment interest penalty to such first-tier subcontractor computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contracts Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(g) A written notice of any withholding shall be issued to a subcontractor (with a copy to the Contracting Officer of any such notice issued by the Contractor), specifying--

(1) The amount to be withheld;

(2) The specific causes for the withholding under the terms of the subcontract; and

(3) The remedial actions to be taken by the subcontractor in order to receive payment of the amounts withheld.

(h) The Contractor may not request payment from the Government of any amount withheld or retained in accordance with paragraph (d) of this clause until such time as the Contractor has determined and certified to the Contracting Officer that the subcontractor is entitled to the payment of such amount.

(i) A dispute between the Contractor and subcontractor relating to the amount or entitlement of a subcontractor to a payment or a late payment interest penalty under a clause included in the subcontract pursuant to paragraph (c) of this clause does not constitute a dispute to which the United States is a party. The United States may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

(j) Except as provided in paragraph (i) of this clause, this clause shall not limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or a subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor or deficient subcontract performance or nonperformance by a subcontractor.

(k) The Contractor's obligation to pay an interest penalty to a subcontractor pursuant to the clauses included in a subcontract under paragraph (c) of this clause shall not be construed to be an obligation of the United States for such interest penalty. A cost reimbursement claim may not include any amount for reimbursement of such interest penalty.

19. DFARS 252.232-7006 REDUCTION OR SUSPENSION OF CONTRACT PAYMENTS UPON FINDING OF FRAUD (AUG 1992)

(a) 10 U.S.C. 2307(e) permits the head of the agency to reduce or suspend further payments upon a written determination by the agency head that substantial evidence exists that the Contractor's request for advance, partial, or progress payments is based on fraud. The provisions of 10 U.S.C. 2307(e) are in addition to any other rights or remedies provided the Government by law or under contract.

(b) Actions taken by the Government in accordance with 10 U.S.C. 2307(e) shall not constitute an excusable delay under the Default clause of this contract or otherwise relieve the Contractor of its obligations to perform under this contract.

20. SAACONS 52.0232-4501 INVOICES (AUG 1991)

The Government shall pay the Contractor upon submission of proper invoices for supplies delivered and accepted or services rendered and accepted for the portion of work actually performed under this contract. Invoices will be submitted in quadruplicate to the address in Block 26, SF1442, which will be completed at time of award. Invoices shall be submitted on ENG Form 93 which will be provided to the Contractor by the Government

21. FAR 52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least <u>twenty</u> percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

22. FAR 52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations by the Government.

(b) Weather conditions: The Contractor shall satisfy himself/herself as to the hazards likely to arise from weather conditions. Complete weather records and reports may be obtained from any U.S. Weather Bureau Office.

(c) Transportation Facilities: The Contractor shall make his/her own investigation of the conditions of existing public and private roads and of clearances, restrictions, bridge load limits and other limitations affecting transportation and ingress and egress at the job site. The unavailability of transportation facilities or limitations thereon shall not become a basis for claims against the Government or extension of time for completion of the work.

23. FAR 42.236-25 REQUIREMENTS FOR REGISTRATION OF DESIGNERS (APR 1984)

The design of architectural, structural, mechanical, electrical, civil, or other engineering features of the work shall be accomplished or reviewed and approved by architects or engineers registered to practice in the particular professional field involved in a State or possession of the United States, in Puerto Rico, or in the District of Columbia.

24. DFARS 252.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (DEC 1991)

(a) The Government--
(1) Will provide the Contractor, without charge, one set of large-scale contract drawings and specifications except publications incorporated into the technical provisions by reference;
(2) Will furnish additional sets on request, for the cost of reproduction; and
(3) May, at its option, furnish the Contractor one set of reproducibles, or half-size drawings, in lieu of the drawings in paragraph (a)(1) of this clause.
(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; and
(4) Be responsible for any errors which might have been avoided by complying with this paragraph (b).
(c) Large scale drawings shall, in general, govern small scale drawings. Figures marked on drawings shall, in general, be followed in preference to scale measurements.
(d) Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work, but shall be performed 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 in the ATTACHMENTS.

25. SAACONS 52.0236-4801 SALVAGE AND SCRAP GOVERNMENT PROPERTY (OCT 1993)

(a) "Government property" means all property owned by or leased to the Government or acquired by the Government under the terms of the contract. It includes both Government-furnished property and contractor-acquired property.
(b) "Salvage" means Government property in possession of a contractor, including subcontractors, that, because of its worn, damaged, deteriorated, or incomplete condition or specialized nature, has no reasonable prospect of sale

or use as serviceable property without major repairs, but has some value in excess of its scrap value.

(c) "Scrap" means Government personal property that has no value except for its basic material content.

(d) In accordance with FAR 45.505-8 the Contractor shall maintain records of all scrap and salvage generated from this contract. The Contractor's records shall contain the following information:

(1) Contract Number

(2) Description of salvageable items or classification (material content) of scrap

(3) Quantity on hand

(e) The Contractor shall provide final accounting and disposition recommendations of all Government property not consumed in performing this contract or delivered to the Government including salvage and scrap. The Government will review the Contractor's records and shall cause correction if the Government disagrees with the classification of items as salvage or scrap. The Contractor shall dispose of the items as directed by the Contracting Officer. Items designated as scrap (agreed to by the Contracting Officer) shall be retained by the Contractor; its disposition shall be the responsibility of the Contractor. See Specification Section 01500, paragraph entitled "Scrap Material". Items designated as salvageable items (agreed to by the Contracting Officer) shall be turned over to the Government.

26. SAACONS 52.0236-4581 AVAILABILITY OF UTILITIES SERVICES (APR 1992)

All reasonably required amounts of water, electricity, and other utilities essential to contract performance will be made available to the contractor at no cost to the contractor from existing systems, outlets and supplies. All temporary connections, outlets and distribution lines, as may be required, shall be installed, maintained and removed by the Contractor at Contractor's expense; removal shall be before final acceptance of the work by the Government. The Contractor shall carefully conserve any utilities furnished without charge.

27. SAACONS 52.0236-4901 PARTNERING (MAR 1992)

The Government intends to encourage the foundation of a cohesive partnership with the Contractor and its subcontractors. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and intended to achieve completion within budget, on schedule, and in accordance with plans and specifications. This partnership would be bilateral in makeup, and participation will be totally voluntary. Any costs associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. To implement this partnership initiative it is anticipated that within 60 days of Notice to Proceed the Contractor's on-site project manager and the Government's Resident Engineer would attend a one or two-day partnership development seminar/team building workshop together with the Contractor's key on-site staff and key Government personnel. Follow-up workshops of 1 or 2 days duration would be held periodically throughout the duration of the contract as agreed to by the Contractor and the Government.

28. SAACONS 52.0244-4501 SUBSTITUTION OF KEY PERSONNEL AND SUBCONTRACTORS (JAN 1994)

The Contractor shall be limited to utilizing the key personnel and subcontractors during the performance of this contact which were identified in the Contractor's technical proposal accepted by the Government upon award of the contract unless prior Contracting Officer approval of the substitutions is obtained. The Contractor shall obtain the Contracting Officer's written consent before making any substitutions for key personnel or subcontractors by submitting in writing to the Contracting Officer the reasons for the substitutions and the qualifications of the persons or subcontractors. Provide the same level of detail on credentials and qualifications on the key personnel or subcontractor as was required by the solicitation. The key personnel or subcontractors which are proposed as substitutes must possess equal or greater qualifications than the individuals or subcontractors accepted with the award of the contract at no additional cost to the Government.

29. FAR 52.246-12 INSPECTION OF CONSTRUCTION (JUL 1986)

(a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components.

(b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.

(c) Government inspections and tests are for the sole benefit of the Government and do not--

(1) Relieve the Contractor of responsibility for providing adequate quality control measures;

(2) Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

(3) Constitute or imply acceptance; or

(4) Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) below.

(d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

(e) The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

(f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(g) If the Contractor does not promptly replace or correct rejected work, the Government may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed.

(h) If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

(i) Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

30. SUBMISSION OF CONSTRUCTION DRAWINGS, SPECIFICATIONS AND DESIGN ANALYSES:

30.1 The Contractor shall certify that all items submitted in the documents (after construction award) comply with STATEMENT OF WORK and perform a code analysis verifying that the design meets the UBC and NFPA requirements. The criteria specified in this Contract are binding contract criteria and in case of any conflict, after award, between the Contract and Contractor's submittals, the Contract will govern unless there is a written and signed agreement between the Contracting Officer and the Contractor waiving a specific requirement. This certification shall be included on each sheet of working drawings.

30.1.1 The Contractor shall be responsible for the professional quality, technical accuracy and coordination of all designs, drawings, specifications, and other design functions necessary for the Contractor to perform this contract. The Contractor shall without additional compensation, correct or revise any errors or deficiencies in its design, drawings, specifications, or other design function.

30.1.2 Neither the Government’s review, approval or acceptance of, nor any payment related to the design portion of this contract shall be construed as to operate as a waiver of any rights under this contract or any cause of action out of the performance of this contract.

30.2 Deviations from the Contract technical requirements will be considered and approved by the Contracting Officer.

30.3 The government has not supplied the topographic information required for the project. Any topographic information required by the Contractor for engineering of the contract shall be procured and paid for by the successful Proposer.

30.4 The Contractor shall verify field conditions which are significant, by field inspection, researching and obtaining all necessary as-built drawings and reproducing them for his own use as necessary, and discussing status with knowledgeable personnel. The information shall be reflected in the documents.

30.5 Based upon data provided in paragraph, FOUNDATION DESIGN under STATEMENT OF WORK, a preliminary soils and foundation report has been furnished to the contractor. The Contractor is responsible for undertaking a final soils and foundation report and designing the foundation acordingly at no additional expense to the Government.

30.6 Necessary drawings shall be in accordance with subsection DRAWING FORMAT in ATTACHMENTS and as specified herein. Drawing file number for the this project is **229-25-506** and specification number is **9923**. All drawings shall be digitized. Provide all digitized deliverables to the Corps of Engineers Technical Manager in AUTOCAD 14 compatible format. Media for deliverables shall be high density floppy disk or compact disc (C-D). Floppy disks or compact discs shall be furnished in addition to hard copy drawings.

30.6.1 Any necessary drawings shall be drawn on 24" x 36" format. Provide an index of drawings.

30.7 A compliance review shall be held at **Sacramento District** at the 100% completion stages of the final submittal. **A 65% submittal shall be required for an Over-The-Shoulder review. SEE ATTACHMENT NO. 9,(paragraph no. 4.0 and 5.0) for 65% and 100% submittal requirements for Comprehensive Interior Design Submittal Requirements.**

30.8 The submittal shall include the building design/site and utilities design. "For Review Only - 65% Buildings/Site/Utilities", accordingly; and each sheet of the drawings shall also be stamped. The backcheck submittal(s) after the Government reviews of the 65 percent complete buildings submittals and site and utilities shall be packaged and stamped "For Backcheck Review Only -65% Building/Site/Utility" each sheet of the drawings shall also be stamped.

30.9 The submittal shall include the building design/site and utilities design. "For Review Only - 100% Buildings/Site/Utilities", accordingly; and each sheet of the drawings shall also be stamped. The backcheck submittal(s) after the Government reviews of the 100 percent complete buildings submittals and site and utilities shall be packaged and stamped "For Backcheck Review Only -100% Building/Site/Utility" each sheet of the drawings shall also be stamped.

31. MATERIAL REQUIRED FOR SUBMITTAL (AFTER AWARD):

31.1 Drawings: All building drawings included in the Request for Proposal and drawings listed in paragraph 31.2 thru 31.3, shall be developed for coordination.
Drawings shall indicate the design or test number upon which the fire and sound rated separations are based.

31.2 Site

a. Demolition Plan: Scale 1:400

Show the following:

-- Existing Features
-- Features to be removed/relocated, (Including utilities)
-- Project boundaries

b. Overall Site Layout: Scale 1:400

Show the following:

-- Location of streets
-- Driveways
-- Parking
-- Walks

c. Site Grading, Drainage and Utility Plan: Scale 1:400

Show the following:

-- Existing topographical contours of 2-foot intervals
-- New topographical contours of 2-foot intervals
-- New spot elevations as necessary to construct project

d. Utility Plan: Scale 1:400

Show the following:

-- Existing underground and above ground utilities
-- New underground and above ground utilities

e. Landscaping Plan: Scale 1:250

Show the following:

-- Kind, size and quality of trees, shrubs and ground coverings
-- Kind, size and quality of site furnisings
-- Kind, size and quality of mulch areas
-- Kind, size and quality of lawn

f. Irrigation System Plan: Scale 1:250

g. Site Electrical Plan: Scale 1:250

Show the following:

-- Demolition of affected electrical and communications utility lines
-- Site lighting
-- Pad-mounted transformers
-- Location of primary supply point of take-off
-- Existing electrical and communication lines, both overhead and underground, properly identified
-- New construction and tie-in to electrical and communication distribution system

h. Off-Site Electrical Plan: Scale 1:250

NOTE: Drawings shall be dimensioned to show building separations, set back, etc.

31.3 Dormitory Building:

a. Floor Plans: Scale 1:100

Show the following:

-- Typical Dormitory Room Module (Scale 1:50)
-- Overall dimensions
-- Room description with dimensions and areas
-- Furniture layouts
-- Plumbing fixtures
-- Door swings
-- Furnace and hot water heater location
-- Vents
-- Calculated gross and net floor areas

b. Exterior Elevations: Scale 1:100

Show all sides of the **Dormitory** building complete with notes indicating the exterior finish materials shall be shown.

c. Interior Elevations: Scale 1:50

Show the following:

-- Bath Rooms
-- Kitchen/Dining of typical unit module
-- Lavatory of typical unit module

d. Building Cross Sections for **Dormitory:** Scale 1:100

Show the following:

-- Structural system
-- Building materials
-- Finishes
-- Vertical dimensions

e. Typical Wall Section: Scale 1:20

Show the following:

-- Typical wall
-- Foundation
-- Floor and roof section
-- Materials

f. Finish Schedule:

Show finish schedule of all rooms.

g. Mechanical Floor Plan: Scale 1:100

Show the following:

-- All equipment schedules
-- Fire protection riserlayout and room hazard classifications
-- Heating/cooling hydronic system
-- Plumbing waste and vent piping
-- Mechanical, plumbing and fire protection details

-- Plumbing riser diagram
-- Cold and Hot water piping
-- Air Conditioning equipment and duct work
-- Exhaust fans and ducts
-- Controls
-- EMCS(Energy Monitoring and Control System)

h. Power and Signal Floor Plans: Scale 1:100

Show the following:

-- Electrical legend and notes
-- Electrical power one-line diagrams
-- Location of service equipment and motor control center (if used)
-- Location of branch circuit and distribution panelboards
-- Location of motors or special mechanical equipment
-- Convenience outlet locations
-- Fire alarm riser diatrams
-- Fire alarm system device and equipment locations
-- Telephone data riser diagram including backboard details
-- Telephone data outlet locations
-- Cable television riser diagram
-- Cable television outlet locations

i. Lighting Floor Plans: Scale 1:100

Show the following:

-- Lighting fixture locations, properly labeled to show type of fixture. Include fixture schedule which indicates general fixture description, number and type of lamps, type of mounting, and any special features.
-- Switch locations
-- Exit and emergency lighting

j. Structural Drawings

Show the following:

-- Foundation Plan, legend and general notes, same scale as architectural floor plan.
-- Foundation details, scale as appropriate for clarity.
-- Floor plan, same scale as foundation plan.
-- Wall sections, Scale 1:20
-- Roof plan, same scale as floor plan.
-- Details, as appropriate for clarity.

31.4 Specifications: Specifications (based on information contained in STATEMENT OF WORK) for **Dormitory Building**, including index and trade sections. The specifications submitted by the Contractor shall be prepared using the RFP specifications as a basis. Paragraphs that are not applicable to the system or design used by the Contractor shall be replaced with “NOT APPLICABLE”. Paragraph numbers shall remain the same as in the RFP, to facilitate the Governments review of the design submittal.

31.5 **Comprehensive Interior Design:** Six (6) sets of samples of color chips showing color and pattern of materials proposed for interior and exterior finish materials, including floor, wall, and ceiling finishes, roofing, siding and trim shall be submitted to the Contracting Officer.

31.6 Design Analysis: Each design submittal shall include a design analysis as required to document and support the level of design. The required design analysis shall include design calculations developed to the extent required to support the design of that portion of utility distribution, structural, including seismic, electrical and mechanical systems included in this submittal.

Design analysis shall include complete site and design calculations for utility distribution systems, structural elements, electrical and mechanical systems, and roadway pavement and shoulder design. Complete site and Engineering calculations for utility distributions systems, structural elements and electrical and mechanical systems. Include computations for sizing equipment, air duct design, and U-factors for ceilings, roofs and exterior walls and floors.

31.7 Furnish mechanical and electrical plans, with complete schematics, to show all HVAC, Fire Protection, plumbing and electrical work.

31.7.1 Show the construction of fire and sound rated assemblies in detail and note on the drawings the tested design upon which the construction is based. Note any modification to materials or method of construction. Detail all penetrations of rated partitions.

31.7.2 All details shall be referenced to floor plans, elevations or sections.

31.7.3 Building Sections: Transverse and longitudinal sections (1:50) for all building types.

31.8 General Site Layout: Scale 1:400.

31.8.1 Site Grading and Drainage Plans: Site grading and drainage plans (1:400 scale), indicating the approximate drainage areas each will service. Include limits of landscaping and seeded areas. General site grading and drainage shall be indicated by contour lines with an interval of not more than 2 feet.

31.9 Sanitary Sewer: Sanitary sewer main plans and profiles showing location and elevation of pipe, thrust blocks, manholes, etc. Materials and construction of main and appurtenances shall be indicated. Specifications shall be provided.

31.10 Water: Water supply line plans and profiles showing locations of valves, thrust blocks, connections, etc. Materials shall be indicated and specifications shall be provided for valves, pipes, etc.

31.11 Specific Mechanical Requirements:

31.12.1 Required Plans, Diagrams, Schedules and Details on Unit Mechanical Drawings.

31.12.1.1 Mechanical Floor Plan (Scale 1:50): The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plan shall also show the following:

- Room Designations
- HVAC, Plumbing, and Fire Protection legends and applicable notes
- Location of all ductwork or piping (double line ductwork required)
- Location and capacity of all terminal units (i.e., registers, diffusers, grilles)
- Exhaust fan and range hood location Size of all ductwork and piping shown
- Thermostat location
- Location of heating plant
- Return air paths (i.e., undercut doors, transfer grilles)
- Flue piping - size and location
- Piping diagram for forced hot water system (if used)
- Fuel supply and return piping
- Fire Riser and Pump
- Room (fire) occupancy classifications
- Location of utility entrances
- Waste and water pipe location and size

31.12.2 Equipment Schedule Sheet: Complete equipment schedules shall be provided. Schedule shall also include:

Capacity
Electrical characteristics
Efficiency (if applicable)
Manufacturer's name
Any optional features to be provided
Physical size
Plumbing fixture designations and minimum connection sizes

31.12.3 Details: Construction details, sections, elevations, etc., shall be provided where required for clarification of methods and materials of design. All roof and exterior wall penetrations shall be detailed on the drawings. (Details shown on the arch. Sheets need to be repeated here.)

31.12.4 Equipment Schedule. Based on the results of calculations, provide a complete list of the materials and equipment proposed for HVAC, plumbing, and fire protection with the manufacturer's published cataloged product installation specifications and roughing-in data. The heating equipment data shall include the manufacturer's wiring diagrams, installation specifications, ARI certification, and the standard warranty for the equipment. In addition, provide the manufacturer's published cataloged capacities for supply diffusers as evidence that the arrangement of supply air outlets in each room will provide the throw and spread characteristics required to cover completely all exterior wall surfaces with the blanket of warm air at the proper design velocities.

31.12.5 Separate plumbing plans will not be required if sufficient information can be shown on the HVAC plans to meet the requirements shown above.

31.12.6 Submit calculations at submittal stages to determine correct main water supply to each unit and/or building.

31.13 Specific Electrical Requirements:

31.13.1 Required plans, diagrams and details on Site Electrical Drawings.

31.13.1.1 Electrical Site Plan (Scale: 1"=250): Show connections to existing electrical primary electrical and communication lines, along with routing of underground duct lines from connection points to new facility service entrance points. Show exterior lighting poles, walkway lighting bollards, and associated conduit routing. Show conduit routing to any exterior electrical loads such as exterior mechanical equipment and lighting circuits to exterior storage structures. Show location of fire alarm system post indicator valve supervisory switch.

31.13.1.2 Off-Site Primary Circuit Routing Plans (Scale 1:250) (If applicable).

31.13.1.3 Off-Site One Line Diagram (If applicable).

31.13.1.4 Off-Site Details (Aerial Pole Line Construction, etc.) (If applicable).

31.13.1.5 On-Site Electrical Distribution Plan (Scale: 1:250)

31.13.1.6 On-Site One Line Diagram

31.13.1.7 On-Site Distribution Transformer Schedule (with the following headings:)

- Transformer Designation
- Transformer Size (KVA)
- Building(s) Served
- Primary Phase(s) and Circuit to which connected.

31.13.1.8 On-Site Details (Site Lighting, Trenching, Pad-Mounted Transformer, etc.).

31.13.2 Required Plans, Diagrams, Schedules, and Details on Unit Electrical Drawings:

31.13.2.1 Electrical Legend. Provide an electrical legend with descriptions of s1mbols and abbreviations used on electrical drawings. Include symbols for lighting, switches, receptacles, panelboards and power equipment, circuiting, fire alarm system, exit alarm and monitoring system, closed circuit television system, and intercom system. As a contractor option, the electrical legend may be distibuted among the various electrical sheets where the respective symbols and abbreviations occur rather than be put on a stand alone Electrical Legend sheet.

31.13.2.2 Power and Signal Floor Plans (Scale 1:100): The floor plans shall show all principle architectural features of the building which will affect the electrical design. The floor plan shall also show the following:

- Room designations
- Applicable notes
- Location of all fire alarm system devices,

graphic annunciator panel, and control panel
- Location of all intercom system devices and central equipment
- Location of all closed circuit television system cameras, monitors, and equipment
- Location of door alarm devices and equipment
- Location of telephone outlets and telephone backboards
- All receptacles
- The location and designation of all panelboards. Plans should clearly indicate type of mounting required (flush or surface) and be reflected accordingly in specifications.
- Motor Control Center (If used)
- Service entrance (conduit and main disconnect including any sections or cabinets for current transformers and watthour demand meter)
- Location, designation and rating of all motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment.
- Show all necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.

31.13.2.3 Lighting Floor Plans (Scale 1:100): The floor plans shall show all principle architectural features of the building which will affect the electrical design. The floor plan shall also show the following:

- Room designations
- Applicable notes
- All lighting fixtures, properly identified
- All switches, photocells, lighting contactors, and time clocks for control of lighting
- The location and designation of all lighting panelboards. Plans should clearly indicate type of mounting required (flush or surface) and be reflected accordingly in specifications.

31.13.2.4 Power One-Line Diagram. Provide a one line or single line diagram (not a riser diagram) showing connection to existing overhead primary pole, underground primary to pad mount transformer, underground secondary to service entrance equipment, and all major equipment and panelboards. This shall include motor control center (if used), distribution and branch circuit panelboards, motors not fed by branch circuit panelboards, and conductor and conduit sizes to this equipment and devices. State number of phases, poles, wires, and voltage. State minimum percent impedance for transformers. Show ampere interrupting capacity for equipment.

31.13.2.5 Wiring Diagrams. Provide wiring diagrams for each of the following systems on the plans: telephone, closed circuit television (CCTV), intercom, fire alarm, and door alarm systems. Show locations only of service entrances,

major equipment, and devices on Power and Signal Floor Plan. Show these items along with wiring and conduit requirements on the wiring diagrams.

31.13.2.6 Panelboard Schedules: (Schedules shall indicate the following information:)

- Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting, AIC Rating).
- Branch Circuit Designations.
- Panel Connected Load, 10-20% Spare Capacity, Demand Load including spare capacity for each phase
- Circuit Breaker Characteristics (Number of Poles, Trip Rating, AIC Rating)
- Branch Circuit Connected Loads (AMPS).
- Any Special Features

31.13.2.7 Lighting Fixture Schedule: (Schedule shall indicate the following information:)

- Fixture Designation
- General Fixture Description
- Number and Type of Lamp(s)
- Type of Mounting
- Any Special Features
- Exterior Lighting Control Diagram(s) (Here or on a detail sheet)

31.13.2.8 Details: Construction details, sections, elevations, etc., shall be provided where required for clarification of methods and materials of design.

31.13.3 Required Electrical Design Analysis:

31.13.3.1 General: All necessary design and calculations for the electrical systems shall be performed by a licensed professional engineer, and shall be stamped as such. The design shall be a separate bound assembly, in one or more volumes, of all the functional and engineering criteria, design information, and calculations applicable to the project design. The analysis shall be organized in a format appropriate for review, approval, and record purposes. The design calculations shall be presented in a clear and legible form, with all methods and references identified, and all assumptions and conclusions explained.

31.13.3.2 Load Calculations

31.13.3.2.1 Demand load calculations shall be provided for Main Distribution Panelboard or Switchboard, Motor Control Center (if used), all distribution panelboards, all branch circuit panelboards, and dry-type transformers.. Include catalog cuts of the electrical data for the HVAC equipment that was selected by the mechanical designer.

31.13.3.3 Voltage Drop (VD) Calculations:

31.13.3.3.1 Select conductor sizes of site lighting circuits and calculate the VD for each circuit. (Maximum allowable VD = 3%).

31.13.3.3.2 Perform voltage drop calculations for service entrance conductors, feeders, and worst case branch circuits to meet requirements stated in STATEMENT OF WORK, Voltage Drop.

31.13.3.4 Short Circuit Calculations: Perform short circuit calculations to meet requirements stated in STATEMENT OF WORK, Equipment Interrupting Capacity.

31.13.3.5 Lighting Calculations: Perform lighting calculations for all interior rooms and for parking lot lighting areas. Include catalog cuts of lighting fixtures with their associated photometric data which were used to perform calculations. Fixtures used in calculations shall meet all fixture requirements shown in lighting fixture schedule and applicable industry or federal standards. These fixtures shall be the ones submitted for intended installation in the facility.

31.13.3.6 Battery Calculations: Perform substantiating battery calculations for fire alarm system supervisory and alarm power requirements. Ampere-hour requirements for each system component and each panel component, and the battery recharging period shall be included.

31.14 Specifications: Submit specifications for utilities, site work, and **Dormitory** Building.

31.15 Corrected Drawings and Specifications for Backcheck Review: After Government Review, Contractor shall submit copies of the corrected drawings and specifications and distribute to the agencies in the quantities listed in **paragraph,** TRANSMITTAL TO GOVERNMENT AGENCIES.

31.15 Submittals and Submittal Register, ENG FORM 4288: The Contractor shall complete and submit seven copies in accordance with Section 01300.
IN ADDITION TO STATEMENT OF WORK REQUESTED SUBMITTALS, CONTRACTOR SHALL PROVIDE ALL PRODUCT INFORMATION AND SAMPLES FOR MECHANICAL AND ELECTRICAL EQUIPMENT AND FIXTURES.

31.15 Consumer Information for Handicapped Requirements: The Contractor shall furnish a report including drawings in accordance with the Uniform Federal Accessibility Standards.

31.17 Reproduction and Distribution : Contractor shall provide for the reproduction and distribution of the submittal documents. All drawings distributed shall be 24"x36". Distribution shall be by USPS Express Mail. Distribution list and addresses are provided below. Contractor to provide copies of the transmittal letters to the Sacramento District Technical Manager.

32. TRANSMITTAL TO GOVERNMENT AGENCIES:

32.1 Government agencies shall receive submittal documents in accordance with the performance period requirements (SEE SECTION 00800). Transmittal letters shall indicate distribution by use of the "ATTN" code shown in the address. Document set shall include design analysis, one (1) 24"x36" and one (1) ea., calculations and specifications. One drawing set will be submitted where indicated below.

ACTIVITY ADDRESS	QUANTITY
US ARMY ENGINEER DISTRICT, SACRAMENTO ATTN: CESPK-ED-M, PM-AF (David Neff) 1325 J. STREET SACRAMENTO, CA. 95814-2922	11 SETSs
DEPARTMENT OF THE AIR FORCE ATTN: 99CES/CECF (Gary Faron) 6020 BEALE AVENUE NELLIS AFB, NV 89191-7260	10 SETS
US ARMY CORPS OF ENGINEERS LAS VEGAS RESIDENT OFFICE ATTN: CESPL-CO-NN (Bob Joyner) 5490 PEASE AVENUE, BLDG 1114 NELLIS AFB, NV 89191-0744	02 SETS
US ARMY CORPS OF ENGINEERS ARIZONA-NEVADA AREA OFFICE ATTN: CESPL-CO-AN (Fran Hartman-Behrens) 3636 N. CENTRAL AVENUE, SUITE 750 PHOENIX, AZ 85012-1936	01SET
US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT ATTN: SPL-PM-M (Phil Strayhorn) 911 WILSHIRE BOULEVARD LOS ANGELES, CA 90017-3401	02 SETS
DEPARTMENT OF THE AIR FORCE ATTN: ACC/CES (Dennis Long) CRESTAR BLDG. , 5TH FLOOR 11817 CANNON BLVD. NEWPORT NEWS, VA 23606-2558	01 SETS

DEPARTMENT OF THE AIR FORCE 01 SETS
38TH MSS/EGM
ATTN: MCP COORDINATOR
8745 ENTRANCE ROAD 'A'
TINKER AFB, OK 73145-3312

32.2 Government Compliance Review

32.2.1 Copies of comments, annotated with comment action agreed on, will be made available to all parties before the review conference adjourns. Unresolved problems will be resolved by immediate follow-on action at end of conferences.
On receipt of corrected submittal documents, the Sacramento District formally provide Government approval necessary to initiate construction. Withholding payment for unsatisfactory performance shall be made in accordance with CONTRACT CLAUSE, FAR 52.232-5, PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS. The Contractor shall submit to the Contracting Officer within five (5) calendar days, two (2) copies of a memorandum of the compliance review meeting summarizing major decision points and issues which requires resolution and the action office.

32.2.2 The Contractor shall submit corrected 100% submittal documents in the same quantity and to the same offices listed above in **paragraph**, TRANSMITTAL TO GOVERNMENT AGENCIES. Following the corrected submittal, the Contractor shall submit within seven (7) calendar days, six (06) complete sets of full size copies and , eleven (11) complete sets of half size of the submittal drawings and one reproducible set of complete full size drawings to the District (CESPK-ED) and eleven (11) copies of the specifications. All as-build drawings shall be digitized. Provide the corrected final submittal digitized deliverables to the Corps of Engineers Technical Manager in AUTOCAD 14 compatible format. High density floppy disk or compact discs (C-D). Floppy disks or compact discs shall be furnished in addition to hard copy drawings.

33. SAACONS 52.0239-4001 YEAR 2000 COMPLIANCE (Y2K) - CONSTRUCTION CONTRACTS (JUL 1998)

(a) In accordance with FAR 39.106, the Contractor shall ensure that with respect to any design, construction, goods, or services under this contract as well as any subsequent task/delivery orders issued under this contract (if applicable), all information technology contained therein shall be Year 2000 compliant. Specifically the Contractor shall:
(1) Perform, maintain, and provide an inventory of all major components to include structures, equipment, items, parts, and furnishings under this contract and each task/delivery order which may be affected by the Year 2000 compliance requirement.
(2) Indicate whether each component is currently Year 2000 compliant or requires an upgrade for compliance prior to Government acceptance.
(3) For any architect-engineering or design work included in this contract, the contractor shall insure that the hardware, firmware, software, and information technology systems separately or in combination with each other or other elements specified in the documents developed under this contract shall be year 2000 compliant in accordance with FAR 39.106.

34. FAR 52.219-14 LIMITATIONS ON SUBCONTRACTING (DEC 1996)

(a) This clause does not apply to the unrestricted portion of a partial set-aside.

(b) By submission of an offer and execution of a contract, the Offeror/Contractor agrees that in performance of the contract in the case of a contract for--

(1) Services (except construction). At least 50 percent of the cost of contract performance incurred for personnel shall be expended for employees of the concern.

(2) Supplies (other than procurement from a non-manufacturer of such supplies). The concern shall perform work for at least 50 percent of the cost of manufacturing the supplies, not including the cost of materials.

(3) General construction. The concern will perform at least 15 percent of the cost of the contract, not including the cost of materials, with its own employees.

(4) Construction by special trade contractors. The concern will perform at least 25 percent of the cost of the contract, not including the cost of materials, with its own employees.

--End of Section--

ATTACHMENTS

ATTACHMENTS

1. GENERAL WAGE DECISION

2. DD FORM 2051, APPLICATION FOR COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE - SEE SECTION 00100, DFARS 252.204-7001. COMPLETE SECTION B, BLOCKS 1 THROUGH 10, OF THE DD FORM 2051 AND RETURN WITH BID/COST PROPOSAL IF YOU DO NOT ALREADY HAVE A CAGE CODE.

   IF YOU HAVE BEEN AWARDED A DOD CONTRACT WITHIN THE PAST SEVERAL YEARS, THE OFFICE THAT MADE THE AWARD WILL PROBABLY HAVE YOUR CAGE CODE NUMBER IN THEIR DATA BASE. (SACRAMENTO DISTRICT WILL NOT HAVE INFORMATION ON LOS ANGELES DISTRICT AWARDS AND VICE VERSA.) IF YOU DO NOT KNOW YOUR CAGE CODE NUMBER, SUBMIT THE DD FORM 2051 WITH YOUR BID/PROPOSAL. PLEASE DO NOT SEND THE DD FORM 2051 AHEAD OF TIME. BE SURE THAT YOU USE A STREET ADDRESS FOR YOUR FIRM, NOT A POST OFFICE BOX.

   DO NOT UNDER ANY CIRCUMSTANCES DELAY SUBMITTING YOUR BID OR PROPOSAL WHILE ATTEMPTING TO OBTAIN A CAGE CODE NUMBER OR INFORMATION ON HOW TO COMPLETE THE DD FORM 2051. FAILURE TO FURNISH A CAGE CODE NUMBER OR THE FORM WILL NOT RENDER YOUR BID/PROPOSAL NONRESPONSIVE.

   IN ORDER TO FILL IN THE STANDARD INDUSTRIAL CLASSIFICATION (SIC) NUMBER AS REQUIRED BY THE DD FORM 2051, YOU WILL FIND THE SIC CODE FOR THIS SOLICITATION IN SECTION 00600, FAR 52.219-1. TO LIST OTHER SIC CODES YOUR FIRM IS ALSO IN THE BUSINESS TO PROVIDE, THE STANDARD INDUSTRIAL CLASSIFICATION MANUAL IS SOLD BY THE NATIONAL TECHNICAL INFORMATION SERVICE, 5285 PORT ROYAL ROAD, SPRINGFIELD, VIRGINIA 22161. THE ORDER NUMBER IS PB 87-100012.

3. PREAWARD SURVEY - SEE SECTION 00100, SAACONS 52.0209-4501 AND SAACONS 52.0215-4550. COMPLETE AND RETURN WITH COST PROPOSAL.

4. SAMPLE SUBCONTRACTING PLAN - SEE SECTION 00100, SAACONS 52.0215-4540, SAACONS 52.215-4547, AND SAACONS 52.0219-4581; SECTION 00800, FAR 52.219-9, AND SAACONS 52.0219-4509. COMPLETE AND RETURN WITH PRICE/COST PROPOSAL IF YOUR FIRM IS A LARGE BUSINESS AND YOUR CONTRACT PRICE IS OVER $1 MILLION. SUBCONTRACTING PLAN IS NOT REQUIRED FROM SMALL BUSINESSES. SEE SECTION 00100, SAACONS 52.0215-4547, FOR AN EXPLANATION OF THE GOVERNMENT'S EVALUATION TO DETERMINE ACCEPTABILITY OF THE SUBCONTRACTING PLAN.

5. PROPOSAL COVER SHEET (SEE FAR 52.215-1, SECTION 00100)

6. COMPLIANCE STATEMENT - COMPLETE AND RETURN WITH TECHNICAL PROPOSAL.

7. DRAWING FORMAT

8. LIST OF DRAWINGS

9. COMPREHENSIVE INTERIOR DESIGN REQUIREMENTS SUBMITTAL REQUIREMENTS

10. FURNITURE QUALITY REQUIREMENTS

11. GEOTECHNICAL REPORT

ATTACHMENT NO. 1
GENERAL WAGE DECISION

General Decision Number NV980001

General Decision Number NV980001
Superseded General Decision No. NV970001
State: Nevada
Construction Type:
BUILDING
County(ies):
WASHOE
BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	02/13/1998
1	03/13/1998
2	08/14/1998
3	08/21/1998
4	08/28/1998

COUNTY(ies):
WASHOE

BRNV0001C 07/01/1998

	Rates	Fringes
BRICKLAYERS	19.60	3.60

CARP0971D 10/01/1995

	Rates	Fringes
CARPENTERS:		
(Including Metal Stud Framing , Batt Insulation and Cabinet Installer; Excluding Drywall hanging & Acoustical Ceiling)	19.50	6.45

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CARP0971H 10/01/1993

	Rates	Fringes
SOFT FLOOR LAYERS	18.25	6.20

ELEC0401D 06/01/1998

	Rates	Fringes
ELECTRICIANS:		
Electricians	23.00	5.70+3%
Cables Splicers	25.50	5.70+3%

ELEV0008B 08/01/1997

	Rates	Fringes
ELEVATOR MECHANIC	30.185	6.405+a

FOOTNOTE:
a. Employer contributes 8% basic hourly rate for over 5 years service and 6% basic hourly rate for 6 months to 5 years service as Vacation Pay Credit. Seven Paid Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Friday after Thanksgiving Day; Christmas Day.

ENGI9993L 07/01/1998

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
GROUP 1:	24.58	7.86
GROUP 2:	25.32	7.86
GROUP 3:	25.62	7.86
GROUP 4:	25.79	7.86
GROUP 5:	26.04	7.86
GROUP 6:	26.63	7.86
GROUP 7:	26.95	7.86
GROUP 8:	27.30	7.86
GROUP 9:	27.49	7.86
GROUP 10:	27.73	7.86
GROUP 11:	29.37	7.86
GROUP 12:	30.18	7.86

CLASSIFICATIONS

GROUP 1: Bobcat or similar loader (1/4 cu. yd. or less); Screedman (except asphaltic or concrete paving).
GROUP 2: Skip loader (under 1 cu. yd.)
GROUP 3: Screedman (barber-green and similar) asphaltic or

concrete paving.
GROUP 4: Roller (except asphalt); Snooper crane.
GROUP 5: Roller operator (asphalt); Truck type loader.
GROUP 6: Dozer operator, Loader (up to and including 2-1/2 cu. yds.; Tractor-drawn scraper.
GROUP 7: Combination backhoe and loader (up to and including 3/8 yd.; Track-laying earthmoving machine (single engine with tandem scrapers).
GROUP 8: Bridge crane; Euclid loader and similar types; Loader (over 2-1/2 cu. yds. up to and including 4 cu. yds.; Rubber-tired scraper, self loading; Single-engine scraper (over 35 cu. yds.); Whirley crane (up to and including 25 tons).
GROUP 9: Backhoe (up to and including 1 cu. yd. hydraulic and cable); Cranes (not over twenty five (25) tons hammerhead and gantry); Finish blade; Motor Patrol; Cranes (up to and including 1 cu. yd.), Rubber-tired scraper, self loading (twin engine).
GROUP 10: Cranes (over 25 tons); Euclid loaders when controlled from pullcat; Loader (over 4 cu. yds. up to and including 12 cu. yds.); Muti-engine scrapers (when used to pull); Backhoes (over 1 cu. yd. and up to and including 7 cu. yds. M.R.C., Tandem scrapers); Tower cranes mobile (including rail mounted); Truck mounted hydraulic crane when remote control equipped (over 10 tons up to and including 25 tons); Universal Liebher and tower cranes (and similar types); Whirley cranes (over 25 tons).
GROUP 11: Loaders (over 12 cu. yds.); Backhoes (over 7 cu. yds. M.R.C.).
GROUP 12: Holland loader or similar or loader (over 18 cu. yds.)

IRON0001J 07/01/1997

	Rates	Fringes
IRONWORKERS: (Including Metal Roof Installation, Structural, Onamental and Reforcing)	22.68	13.17

LABO0169A 10/01/1997

	Rates	Fringes
PLASTER HOD CARRIERS	18.81	4.00
GUN TENDER	19.41	4.00

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* LABO0169D 07/01/1998

	Rates	Fringes
BRICK HOD CARRIER	17.53	4.12

LABO0169H 10/01/1997

	Rates	Fringes
GROUP 1	17.60	4.37
GROUP 2	17.70	4.37
GROUP 3	17.85	4.37
GROUP 4	18.10	4.37
GROUP 5	12.44	4.37

LABORER CLASSIFICATIONS
GROUP 1: General laborers

GROUP 2: Concrete worker (all work not listed in group 3)
Group 3: Air tool operators, asphalt workers, sandblaster, concrete saw, grinding, jackhammer, compactor (all types), concrete pump.
GROUP 4: Pipelayer
GROUP 5: Landscaper

PAIN0567D 01/01/1998

	Rates	Fringes
PAINTERS:		
Brush & Roller	18.73	4.34
Spray	19.23	4.34

PAIN0767B 07/01/1997

	Rates	Fringes
GLAZIERS	22.16	7.88

PLAS0241D 10/01/1997

	Rates	Fringes
CEMENT MASONS (Including cement finishing)	17.02	7.10

PLAS0241E 10/01/1997

	Rates	Fringes
PLASTERERS	18.12	4.05

PLUM0350F 08/01/1998

	Rates	Fringes
PLUMBERS (Except HVAC Piping)	22.95	9.20

SFNV0669B 04/01/1997

	Rates	Fringes
SPRINKLER FITTERS	25.20	6.30

SHEE0026B 07/01/1998

	Rates	Fringes
SHEET METAL WORKERS (Excluding HVAC Ductwork)	23.93	7.97

SUNV1007A 07/08/1995

	Rates	Fringes
CARPENTERS:		
Acoustical Ceilings	16.95	
Drywall Hangers	15.48	
HVAC-HEATING & A/C MECHANIC (Piping Only)	14.00	
SHEET METAL WORKER:		
HVAC Ductwork	11.50	.50

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

ATTACHMENTS

ATTACHMENTS

1. GENERAL WAGE DECISION

2. DD FORM 2051, APPLICATION FOR COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE - SEE SECTION 00100, DFARS 252.204-7001. COMPLETE SECTION B, BLOCKS 1 THROUGH 10, OF THE DD FORM 2051 AND RETURN WITH BID/COST PROPOSAL IF YOU DO NOT ALREADY HAVE A CAGE CODE.

   IF YOU HAVE BEEN AWARDED A DOD CONTRACT WITHIN THE PAST SEVERAL YEARS, THE OFFICE THAT MADE THE AWARD WILL PROBABLY HAVE YOUR CAGE CODE NUMBER IN THEIR DATA BASE. (SACRAMENTO DISTRICT WILL NOT HAVE INFORMATION ON LOS ANGELES DISTRICT AWARDS AND VICE VERSA.) IF YOU DO NOT KNOW YOUR CAGE CODE NUMBER, SUBMIT THE DD FORM 2051 WITH YOUR BID/PROPOSAL. PLEASE DO NOT SEND THE DD FORM 2051 AHEAD OF TIME. BE SURE THAT YOU USE A STREET ADDRESS FOR YOUR FIRM, NOT A POST OFFICE BOX.

   DO NOT UNDER ANY CIRCUMSTANCES DELAY SUBMITTING YOUR BID OR PROPOSAL WHILE ATTEMPTING TO OBTAIN A CAGE CODE NUMBER OR INFORMATION ON HOW TO COMPLETE THE DD FORM 2051. FAILURE TO FURNISH A CAGE CODE NUMBER OR THE FORM WILL NOT RENDER YOUR BID/PROPOSAL NONRESPONSIVE.

   IN ORDER TO FILL IN THE STANDARD INDUSTRIAL CLASSIFICATION (SIC) NUMBER AS REQUIRED BY THE DD FORM 2051, YOU WILL FIND THE SIC CODE FOR THIS SOLICITATION IN SECTION 00600, FAR 52.219-1. TO LIST OTHER SIC CODES YOUR FIRM IS ALSO IN THE BUSINESS TO PROVIDE, THE STANDARD INDUSTRIAL CLASSIFICATION MANUAL IS SOLD BY THE NATIONAL TECHNICAL INFORMATION SERVICE, 5285 PORT ROYAL ROAD, SPRINGFIELD, VIRGINIA 22161. THE ORDER NUMBER IS PB 87-100012.

3. PREAWARD SURVEY - SEE SECTION 00100, SAACONS 52.0209-4501 AND SAACONS 52.0215-4550. COMPLETE AND RETURN WITH COST PROPOSAL.

4. SAMPLE SUBCONTRACTING PLAN - SEE SECTION 00100, SAACONS 52.0215-4540, SAACONS 52.215-4547, AND SAACONS 52.0219-4581; SECTION 00800, FAR 52.219-9, AND SAACONS 52.0219-4509. COMPLETE AND RETURN WITH PRICE/COST PROPOSAL IF YOUR FIRM IS A LARGE BUSINESS AND YOUR CONTRACT PRICE IS OVER $1 MILLION. SUBCONTRACTING PLAN IS NOT REQUIRED FROM SMALL BUSINESSES. SEE SECTION 00100, SAACONS 52.0215-4547, FOR AN EXPLANATION OF THE GOVERNMENT'S EVALUATION TO DETERMINE ACCEPTABILITY OF THE SUBCONTRACTING PLAN.

5. PROPOSAL COVER SHEET (SEE FAR 52.215-1, SECTION 00100)

6. COMPLIANCE STATEMENT - COMPLETE AND RETURN WITH TECHNICAL PROPOSAL.

7. DRAWING FORMAT

8. LIST OF DRAWINGS

9. COMPREHENSIVE INTERIOR DESIGN REQUIREMENTS SUBMITTAL REQUIREMENTS

10. FURNITURE QUALITY REQUIREMENTS

11. GEOTECHNICAL REPORT

ATTACHMENT NO. 1
GENERAL WAGE DECISION

General Decision Number NV980001

General Decision Number NV980001
Superseded General Decision No. NV970001
State: Nevada
Construction Type:
BUILDING
County(ies):
WASHOE
BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	02/13/1998
1	03/13/1998
2	08/14/1998
3	08/21/1998
4	08/28/1998

COUNTY(ies):
WASHOE

BRNV0001C 07/01/1998

	Rates	Fringes
BRICKLAYERS	19.60	3.60

CARP0971D 10/01/1995

	Rates	Fringes
CARPENTERS:		
(Including Metal Stud Framing , Batt Insulation and Cabinet Installer; Excluding Drywall hanging & Acoustical Ceiling)	19.50	6.45

,

CARP0971H 10/01/1993

	Rates	Fringes
SOFT FLOOR LAYERS	18.25	6.20

ELEC0401D 06/01/1998

	Rates	Fringes
ELECTRICIANS:		
Electricians	23.00	5.70+3%
Cables Splicers	25.50	5.70+3%

ELEV0008B 08/01/1997

	Rates	Fringes
ELEVATOR MECHANIC	30.185	6.405+a

FOOTNOTE:
a. Employer contributes 8% basic hourly rate for over 5 years service and 6% basic hourly rate for 6 months to 5 years service as Vacation Pay Credit. Seven Paid Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Friday after Thanksgiving Day; Christmas Day.

ENGI9993L 07/01/1998

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
GROUP 1:	24.58	7.86
GROUP 2:	25.32	7.86
GROUP 3:	25.62	7.86
GROUP 4:	25.79	7.86
GROUP 5:	26.04	7.86
GROUP 6:	26.63	7.86
GROUP 7:	26.95	7.86
GROUP 8:	27.30	7.86
GROUP 9:	27.49	7.86
GROUP 10:	27.73	7.86
GROUP 11:	29.37	7.86
GROUP 12:	30.18	7.86

CLASSIFICATIONS

GROUP 1: Bobcat or similar loader (1/4 cu. yd. or less); Screedman (except asphaltic or concrete paving).
GROUP 2: Skip loader (under 1 cu. yd.)
GROUP 3: Screedman (barber-green and similar) asphaltic or

concrete paving.
GROUP 4: Roller (except asphalt); Snooper crane.
GROUP 5: Roller operator (asphalt); Truck type loader.
GROUP 6: Dozer operator, Loader (up to and including 2-1/2 cu. yds.; Tractor-drawn scraper.
GROUP 7: Combination backhoe and loader (up to and including 3/8 yd.; Track-laying earthmoving machine (single engine with tandem scrapers).
GROUP 8: Bridge crane; Euclid loader and similar types; Loader (over 2-1/2 cu. yds. up to and including 4 cu. yds.; Rubber-tired scraper, self loading; Single-engine scraper (over 35 cu. yds.); Whirley crane (up to and including 25 tons).
GROUP 9: Backhoe (up to and including 1 cu. yd. hydraulic and cable); Cranes (not over twenty five (25) tons hammerhead and gantry); Finish blade; Motor Patrol; Cranes (up to and including 1 cu. yd.), Rubber-tired scraper, self loading (twin engine).
GROUP 10: Cranes (over 25 tons); Euclid loaders when controlled from pullcat; Loader (over 4 cu. yds. up to and including 12 cu. yds.); Muti-engine scrapers (when used to pull); Backhoes (over 1 cu. yd. and up to and including 7 cu. yds. M.R.C., Tandem scrapers); Tower cranes mobile (including rail mounted); Truck mounted hydraulic crane when remote control equipped (over 10 tons up to and including 25 tons); Universal Liebher and tower cranes (and similar types); Whirley cranes (over 25 tons).
GROUP 11: Loaders (over 12 cu. yds.); Backhoes (over 7 cu. yds. M.R.C.).
GROUP 12: Holland loader or similar or loader (over 18 cu. yds.)

IRON0001J 07/01/1997

	Rates	Fringes
IRONWORKERS: (Including Metal Roof Installation, Structural, Onamental and Reforcing)	22.68	13.17

LABO0169A 10/01/1997

	Rates	Fringes
PLASTER HOD CARRIERS	18.81	4.00
GUN TENDER	19.41	4.00

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* LABO0169D 07/01/1998

	Rates	Fringes
BRICK HOD CARRIER	17.53	4.12

LABO0169H 10/01/1997

	Rates	Fringes
GROUP 1	17.60	4.37
GROUP 2	17.70	4.37
GROUP 3	17.85	4.37
GROUP 4	18.10	4.37
GROUP 5	12.44	4.37

LABORER CLASSIFICATIONS
GROUP 1: General laborers

GROUP 2: Concrete worker (all work not listed in group 3)
Group 3: Air tool operators, asphalt workers, sandblaster, concrete saw, grinding, jackhammer, compactor (all types), concrete pump.
GROUP 4: Pipelayer
GROUP 5: Landscaper

PAIN0567D 01/01/1998

	Rates	Fringes
PAINTERS:		
Brush & Roller	18.73	4.34
Spray	19.23	4.34

PAIN0767B 07/01/1997

	Rates	Fringes
GLAZIERS	22.16	7.88

PLAS0241D 10/01/1997

	Rates	Fringes
CEMENT MASONS (Including cement finishing)	17.02	7.10

PLAS0241E 10/01/1997

	Rates	Fringes
PLASTERERS	18.12	4.05

PLUM0350F 08/01/1998

	Rates	Fringes
PLUMBERS (Except HVAC Piping)	22.95	9.20

SFNV0669B 04/01/1997

	Rates	Fringes
SPRINKLER FITTERS	25.20	6.30

SHEE0026B 07/01/1998

	Rates	Fringes
SHEET METAL WORKERS (Excluding HVAC Ductwork)	23.93	7.97

SUNV1007A 07/08/1995

	Rates	Fringes
CARPENTERS:		
Acoustical Ceilings	16.95	
Drywall Hangers	15.48	
HVAC-HEATING & A/C MECHANIC (Piping Only)	14.00	
SHEET METAL WORKER:		
HVAC Ductwork	11.50	.50

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

ATTACHMENT NO. 2
DD FORM 2051

REQUEST FOR ASSIGNMENT OF A COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE

(See Instructions on Reverse)

Form Approved
OMB No. 0704-0225
Expires May 31, 1990

SECTION A - TO BE COMPLETED BY INITIATOR

1. REQUESTING GOVERNMENT AGENCY / ACTIVITY

a. NAME: Activity Code: 369

b. ADDRESS (Street, City, State and Zip Code): Corps of Engineers, 1325 J Street, Rm 878, Sacramento, CA 95814-2922

2. TYPE CODE REQUESTED (X one)		3. EXCEPTION CODES
	a. TYPE A	a. CAO
X	b. TYPE F	b. ADP

4. INITIATOR

a. TYPED NAME (Last, First, Middle Initial)	b. OFFICE SYMBOL	c. SIGNATURE	d. TELEPHONE NO.
MILLER, RONALD J.	CESPK-CT	Ronald J. Miller	(916) 557-5205

SECTION B - TO BE COMPLETED BY FIRM TO BE CODED

1. FIRM DO NOT USE A P.O. BOX ADDRESS!!!

a. NAME (Include Branch of, Division of, etc.)

b. ADDRESS (Street, City, State and Zip Code)

c. CAGE CODE (If previously assigned)

2. IF FIRM PREVIOUSLY OPERATED UNDER OTHER NAME(S) OR OTHER ADDRESS(ES) SPECIFY THE PREVIOUS NAME(S) AND/OR ADDRESS(ES) (Use separate sheet of paper, if necessary)

3. PARENT COMPANY AND AFFILIATED FIRMS (X one, and complete as applicable)

- [ ] a. NONE
- [ ] b. CURRENTLY AFFILIATED WITH OTHER FIRMS (List name(s) and address(es) of such firms on a separate sheet of paper)
- [ ] c. PREVIOUSLY AFFILIATED WITH OTHER FIRMS (List name(s) and address(es) of such firms on a separate sheet of paper)

4. PRIMARY BUSINESS CATEGORY (X one)

- [ ] a. MANUFACTURER
- [ ] b. DEALER / DISTRIBUTOR
- [ ] c. CONSTRUCTION FIRM
- [ ] d. SERVICE COMPANY
- [ ] e. SALES OFFICE
- [ ] f. OTHER (Specify)

5. DISADVANTAGED SMALL BUSINESS STATUS (X one)

- [ ] a. APPROVED BY SMALL BUSINESS ADMINISTRATION (SBA) FOR SECTION 8(a) PROGRAM
- [ ] b. OTHER DISADVANTAGED SMALL BUSINESS FIRM
- [ ] c. NOT DISADVANTAGED SMALL BUSINESS FIRM

6. NUMBER OF EMPLOYEES

7. WOMAN OWNED BUSINESS (X one)

- [ ] a. YES
- [ ] b. NO

8. STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODE(S)

a. PRIMARY

b. OTHER (Specify)

SOLICITATION NUMBER: DACA 05-98-R-0060

CONTRACT SPECIALIST: LOS ANGELES PROJECT

10. FIRM OFFICIAL

a. TYPED NAME (Last, First, Middle Initial)	b. DATE SIGNED (YYMMDD)	c. SIGNATURE	d. TELEPHONE NO.

INSTRUCTIONS FOR COMPLETING DD FORM 2051

GENERAL NOTE FOR PERSONNEL PREPARING OR PROCESSING THIS REPORT

Coding must be as indicated in the instructions. In cases where specific coding instructions are provided, reference must be made to the Department of Defense Manual for Standard Data Elements, DoD 5000.12-M. Noncompliance with either the coding instructions contained herein or those published in referenced manual will make the organization which fails to comply responsible for required concessions in data base communication.

SPECIFIC INSTRUCTIONS

SECTION A - TO BE COMPLETED BY THE INITIATING GOVERNMENT ACTIVITY

Item 1: Self-explanatory.

Item 2: Mark the type of code being requested.

a. Type A - Manufacturers Code which is used in the Federal Catalog System to identify a certain facility at a specific location which is a possible source for the manufacture and/or design control of items cataloged by the Federal Government; or,

b. Type F - Non-manufacturers Code which is required for identifying an organization/ function in MILSCAP. These are assigned to contractors which are non-manufacturers or are manufacturers not qualifying for a Type A Code.

Item 3: If applicable, enter the exception DoD Activity Address Code for the Servicing Contract Administration Office (CAO) or ADP point.

Item 4: Self-explanatory.

SECTION B - TO BE COMPLETED BY THE FIRM TO WHICH THE CODE WILL BE ASSIGNED

Items 1a and 1b: Self-explanatory.

Item 1c: If a CAGE Code (Type A or Type F) was previously assigned, enter it in this block.

Item 2: Self-explanatory.

Item 3: If a block other than "None" is marked, identify the Parent company by a (P) beside the firm name.

SECTION B - *(Continued)*

Item 4: Self-explanatory.

Item 5: A disadvantaged business firm is defined as a firm that is 51%, or more, owned, controlled, and operated by a person(s) who is socially and economically disadvantaged. "Controlled" is defined as exercising the power to make policy decisions. "Operated" is defined as actively involved in the day-to-day management of the firm.

Item 6: Enter the number of employees. This number should include the employees of all affiliates.

Item 7: A woman-owned business is defined as a firm that is 51%, or more, owned, controlled, and operated by a woman or women. "Controlled" and "Operated" are as defined in Item 5.

Item 8: The SIC Code is a Government Index used to identify business activity and indicates the function (manufacturer, wholesaler, retailer, or service) and the line of business in which the company is engaged. If multiple SIC Codes, indicate the primary first, next important, etc.

Items 9 and 10: Self-explanatory.

NOTE: When any future changes are made to the coded facility; i.e., name change, location change, business sold or operations discontinued, etc., written notification stating the appropriate change should be sent to:

Commander
Defense Logistics Services Center
ATTN: DLSC-SBB
Federal Center
74 North Washington
Battle Creek, MI 49017-3084
(616) 961-4358 FAX (616) 961-4265

☆U.S. Government Printing Office: 1989-242-450/90225

ATTACHMENT NO. 3
PREAWARD SURVEY

PREAWARD SURVEY OF PROSPECTIVE CONTRACTORS
CONSTRUCTION CONTRACTS

It is the general policy of the Department of Defense that contracts shall be awarded only to contractors determined to be responsible in accordance with Part 9 of the Federal Acquisition Regulation (FAR).

No contract shall be awarded to any person or firm unless the Contracting Officer first makes an affirmative determination that the prospective contractor is responsible within the meaning of the FAR, Part 9.

Before making a determination of responsibility, the Contracting Officer shall have in his/her possession or obtain information sufficient to satisfy himself/herself that a prospective contractor currently meets the minimum FAR Part 9 standards.

In order to make the required determination and also to expedite the contract award, the following information must be submitted by the Contractor as directed (see Section 00100, SAACONS 52.0209-4501):

A. COMPLETED CONTRACTOR EXPERIENCE DATA FORM WITH SUPPLEMENTAL SCHEDULES A-D (ATTACHED).

B. LATEST FINANCIAL STATEMENTS. IF THE FINANCIAL STATEMENT IS MORE THAN 60 DAYS OLD, SUBMIT A CERTIFICATE STATING THAT THE FIRM’S FINANCIAL CONDITION IS SUBSTANTIALLY THE SAME, OR, IF NOT THE SAME, STATE THE CHANGES THAT HAVE TAKEN PLACE.

C. PROVIDE LETTERS FROM BANKS OR OTHER FINANCIAL INSTITUTIONS WITH WHICH THE CONTRACTOR CONDUCTS BUSINESS. THE LETTERS SHOULD CONTAIN INFORMATION ABOUT YOUR FIRM’S ACCOUNTS, LOANS, LINES OF CREDIT, ETC., PROVIDING INFORMATION LEADING TO A DETERMINATION THAT YOUR FIRM IS "RESPONSIBILE" AS DEFINED IN THE FEDERAL ACQUISITION REGULATION, PART 9, "HAS THE FINANCIAL RESOURCES TO PERFORM THE CONTRACT OR THE ABILITY TO OBTAIN THEM". THE GOVT IS INTERESTED IN FINANCIAL STABILITY, TIMELY PAYMENTS, THE LENGTH AND NATURE OF THE RELATIONSHIP BETWEEN THE FIRM AND THE FINANCIAL INSTITUTION, ETC. WHICH REVEALS THE FIRM’S FINANCIAL ABILITY TO PERFORM THE CONTRACT. THE LETTERS SHOULD ALSO PROVIDE THE NAME AND TELEPHONE NUMBER OF THE BANK REPRESENTATIVE THE GOVERNMENT MAY CONTACT.

BE SURE TO INCLUDE IN YOUR PREAWARD SURVEY, INFORMATION ON ANY CONTRACTS YOU HAVE HAD WITH THE SACRAMENTO DISTRICT OR LOS ANGELES DISTRICT, CORPS OF ENGINEERS, WITHIN THE LAST 12 MONTHS.

THESE DOCUMENTS SHALL BE TREATED BY THE GOVERNMENT AS CONFIDENTIAL.

CONSTRUCTION CONTRACTOR EXPERIENCE DATA

DATE (Day, Month, Year)

1. FIRM NAME

2. MAIN OFFICE ADDRESS (Street, City, State and Telephone)

3. BRANCH OFFICES

4. SERVICES RENDERED
☐ CONSTRUCTION
☐ DESIGN ☐ CONSULTANT

5. ORGANIZATION
☐ INDIVIDUAL ☐ JOINT VENTURE
☐ PARTNERSHIP ☐ CORPORATION

6. DATE ORGANIZED

7. DATE INCORPORATED AND STATE

8. NAMES OF OFFICERS AND OTHER KEY PERSONNEL

I – PRESENT PAYROLL PERSONNEL (List Number of Each Category Below)

PARTNERS	OFFICERS	OTHER KEY	REMAINDER	TOTAL	SUBTOTAL PERMANENT	MAXIMUM PERSONNEL AT ANY TIME
						DATE _____

II – EQUIPMENT OWNED

PRESENT VALUE ($)	ACQUISITION COST ($)

III – FINANCIAL DATA AS OF (Date) _____

CURRENT ASSETS	CURRENT LIABILITIES	NET WORTH

IV – TOTAL CONTRACT VALUE OF CONSTRUCTION AND DEMOLITION IN PAST SIX YEARS EXCLUSIVE OF JOINT VENTURE

19	$
19	$
19	$
19	$
19	$
19	$
AVERAGE ANNUAL $ INCOME	

LARGEST JOB IN PAST SIX YEARS

CONTRACT AMOUNT	DATE

DESCRIPTION

OWNER

V – LARGEST JOB EVER CONTRACTED (If Other Than In Past Six Years)

CONTRACT AMOUNT	DATE

DESCRIPTION

OWNER

VI – TYPE OF WORK IN WHICH FIRM SPECIALIZES

VII – TYPE OF WORK AND ACCEPTABLE LOCATIONS FOR WHICH FIRM DESIRES TO BE CONSIDERED

VIII – COST-REIMBURSEMENT TYPE CONTRACTS

AGENCY OR OWNER	DATE	DESCRIPTION	AMOUNT

TYPED NAME AND POSITION OR TITLE OF PERSON SIGNING

SIGNATURE

NOTE: Use reverse side for remarks, explanations, or detailed description of items reported above.

SCHEDULE A

CONSTRUCTION CONTRACTOR EXPERIENCE DATA

EXISTING COMMITMENTS: (List below the construction projects your firm has under way on this date, including those on which you are presently low bidder but have not received an award.)

CONTRACT NUMBER AND AMOUNT	DESCRIPTION OF WORK	FOR WHOM PERFORMED*	PERCENT COMPLETE	PERCENT SUBLET

* PROVIDE NAME OF ORGANIZATION, POINT OF CONTACT AND TELEPHONE NUMBER FOR CONTACT.

SCHEDULE B

CONSTRUCTION CONTRACTOR EXPERIENCE DATA

EXPERIENCE DATA: (List below the principal construction projects your firm has completed within the past six (6) years.)

CONTRACT NO.	AMOUNT	DESCRIPTION/LOCATION	CONTACT PERSON/PHONE NO	PERCENT SUBLET

SCHEDULE C

CONSTRUCTION CONTRACTOR EXPERIENCE DATA

CONSTRUCTION AND/OR TECHNICAL EQUIPMENT: (List total equipment and facilities owned for performing the work and present status as to whether or not it is committed to existing contracts.)

QUANTITY	DESCRIPTION	CONDITION	YEARS OF SERVICE	PRESENT STATUS

SCHEDULE D

CONSTRUCTION CONTRACTOR EXPERIENCE DATA

TO BE COMPLETED IF PROPOSED MILITARY CONSTRUCTION CONTRACT EXCEEDS $1,000,000.

A. Each contract awarded within the preceding three-month period exceeding $1,000,000 in value with brief description of the contract:

B. Each contract awarded within the preceding three-year period not already physically completed and exceeding $5,000,000 in value with brief description of the contract:

ATTACHMENT NO. 4
NOT USED

ATTACHMENT NO. 5
PROPOSAL COVER SHEET

PROPOSAL COVER SHEET

(See Section 00100, FAR 52.215-1, Instructions to Offerors--Competitve Acquisition (OCT 1997)

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:

4. 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.

ATTACHMENT NO. 6
COMPLIANCE STATEMENT

COMPLIANCE STATEMENT

SOLICITATION NUMBER: _____

PROJECT TITLE: _____

_____

PROJECT LOCATION: _____

NOTE:

In the event of a conflict after award between the Government specifications and the technical proposal, the specifications shall govern unless the exception or deviation is listed below and the exception/deviation is accepted by the Government. If accepted by the Government, this compliance statement identifying the agreement between the Government and the contractor shall be incorporated into the resultant contract and shall constitute a binding agreement between the Government and the contractor.

CERTIFICATION:

I hereby certify that the proposal submitted in response to subject solicitation complies fully with the specifications and drawings with the exception of the following differences, deviations, or exceptions:

Solicitation Reference	Explanation of Exceptions

IF NO DIFFERENCES, DEVIATIONS, OR EXCEPTIONS, SO STATE:

_____

SIGNATURE: _____

FIRM: _____

DATE: _____

ATTACHMENT NO. 7
DRAWING FORMAT

ATTACHMENT NO. 7

DRAWING FORMAT

1.0 **Policy:** All drawings shall be prepared in accordance with the standards set in this attachment.

2.0 **Drafting:**

2.1 The drawings shall show sufficient detail so that they clearly delineate the proposed construction. Original drawings shall be made on standard size sheets, and may be done in pencil, ink, or as plotted CADD drawings, but not a combination thereof on the same drawing. The final proposal submittal of drawings shall also be made on standard full size sheets and half-sized sheets. The standard size full size shall be 24 inches by 36 inches. The revision block/title shall be approximately 22-1/2 inches by 2-1/4 inches along the right hand side of the drawing.

2.2 The first or cover sheet shall contain the title and location of the project and the Drawing Index.

2.3 The drawing layout will be evaluated with care before the beginning of the drafting. Ample space, without crowding, will be provided, not only for the required plans and details with all necessary titles, dimensions and notes, but also for incidental information required such as graphic scales, general and reference notes, schedules, North Arrow, etc.

2.4 Sheets shall be well ordered and drawn at the scales listed in SECTION 00100 AND SECTION 00800. Any drawings not specifically listed shall be drawn at a reasonable scale and suitable for reduction. Cluttered and overcrowded layouts shall be avoided.

2.5 A graphic scale for each of the different scales used on the drawing shall be placed on the particular drawing to the left of the title block. Scale shall be indicated at each plan, elevation, section, and detail, unless all drawings on the same are at the same scale. No scale larger than 1:2 shall be used without prior approval.

2.6 **Detail Format**: Sheets devoted to detail should have such details reasonably spaced and arranged left to right or top to bottom. Groups of details relating to one particular aspect should be adequately separated from other groups and identified with a title. Sections and details of the final design should be numerous enough to show all design features.

2.7 **Clarity of Details**: Unnecessary details or details of small, standard products or items which are adequately covered by specifications and/or catalogs shall not be included on the drawings.

2.8 A symbol for major disciplines should be selected to properly arrange the sheets in the package. Adequate cross-referencing must be shown to avoid confusion and misunderstanding between disciplines.

3.0 **Drawing Preparation**

3.1 **Preparation for size reduction:** Since drawings may be reduced, all drafting (line widths, spacing, lettering sizes, etc.) shall be adequate size and density to be easily legible after reduction.

3.2 **Scales:** Carefully plan drawing layout together, with suitable scales in advance to properly delineate the project. Similar work for all design disciplines shall, whenever possible, be shown at the same scale on the various drawings involved.

3.3 **Lettering**: Use single stroke lettering, all capitals. Minimum height shall be 3 mm.

3.4 **Sheet Reference:** The proposer will reference all drawings within a discipline of work. The divisions designated below will be utilized.

Discipline Designation	Discipline
G	Title, Location Map, and General Notes
C	Civil and Geotechnical
L	Landscape
A	Architecture
I	Interior Design
S	Structural
P	Plumbing
M	Mechanical
F	Fire Safety
E	Electrical
T	Communications

3.5 Each drawing in the particular division shall be designated by the discipline designation and sheet number (i.e., A2.0 is the first sheet of the second series of Architectural drawings, typically, all plan drawings). This system as listed will be used in establishing sequence of drawings. The notation system shall be placed in the last increment of the drawing number block entitled “sheet”.

3.6 **Ring Number:** Consecutive ring numbering shall begin with the cover sheet. Ring number shall be placed in a circle directly below “Sheet” block of Title Block. Sheets inserted after ring numbers have been finalized shall be designated with the ring number of the original sheet preceding it and and alpha from A to Z beginning with A.

3.7 **Cross Reference:** Cross-referencing for sections and details shall be based on the sheet reference number.

3.8 **Symbols and Conventions:** Symbols and conventions serve two main purposes. One is to simplify the drawing and retain comprehension; the other is to follow or establish a standard which is easily recognized.

3.9 **Legends:** Place legends of symbols and material indications on the drawings. Since many symbols are limited to certain design disciplines, use separate symbol legends on the initial sheet of each design discipline. Symbols in the legend shall be at the same scale or slightly larger than used on the drawings.

4.0 Type of Symbols to be Used

4.1 Symbols shall be the standards used by the various disciplines. Clarity of symbols is just as important as clarity in lettering, due to the necessity of reducing the drawing.

5.0 Clarification

5.1 The proposal submission shall be prepared in accordance with paragraph 2.0 above with the following clarifications:

5.1.1 Detailing, except as specified in SECTION 00100, is not required. The post award submission as described in SECTION 00800, shall incorporate the specified format for all details.

5.1.2 The size and dimensional standards as specified on the following pages shall be required for all proposals. The revision block and title block standards are optional for the proposal, but mandatory for the post award submissions.

6.0 Computer Aided Design and Drafting (CADD)

6.1 General

6.1.1 **Software**: When submitting necessary design drawings prepared using Computer Aided Design and Drafting, the drawings shall be compatible with AutoCAD Release 12 or Release 14 electronic file format.

6.1.2 **Media**: In addition to paper plots, the drawings shall be submitted on 3.5" floppy disks or CD-Rom.

6.2 Production Standards:

6.2.1 **Scale:** Drawings should be accomplished at full size (1 mm = 1 mm or 1 inch = 1 inch) and scaled to the appropriate size when plotted. Unscaled detail and schedule sheets should be drawn to be plotted at 1=1.

6.2.2 **Pens:** Line colors shall be utilized for pen sizes. The following chart lists the colors corresponding to each pen size:

Color Number	Color	Pen Size
1	Red	1
2	Yellow	2
3	Green	3
4	Cyan	4
5	Blue	5
6	Magenta	6
7	White	7
8	Dk Gray	8
9	Red	1
10	Brown	2
11	Green	3
12	Blue	4
13	Dk Blue	5

14	Purple	6
15	Lt Gray	7

6.2.3 **Layers:** Use the layers shown in the following list, and additional layers as desired, to help make drawings easier to work with.

Layer Name	**Contents**
ADIM	All dimensions
AROOM-ID	Room names/numbers
ATITLE	Drawing Titles
ATEXT	All remaining text
BASEPLAN	The basic background without text, dimensions, detail references, etc. May be a reference file.
ACLG	Reflected ceiling grid
AEXST	Any existing items (for renovation projects)

6.2.4 **Lettering:** Lettering shall be sized so the finished drawing has 3 mm (1/8 inch) high general text and 6 mm (1/4 inch) high text for titles. If the drawing has large amounts of text, general text size may be reduced to 2.5 mm (5/32) inch high. Simplex font in color 3 (Green) shall be used for general text and Simplex font in color 4 (Cyan) shall be used for titles.

6.2.5 **File Nomenclature:** Drawings shall be stored under file names consisting of the number sequence N506 followed by a letter to indicate discipline as follows: G = General, C = Civil, L = Landscape, A = Architectural, I = Interior Design, S = Structural, P = Plumbing, M = Mechanical, F - Fire Protection, E = Electrical, and T = Telecommunications. This letter designation shall be followed by one, two, or three numbers to indicate drawing sheets in sequence, for example:

N506C10.DWG	First Civil Sheet
N506L10.DWG	First Landscape Sheet
N506A10.DWG	First Architectural Sheet
N506A33.DWG	Intermediate Architectural Sheet

Etc.

ATTACHMENT NO. 8
LIST OF DRAWINGS

DRAWING LIST

SEQ NO.	SHEET NO.	SHEET TITLE
1	G1.0	TITLE SHEET
2	G2.0	SCHEDULE OF DRAWINGS
3	G3.0	PROJECT LOCATION MAPS
4	G3.1	DORMITORY LOCATION MAP
5	G4.0	METRIC CONVERSION CHARTS
6	C1.0	DEMOLITION PLAN
7	C2.0	SITE PLAN - BASE BID
8	C2.1	SITE PLAN
9	C3.0	EXISTING UTILITY PLAN
10	L1.0	LANDSCAPE PLAN
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ATTACHMENT NO. 9

COMPREHENSIVE INTERIOR DESIGN REQUIREMENTS - SUBMITTAL REQUIREMENTS

ATTACHMENT 9

STRUCTURAL INTERIOR DESIGN REQUIREMENTS
SUBMITTAL REQUIREMENTS

1.0 General

1.1 The Contractor shall prepare and provide to the Government a Structural Interior Design (CID). The SID design and submittal shall include designing, selecting all interior building materials, finishes and special effects necessary to complete the interior environment. The overall objective is to create an integrated visual design theme (architectural and interior design) which reflects the interior atmosphere desired by the user.

1.1.1 Section 4.0 Architectural Design Requirements, detail the structural interior design (SID) requirements. This appendix also describes SID presentation format of the color boards.

1.1.2 The Contractor is NOT required to provide the furniture/furnishings of the CID package. The Government will procure the furniture/furnishings. The Contractor is required to coordinate the interior finish selections with the furnishings that base housing will be using in this facility.

2.0 Color Boards

2.1. Color Boards: The color boards shall depict all structural exterior and interior design as well as showing furniture related materials and finishes which the base will provide the information to the Contractor. Label and coordinate samples according to the Exterior and Interior Finish and Color schedules by referencing the alphanumerical legend. Display samples in a size large enough to indicate true patterns, color and texture. Securely mount samples to the color board modules to withstand long periods of use.

2.1.1 Exterior Building Related Material and Finishes: Include wall finish material, window and door frames, glazing, trim materials, fascias, hand rails, and other visible materials affecting visual design aesthetics.

2.1.2 Refer to Part 3.0 Presentation Format Requirements for further information and requirements.

3.0 Presentation/Format Requirements:

3.1 Definition: Presentation includes all information required to explain the Structural design.

3.2 Purpose: Illustrate the designer's/design team's philosophy and intent to integrate all technical and visual design disciplines from concept through final design. Provide a visual record of the interior design solution for the facility to be used for material and finish selection approved during construction.

3.3 Format:

3.3.1 Binder Format: The presentation will be prepared with a standard 8-1/2" x 11" module basis to fit a standard 3 ring loose binder unless otherwise noted. The maximum spread dimension shall be 25-1/2" x 33" with the exception of full size blueprints of furniture footprint plan(s). Any full size blueprints shall be folded to 8-1/2" x 11", placed in protective plastic sheet holders with title block showing with no more than two (2) individual blueprints per holder. Project title should occur on each module. The modules shall be rigid enough to support and anchor all samples.

3.3.1.1 Front cover of binder and spine of binder shall have a clear front that enables printed material to be inserted in the front cover and spine. (example: K&M View Binder)

3.3.1.2 Binder cover sheet shall be titled "Structural Interior Design" and shall have the project name, location, submittal date, percentage and type (60% Preliminary, 100% Final) and the Corps of Engineers logo.

3.3.1.3 Each module or sheet, with the exception of blueprints, shall have project title and location depicted at bottom of sheet with section (ie color boards) at top of sheet.

3.3.1.4 No fold outs on the top or bottom of pages.

3.3.2 Organization: Submittals shall be organized in a logical manner to facilitate an orderly and fast review. Narrative data should be clearly written. Drawings shall be clear and concise.

3.3.2.1 Recommended sequence is as follows:

1. Title Page
2. Table of Contents
3. Finish and Color Schedule
4. Exterior Color Boards
5. Interior Color Boards

3.3.3 Samples: Samples shall be organized by material and finish color scheme with a separate sample for each scheme as appropriate. The schemes shall be coordinated by room names and numbers shown on the architectural floor plans, room finish and color schedule.

3.3.3.1 All labeling or coding shall correlate to drawings/documents. Building finishes shall be identified with written description including alpha numeric code (according to color and finish schedule), application, generic material name, manufacturer, color name and color number. Furniture and furnishing shall be identified with written description including application, material name and number, and description of manufacturer, furniture type and series.

3.3.3.2 Material and finish samples shall indicate true pattern, color and texture. Carpet samples must be large enough to indicate a complete pattern or design.

3.3.3.3 No photographs or colored photocopies of materials will be accepted or approved except to illustrate large pattern repeats.

3.3.4 Interior Color Boards: Structural Interior Design materials and finishes must include all wall, floor and ceiling finishes, door and window trim, cabinet finishes, signage, and other miscellaneous items requiring the selection of colors, patterns, and textures. Furniture Related Interior Design shall include examples of all accessories, chairs/seating, desks, modular workstations, storage units, and any other miscellaneous items.

3.3.5 Exterior Color Boards: Exterior Building-Related materials and finishes samples should be provided on separate boards and clearly labeled.

4.0 Preliminary (60%) Submittal Requirements:

4.1 Preliminary (60%) Submittal Requirement:

a. Title Page
b. Table of Contents
c. 2.1.1 Statement of Design Objective
d. Finish and Color Schedule
e. 2.2.7 Color Boards

5.0 Final (100%) Submittal Requirements: Update and complete all information provided in previous submittal.

Coordination: ensure that the same numerical and verbal labeling appears on all plans and color boards.

6.0 Corrections to Submittals:

7.1 The binders shall be submitted to the Government for review and approval. The Interior Designer shall revise and update the binders after each review to bring documents into compliance with comments.

7.0 Approval Authority

7.1 Policies: All US Air Force and COE policies relating to interior finishes and furnishings shall be adhered to when making selections.

7.2 Review Authority: Contracting Officer and Using Agency.

ATTACHMENT NO. 10

FURNITURE QUALITY REQUIREMENTS

ATTACHMENT 10

FURNITURE LAYOUT REQUIREMENTS

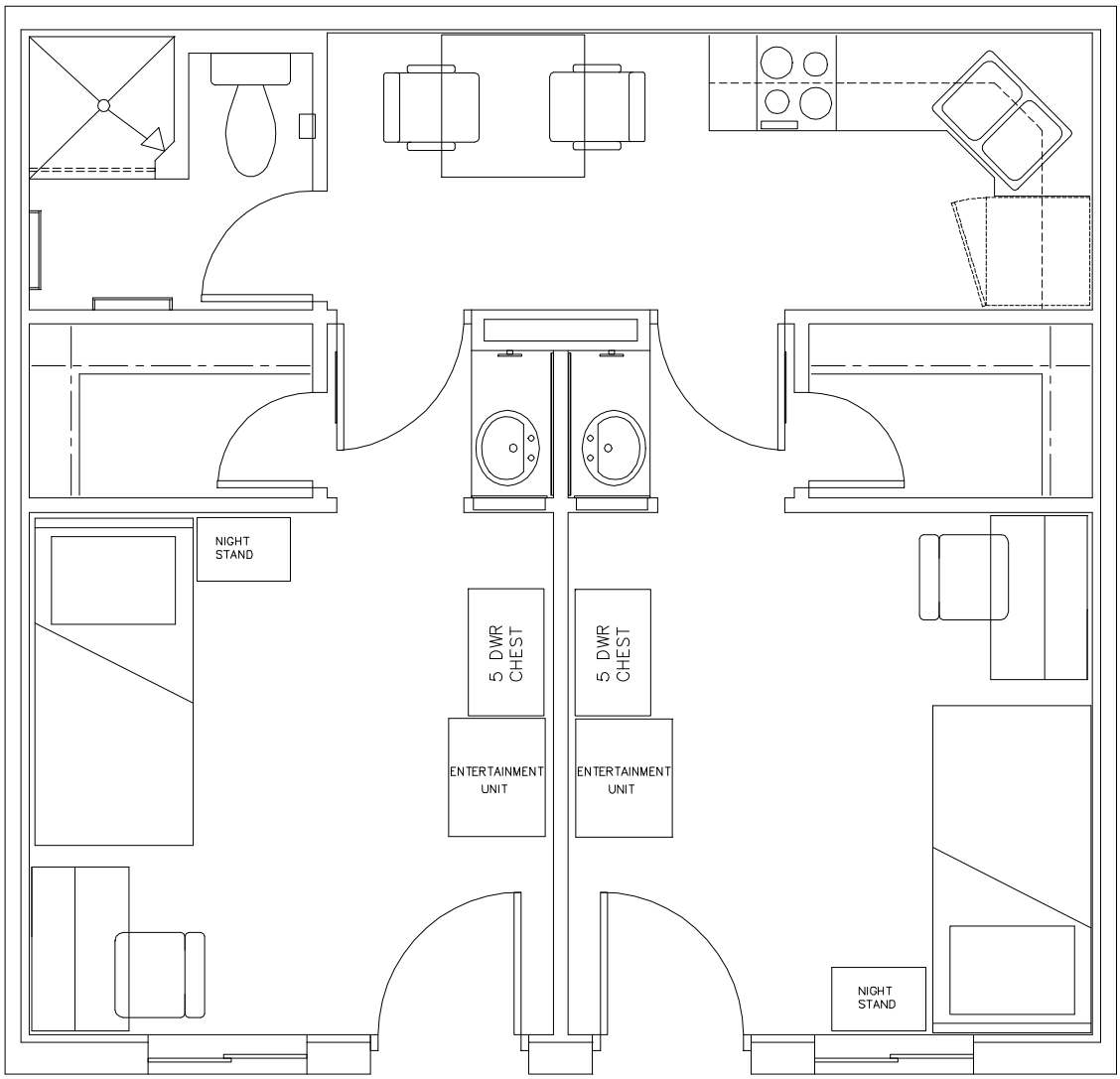
1.0 General Considerations:

1.1 The requirements and recommendations listed within this attachment are directed at freestanding furniture, furnishings and accessories.

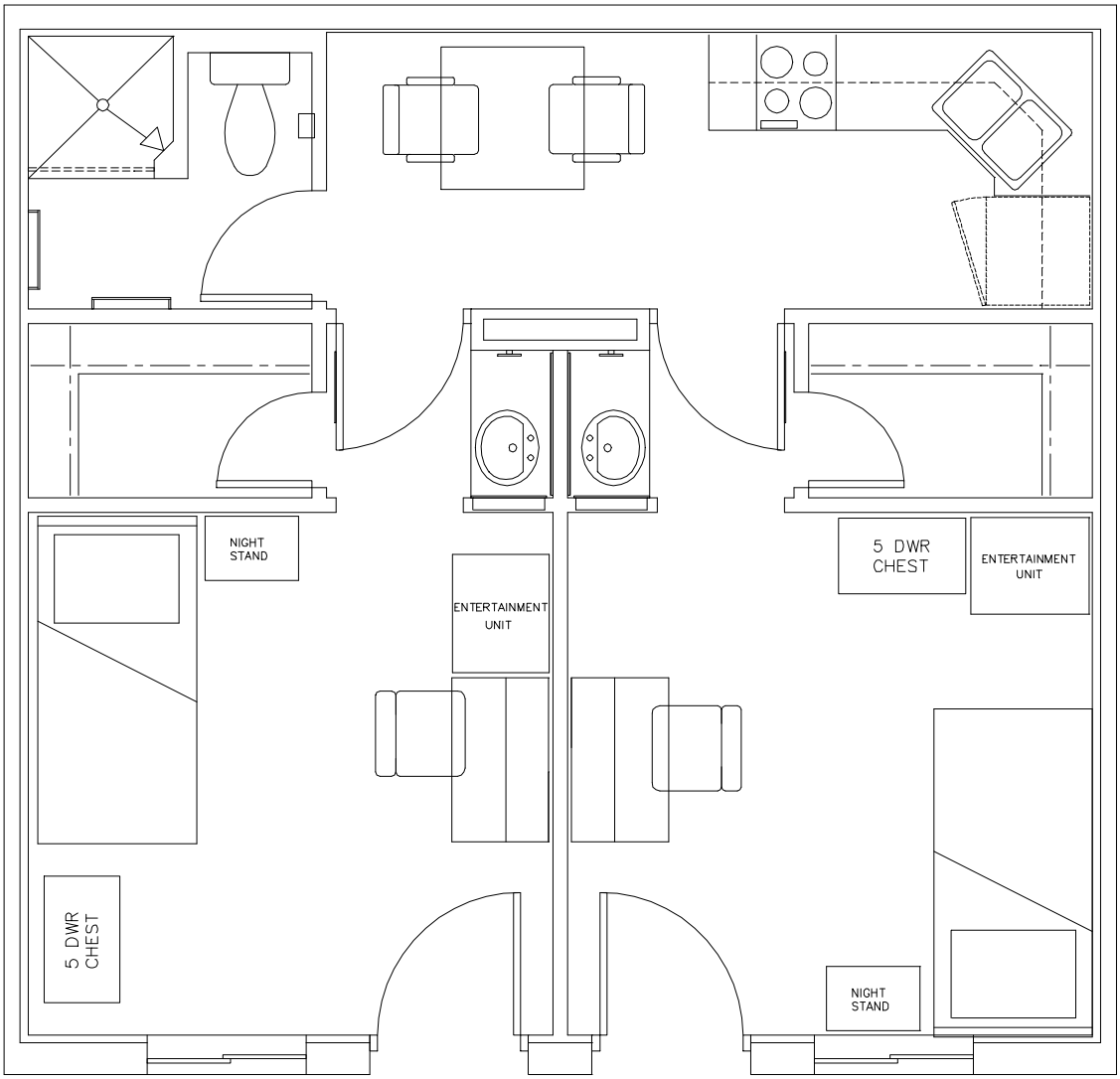
1.2 The base will provide the furniture finishes, furniture descriptions to the Contractor for use in the interior finish selections. This is to ensure that the building finishes are compatible with the furniture finishes.

1.3 The furniture layouts have been provided to show the Contractor the sizes and types of furniture that must be accommodated in the rooms. The contractor will need to verify the sizes with Base Housing and submit room layouts to show that all of the furniture will be accommodated in the rooms.

1.4 Layout of furniture shall comply with NFPA 101 and Fed Std 795.

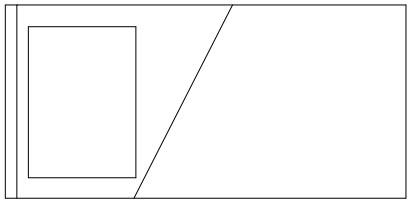
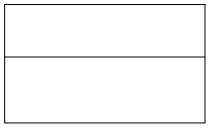
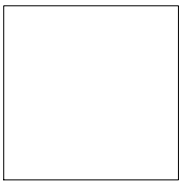
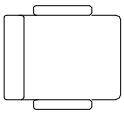
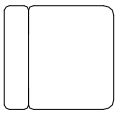


MODULE FURNITURE LAYOUT 1



MODULE FURNITURE LAYOUT 2

FURNITURE LEGEND

SYMBOL	DESCRIPTION
	TWIN BED, WITH STORAGE UNDERNEATH
	DESK WITH OVERHEAD BOOKCASE
	ENTERTAINMENT UNIT
	NIGHT STAND
	KITCHEN TABLE, 914 x 914 mm (36 x 36 inches)
	KITCHEN CHAIR
	STUDY CHAIR

ATTACHMENT NO. 11

GEOTECHNICAL REPORT

FY-99 DORMITORY PROJECT

at
Nellis Air Force Base
(near Las Vegas, Nevada)

PRELIMINARY GEOTECHNICAL REPORT

April 1998

REGISTERED PROFESSIONAL ENGINEER
JOHN P. CHAMBERS
No. C043840
Exp. 6/30/01
CIVIL
STATE OF CALIFORNIA

Prepared By:

Soil Design Section
GEOTECHNICAL BRANCH
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS

1. REPORT ABSTRACT: This report will provide preliminary information for the development of the final exploration program as well as initial foundation and pavement design and cost estimation of the FY-99 Dormitory Project. This report is not to be considered as a substitute for a thorough exploration program and geotechnical site evaluation with final design parameters.

2. GENERAL DATA FOR NELLIS AIR FORCE BASE:

2.1 Topography: Nellis Air Force Base is located in Clark County, Nevada, approximately 11.3 km (7 miles) northeast of the City of Las Vegas. The base covers nearly 16.8 square kilometers(6-1/2 square miles) near the east side of the Las Vegas Valley. The base resides on a smooth desert plain and is surrounded on three sides by mountains that range in distance from 3 to 29 km (2 to 18 miles) from the base. Surface elevations range from about 549 to 579 meters (1,800 to 1,900 feet) above sea level. The base area slopes southward at about 7.6 M/km (40 feet per mile) with natural surface drainage tending southward to a broad wash that tends southwest between the base and Frenchman Mountain. Well defined drainage courses are rare.

2.2 Geology: All surface and near-surface deposits at the base are alluvial materials that are approximately 305 meters (1000 feet) deep. The soils of the central, eastern, and most of the northern and western portions of the base consist of older alluvial materials consisting of sands and gravels with lesser amounts of silt and clay. The southwest and northwest area soils consist of recent alluvial materials such as silts and clays with minor amounts of sand and gravel. Most surface soils at the base are calcareous and are underlaid with a lime-carbonate hardpan locally known as caliche or geologically as soil-caliche.

2.2.1 Ground Water: Well logs from drilling in Section 9 of T20S, R62E of Clark County indicate that first standing groundwater level is at about 21 meters (70 feet) with other aquifers being encountered at depths of 57, 89, 132, 148, and 171 meters (188, 292, 434, 485, and 562 feet). Note that local perched groundwater is can be encountered as shallow as 12 and 18 meters (40 and 60 feet).

2.3 Climate: The climate in this area is typical of the southwest desert with long, hot summers and short, mild winters. Temperatures range from a low of -3.9°C (25°F) in January to a high of 42.2°C (108°F) in June. Freezing temperatures rarely occur and frost does not penetrate to any appreciable depth. The design ground snow loading for Nellis Air Force Base is 24.4 kg/m^2 (5 psf).

2.3.1 Wind Loading: The design wind speed in the Las Vegas area is 120.7 km/hour (75 mph).

2.3.2 Rainfall Intensity: The average annual rainfall in the Las Vegas area is 114.3 mm (4.5 inches) per year. The design 60-minute rainfall intensity for Nellis Air Force Base is:

Design Storm	**2-Year**	**5-Year**	**10-Year**	**25-Year**
Inches/Hour	0.6	0.8	1.0	1.2
mm/Hour	15.2	20.3	25.4	30.5

2.4 Seismicity: Nellis Air Force Base is located near the Las Vegas shear zone and is in seismic zone 2B which has a zone factor "Z" of 0.20. Well drilling logs indicate that the soil materials in the area consist of layers of hard to soft clays and lenses of soil caliche to the drilled depth of 244 meters (800 feet). Use a type "S_3" soil profile with an "S Factor" of 1.5 for the site coefficient.

2.4.1 Significant seismic settlement is unlikely due to the density and strength of the subgrade materials as well as the improbability of an event with enough amplitude to create significant vertical stresses.

2.4.2 Liquefaction: Liquefaction is the sudden loss of bearing capacity of subsurface materials during a seismic event. The liquefaction potential at the project site is relatively nonexistent due to the absence of loose and saturated fine to medium sand.

3. PROJECT DESCRIPTION: See attached site layout.

3.1 Project Location: The project area is situated just north of Fitzgerald Blvd. about 100 meters (300 feet) west of Carswell Avenue (former "B" Street). The site is currently occupied by building 765 and an athletic court.

3.2 Dormitory Project: The dormitory is to be a three-story structure with a footprint of about 900 square meters (10,000 square feet). From the preliminary layout drawing, it appears than a single-story utility building of about 250 square meters (3,000 square feet) is to be constructed immediately north of the dormitory. From preliminary layout drawing, it appears that there will be about 2000 square meters (2000 square yards) of new asphalt concrete parking to be constructed in the areas

occupied by buildings 735 and 755.

4. EXISTING SOIL DATA: Near site exploration data was found from the hospital area project of 1955. Most of this data is north and east of the site with only one drilled exploration plotting on the dormitory site. Note that this data is from one building cycle ago and the site materials may have been altered somewhat during the previous demolition and new construction operations. Local subsurface materials are generally stratified in three layers as follows:

4.1 Surface Materials: The materials in the upper 0.6 to 1.5 meters (2 to 5 feet) was predominately firm silt and caliche. This material is generally unsatisfactory for use as fill and backfill for the following reasons:

- This material may be gypsiferous. Gypsiferous soils tend to partially dissolve in water and have a very strong deteriorating effect on concrete and rock.

- This material is very difficult to compact to any appreciable degree because its consistency changes from dust to putty with very small changes in water content. In a putty like state, this material is merely extruded and shoved from under the wheels of compaction equipment without additional improvement. The material often loses strength with the addition of compactive effort.

4.2 Cemented Layer: A 0.6 to 1 meter (2 to 3 foot) thick layer of highly cemented soil caliche was encountered at depths of 0.6 to 1.5 meters (2 to 5 feet). This layer had standard penetration test (SPT) blow counts of 60 or greater per foot. We recommend leaving this material intact to maximum degree possible.

4.3 Deeper Materials: Below the cemented layer there exists very random layers of very soft to very stiff blends of sands, silts, and clays with various degrees cementation ranging from non to highly cemented. The deeper soil of the one exploration in the dormitory footprint had layers of very soft, moist to wet, compressible material; we highly recommend that the local site subgrade be thoroughly investigated.

5. RECOMMENDED EXPLORATION PROGRAM:

5.1 Field Explorations: We recommend an overall exploration spacing of between 10 to 30 meters (30 to 100 feet) to a depth 10 meters (33 feet). We recommend the use of a dual

exploration program of cone penetrometer testing augmented by drilled explorations with standard penetration testing. Drilling would be used to retrieve samples for field or lab classification and to penetrate the highly cemented soil caliche layer (at other locations) for the cone penetrometer tests. The cone penetrometer tests would provide a relatively quick and less costly method of obtaining mass continuous data and to ferret out soft areas for settlement estimates.

It may be advantageous to explore the whole site on a square grid pattern to determine to best place to locate the dormitory. The cost of this exploration program will likely be offset by savings brought about by the ability to use a less conservative foundation design.

6.2 Laboratory Testing: Soaked CBR (California Bearing Ratio) testing should be performed on laboratory compacted surface materials to determine swell potential and pavement-apron section thicknesses. Several chemistry tests and resistivity tests should be used to determine the corrosivity, chloride, and sulfate contents to determine which type of portland cement to use for the subgrade concrete construction and to size anodes for a cathodic protection system if one is to be used.

6. TENTATIVE FOUNDATION DATA: There is a potential for the use of both a shallow and deep foundation system for the proposed dormitory structure. The following is brief outline of the foundation possibilities:

6.1 Mat Foundation: Three-story dormitory structures on similar materials have been successfully founded on mat foundations at Holloman Air Force Base, New Mexico. This type of system would have the advantage of being able to "bridge" isolated soft areas in order to limit the differential settlement of the dormitory. This system requires more steel than a conventional foundation, but requires less formwork.

6.2 Column and Wall Footings: If the results of the exploration program shows that the subsurface materials can economically support spread footings, while keeping the overall and differential settlements within acceptable limits, this system may be the most economical one to use.

6.3 Drilled Shaft Foundation: In many of the previous explorations, a highly cemented layer of caliche was located at a depth of 3 to 4 meters (9 to 12 feet). This layer may provide a base upon which to found a drilled shaft foundation.

A drilled shaft foundation would be quick to install and would provide additional lateral "stiffness" to the structure. Drilled shafts require more steel and concrete than footings but the formwork and steel bending is minimal. Also, according to *Seismic Design for Buildings*, drilled shaft foundations in seismic zone-2 are required to be interconnected "to allow a re-distribution of lateral forces".

6.4 Slabs-On-Grade: Slabs-on-grade for these foundation types shall be a minimum of 150 mm (6-inches) thick and shall (with the exception of mat foundations) "float" i.e., be isolated from the footings or shafts. All interior slabs-on-grade shall be underlaid with a 150 mm (6-inch) capillary water barrier; no vapor barrier is required at Nellis Air Force Base.

7. TENTATIVE DESIGN PARAMETERS: For bearing, we recommend that footings be founded on the highly cemented near surface caliche layer if it is continuous under the entire building site. The highly cemented layer should be left intact to the maximum degree possible.

A) Bearing Capacity: For footings founded on the cemented caliche layer, use an allowable working dead plus live load capacity of 144 kN/m^2 (3 ksf) with a one-third overstress for the controlling dynamic load. If the highly cemented layer is penetrated or is nonexistent under part of the building area, the design allowable bearing capacity will need to be predicated on the foundation type and the worse case settlement estimates.

B) Soil Unit Weight: Use a unit weight of 18.85 kN/m^3 (120 pcf) for native onsite materials.

C) Lateral Loading:

1. ø angle; use 30 degrees.
2. Passive pressure coefficient; use 3.00
3. At-rest pressure coefficient; use 0.50
4. Active pressure coefficient; use 0.33
5. Coefficient of sliding resistance; use 0.35

8. TENTATIVE PAVEMENT SECTION: Depending on the local depth of the surface silt (ML) materials, coupled with the grading requirements for cut and fill, the surface materials should either be excavated to the cemented layer and removed from the site, or lightly compacted and capped with a "select-material subbase course".

8.1 <u>Removal</u>: The surface silt materials would be scrapped

flat and clear and removed from the site. Any required drainage slopes would be created with imported compacted "satisfactory" soil materials. The "aggregate base course" of pavement section would then be placed on this satisfactory material subgrade.

8.2 Select-Material Subbase: The native silt materials would be graded, shaped to drain, and compacted to a minimum of 85 percent of the ASTM D 1557 maximum dry density. Next, two 150 mm (6 inch) layers of select-material subbase material would be placed; the bottom layer compacted to a minimum of 90 percent and the top layer compacted to a minimum of 95 percent of the ASTM D 1557 maximum dry density. The "aggregate base course" of the pavement section would then be placed on this subbase course.

8.3 Tentative Parking Area Section: For areas trafficked only by automobiles and light trucks use a 4-inch aggregate base course surface with a 2-inch bituminous wearing course (AC). Compact the aggregate base course to 98 percent of the ASTM D 1557 maximum dry density.

8.4 Tentative Heavy Duty Pavement: For areas to be trafficked by medium or large trucks, or garbage vehicles, use a 6-inch aggregate base course surfaced with 3-inch bituminous wearing course (AC). Compact the aggregate base course to 98 percent of the ASTM D 1557 maximum dry density.

9. MISCELLANEOUS MATERIALS AND TESTING:

9.1 Satisfactory Material: Satisfactory materials for fill and backfill on this project shall be materials that classify according to ASTM D 2487 as GW, GP, GC, GM, SW, SP, SC, SM, CL and combinations of these such as SP-SM are satisfactory materials for fill and backfill for this project. Satisfactory materials shall have a maximum particle size of less than 2 inches and shall be free of excess moisture, organic matter and debris.

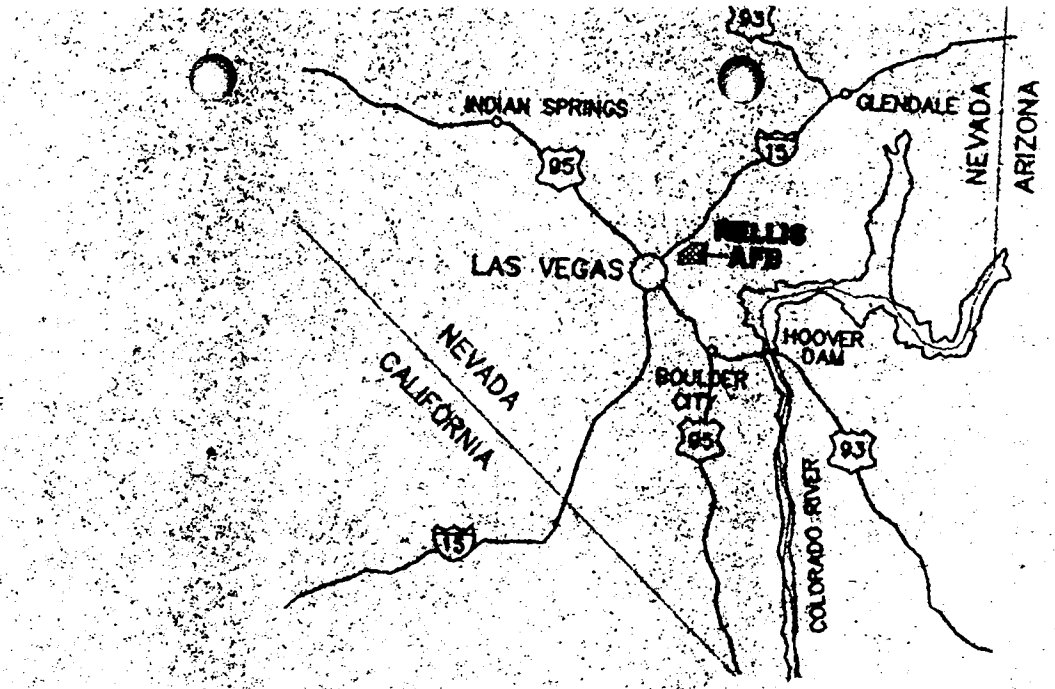
9.2 Select-Material Subbase Course: Select materials shall consist of material that classify according to ASTM D 2487 as GW, GP, GC, GM, SW, SP, SC, SM and combinations of these such as SP-SM. Select materials shall have a maximum particle size of less than 2 inches and shall be free of excess moisture, organic matter and debris. Additionally, select materials shall be capable of generating a soaked California bearing ratio (CBR) of at least 20 when tested in accordance with ASTM D 1883.

9.3 Portland Cement Concrete: Use type-V portland cement for subsurface concrete construction. Use 20.7 MPa (3000 psi)

concrete for foundations, lightly loaded slabs-on-grade, and curbs gutters and sidewalks. Use 27.6 MPa (4000 psi) concrete for any vehicular slabs-on-grade.

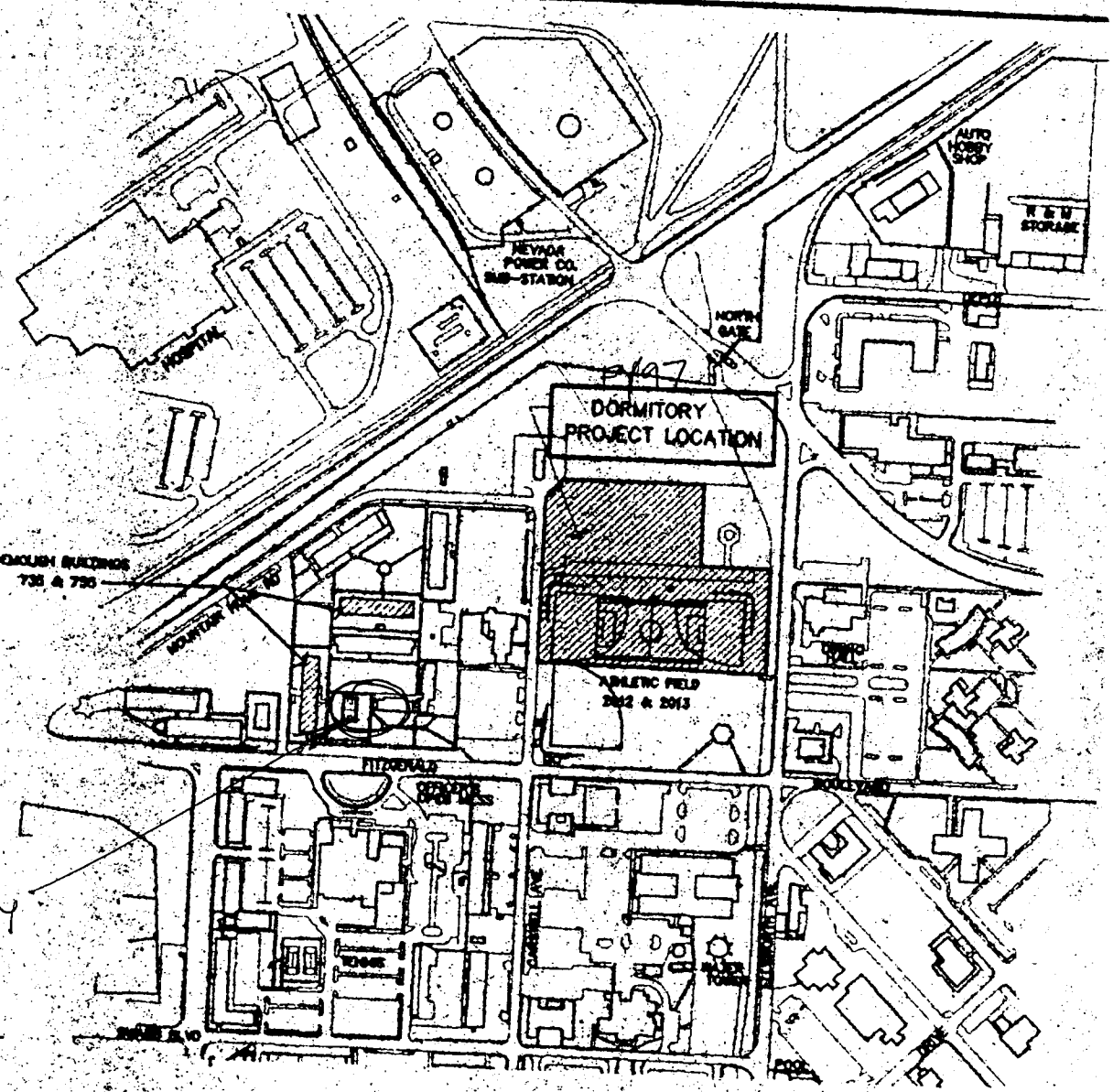
9.4 Soil Density Testing: Use nuclear and sand cone density testing as specified in ASTM D 1556 and ASTM D 2922. Correlate this testing with laboratory density testing per ASTM D 1557 procedure C.

John P. Chambers
Civil Engineer
Soil Design Section
(916) 557-7176



VICINITY MAP

NOT TO SCALE



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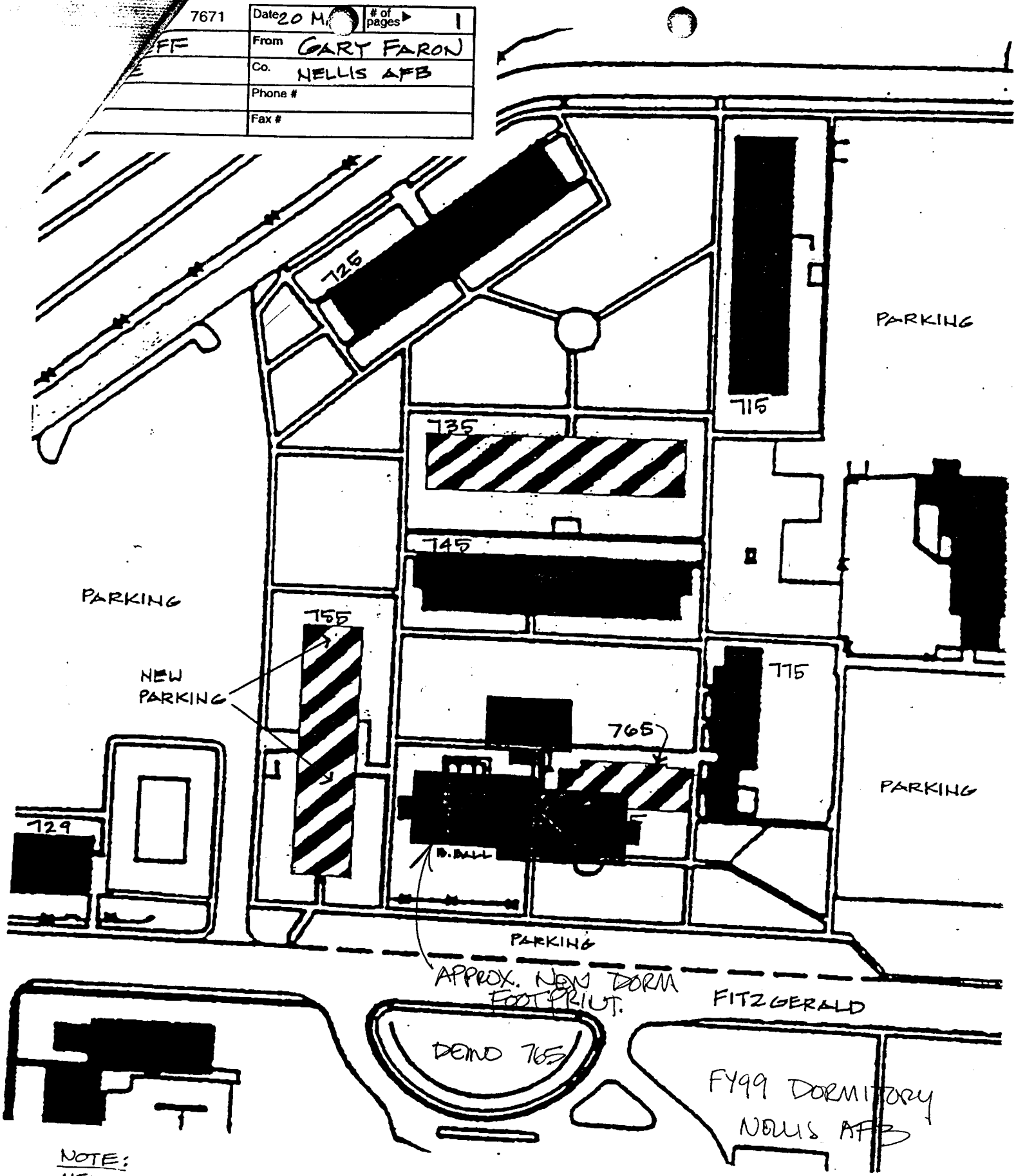

NOTE:
NEW DORM FOOTPRINT IS VERY SCHEMATIC. LOOK AT OTHER OPTIONS THAT MIGHT FIT BETTER ON THE SITE.

SITE PLAN
FY99 9/L

STATEMENT OF WORK

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STATEMENT OF WORK

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STATEMENT OF WORK

1.0 OBJECTIVES AND CRITERIA REFERENCES.

1.1 General Requirements. The new dormitory and the central service core shall be compatible with the surrounding environment. For a project to be compatible with the environment, it must conform to the Nellis Air Force Base Architectural Environmental Standards, and at the same time, relate the new construction to the existing building forms, color and materials as outlined in the Architectural Requirements. The technical criteria contained and cited in this Contract establishes minimum standards for construction quality.

1.2 Objective. Demolish existing building 765 and construct a new 84 unit Dormitory with option for 12 additional units along Fitzgerald Blvd. to provide living accommodations for permanent party personnel. This Contract consists of the demolition of one Dormitory and the construction of one new Dormitory and a central service core with required appurtenances on Government-owned land at Nellis Air Force Base, Nevada.

1.2.1 All work, associated amenities, and site improvements required by the Contract shall be constructed within the project site.

1.2.2 All air quality permits shall be obtained by the construction contractor.

1.3 Technical Criteria. Technical criteria to be used for construction shall be taken from the most current references at the date of issue of the contract and shall only be modified as described herein. Administrative, contractual, and procedural features of the contract shall be as described in other sections of the Contract. Reference codes and standards herein and those listed below are minimum acceptable criteria.

1.3.1 Local Standards: The following specifications, standards, bulletins and handbooks form a part of this document to the extent specified herein.

1.3.2 Federal/Military Specifications, Standards, Bulletins, and Handbooks. The following specifications, standards, bulletins and handbooks form a part of this document to the extent specified herein. Unless otherwise indicated, copies are available from Commanding Officer, Naval Publications and Forms Center, Attention: NPODS, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

1.3.2.1 CODE OF FEDERAL REGULATIONS (CFR)

Order from:
Government Printing Office
Washington, DC 20402
Ph: 202-512-1800
Fax: 202-275-7703
Internet: http://www.pls.com:8001/his/cfr.html

16 CFR 1201	Safety Standard for Architectural Glazing Materials
16 CFR 1630	Standard for the Surface Flammability of Carpets and Rugs

1.3.2.2 FEDERAL SPECIFICATIONS

Order from:
Standardization Documents Order Desk
Bldg 4D
700 Robbins Av
Philadelphia, PA 19111-5094
Ph: 215-697-2179
Fax: 215-697-2978

FS AA-V-00200	(Rev B) Venetian Blinds
FS CCC-W-408	(Rev D) Wall Covering, Vinyl-Coated
FS DD-M-411	(Rev C) Mirrors, Glass
FS FF-P-101	(Rev F) Padlocks
FS HH-I-558	(Rev C) Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type) (Inch-Pound)
FS HH-I-595	(Rev C) Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic
FS L-F-475	(Rev A; Am 1; Int Am 3) Floor Covering Vinyl, Surface (Tile and Roll), with Backing
FS L-P-387	Plastic Sheet, Laminate, Thermosetting (for Designation Plates)
FS L-P-1040	(Rev B) Plastic Sheets and Strips (Polyvinyl Fluoride)
FS P-F-430	(Rev C; Am 1) Finish, Floor, Water-Emulsion (for Use on Light Colored Floors)
FS P-W-155	(Rev C; Int Am 1) Wax, Floor, Water-Emulsion
FS RR-P-1352	(Rev C) Partitions, Toilet, Complete
FS TT-C-535	(Rev B; Am 2) Coating, Epoxy, Two Component, for Interior Use on Metal, Wood, Wallboard, Painted Surfaces Concrete and Masonry
FS TT-C-542	(Rev E) Coating, Polyurethane, Oil-Free, Moisture Curing
FS TT-E-487	(Rev E; Am 1) Enamel: Floor and Deck
FS TT-E-489	(Rev J) Enamel, Alkyd, Gloss, Low Voc

	Content
FS TT-F-1098	(Rev D) Filler, Block, Solvent-Thinned, for Porous Surfaces (Concrete Block, Cinder Block, Stucco, Etc.)
FS TT-P-31	(Rev D) Paint, Oil: Iron-Oxide, Ready-Mixed, Red and Brown
FS TT-P-37	(Rev C; Am 4; Reinstatement Notice) Paint, Alkyd Resin; Exterior Trim, Deep Colors
FS TT-P-38	(Rev E) Paint, Aluminum (Ready-Mixed)
FS TT-P-645	(Rev B) Primer, Paint, Zinc-Molybdate, Alkyd Type
FS TT-P-650	(Rev D) Primer Coating, Latex Base, Interior, White (for Gypsum Wallboard, or Plaster)
FS TT-P-1511	(Rev B) Paint, Latex (Gloss and Semigloss, Tints and White) (for Interior Use)
FS TT-P-001984	(Basic) Primer Coating, Latex Base, Exterior, (Undercoat for Wood), White and Tints
FS TT-S-708	(Rev A; Am 2) Stain, Oil; Semi-Transparent, Wood, Exterior
FS TT-S-711	(Rev C) Stain; Oil Type, Wood, Interior
FS TT-S-001992	(Basic) Stain, Latex, Exterior for Wood Surfaces
FS W-F-1814/GEN	(Rev A; Supple 1, Notice 1) Fuses, Cartridge, High Interrupting Capacity
FS W-S-610	(Rev D; Notice 1) Splice Connectors
FS 595	(Rev B) Colors Used in Government Procurement

1.3.2.3 MILITARY HANDBOOKS & STANDARDS/AIR FORCE REGULATIONS AND MANUALS

AFM 88-3, Ch 1	Structural Design Criteria- Loads
AFM 88-3, Ch 2	Structural Design Criteria for Buildings
AFM 88-3, Ch 3	Masonry Structural Design for Buildings
AFM 88-3, Ch 7	Soils and Geology Procedures for Foundation Design of Buildings and other Structures

AFM 88-3, Ch13	Seismic Design for Buildings
AFM 88-3, Ch15	Concrete Floor Slabs on Grade Subjected to Loads
AFM 88-5, Ch 4	Drainage for Areas Other Than Airfields
AFJMAN 32-1018	Pavement Design for Roads, Streets, Open Storage Areas, Elastic Layered Method
AFJMAN 32-1070	Ch 4 Plumbing
AFM 88-10, V 1	Water Supply Sources and General Considerations
AFM 88-10, V 5	Water Supply, water Distribution
AFM 88-11, V 2	Sanitary and Industrial Wastewater Collection-Gravity Sewers and Appurtenances
AFM 88-36	Energy Monitoring and Control Systems
AFJMAN 32-1090	Noise and Vibration Control
AFJMAN 32-1080	Electrical Power Supply and Distribution
AFM 126-8	Landscape Design and Planting
AFP 88-40	Sign Standards
AFM 85-3	Paints and Protective Coatings

The Department of the Air Force Facility Design Guide for Enlisted Dormitories, dated May 7 1996 (See Attachment No. 14)

Mil Hdbk 1008B	Fire Protection For Facilities Engineering, Design, and Construction
Mil-Std 101	

1.3.2.4 AIR FORCE ENGINEERING TECHNICAL LETTERS

ETL 82-2	Energy Efficient Equipment
ETL 83-1	Design of Control Systems for Heating, Ventilating, and Air Conditioning Systems (HVAC)
ETL 83-7	Plumbing
ETL 83-8	Use of Air-to-Air Unitary Heat Pumps
ETL 83-9	Insulation
ETL 84-2	Computer Energy Analysis
ETL 86-2	Energy Management and Control System (EMCS) for Single Building Connections
ETL 86-4	Paints and Protective Coatings

ETL 86-14	Solar Applications
ETL 86-16	Direct Digital Control of Heating, Ventilation, and Air Conditioning Systems
ETL 87-4	Energy Budget Figures (EBFs) for Facilities in the Military Construction Program
ETL 87-5	Utility Meters in New and Renovated Facilities
ETL 87-9	Pre-wiring
ETL 89-2	Standard Guidelines for Submission of Facility Operating and Maintenance Manuals
ETL 90-2	General Policy for Prewired Workstations and Systems Furniture
ETL 90-6	Electrical System Grounding, Static Grounding and Lightning Protection
ETL 90-7	Air Force Interior Design Policy
ETL 90-10	Commissioning of Heating, Ventilating, and Air-Conditioning (HVAC) Systems Guide Specification
ETL 91-3	Water Supply for Fire Protection
ETL 91-5	Fire Protection Engineering Criteria - Emergency Lighting and Marking of Exits
ETL 91-6	Cathodic Protection
ETL 91-7	Chlorofluorocarbon (CFC) Limitations in Heating, Ventilating and Air- Conditioning (HVAC) Systems
ETL 1110-9-12	Engineering And Design Standing Seam FR) Metal Roof Systems

1.3.2.5 STANDARDS

FED-STD-795	Uniform Federal Accessibility Standards
ADAAG	Americans with Disability Act Accessibility Guidelines

1.3.3 NON-GOVERNMENT PUBLICATIONS. The following publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the Department of Defense Index of Specifications & Standards (DODISS).

1.3.3.1 AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)
4301 North Fairfax Dr., Suite 425
ATTN: Pubs Dept.
Arlington, VA 22203
Ph: 703-524-8800
Fax: 703-528-3816

ARI 410	(1991) Forced-Circulation Air-Cooling and Air-Heating Coils
ARI 430	(1989) Central-Station Air-Handling Units
ARI 590	(1992) Reciprocating Water-Chilling Packages

1.3.3.2 AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA)
30 W. University Dr.
Arlington Heights, IL 60004-1893
Ph: 708-394-0404
Fax: 708-253-0088

AMCA 210	(1985) Laboratory Methods of Testing Fans for Rating
AMCA 300	(1994) Reverberant Room Method for Sound Testing of Fans

1.3.3.3 ALUMINUM ASSOCIATION (AA)
Pubs Department
P.O. Box 753
Waldorf, MD 20604
Ph: 301-645-0756
Fax: 301-843-0159

AA-01	(1993) Aluminum Standards and Data
AA DAF-45	(1980) Designation System for Aluminum Finishes
AA PK-1	(1989) Registration Record of Aluminum Association Alloy Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings and Ingot
AA SAA-46	(1978) Standards for Anodized Architectural Aluminum
AA SAS-30	(1986) Aluminum Construction Manual Series - Section 1 Specifications for Aluminum Structures

1.3.3.4 AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1540 East Dundee Rd., Suite 310
Palatine, IL 60067-8321
Ph: 708-202-1350
Fax: 708-202-1480

AAMA 101	(1993) Voluntary Specifications for Aluminum and Poly(Vinyl Chloride) (PVC) Prime Windows and Glass Doors
AAMA 603.8	(1992) Voluntary Performance Requirements

	and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
AAMA 605.2	(1992; Addenda Feb 1994) Voluntary Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels
AAMA 1503.1	(1988) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

1.3.3.4.1 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LTS-2	(1985; Rev 1986, 1987) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

1.3.3.5 AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)
P.O. Box 12215
Research Triangle Park, NC 27709-2215
Ph: 919-549-8141
Fax: 919-549-8933

AATCC 16	(1993) Test Method: Colorfastness to Light
AATCC 134	(1991) Test Method: Electrostatic Propensity of Carpets
AATCC 165	(1993) Test Method: Colorfastness to Crocking: Carpets - AATCC Crockmeter Method

1.3.3.6 ACI INTERNATIONAL (ACI)
P.O. Box 19150
Detroit, MI 48219-0150
Ph: 313-532-2600
Fax: 313-533-4747

ACI 318/318R	(1989; Rev 1992; Errata) Building Code Requirements for Reinforced Concrete

1.3.3.7 AMERICAN GAS ASSOCIATION (AGA)
1515 Wilson Blvd.
Arlington, VA 22209
Ph: 703-841-8400
Fax: 703-841-8406

AGA-01	(1989) A.G.A. Plastic Pipe Manual for Gas Service

1.3.3.8 AMERICAN IRON AND STEEL INSTITUTE (AISI)
1101 Seventeenth St., NW, Suite 1300
Washington, DC 20036
Ph: 202-452-7100
Fax: 202-463-6573

AISI SG-913	(1991) LRFD Cold-Formed Steel Design Manual

AISI SG-673	(1987; Addenda 1989) Cold-Formed Steel Design Manual

1.3.3.9 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
11 West 42nd St
New York, NY 10036
Ph: 212-642-4900
Fax: 212-302-1286

ANSI A10.6	(1990) Safety Requirements for Demolition
ANSI A108.5	(1992) Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar avail only as part of A108.1 @ 20.00
ANSI A108.10	(1992) Installation of Grout in Tilework avail only as part of A108.1 @ 20.00
ANSI A112.19.1	Enameled Cast Iron Plumbing Fixtures
ANSI A112.19.3	Stainless Steel Plumbing Fixtures (Designed for Residential Use)
ANSI A112.19.4	Porcelain Enameled Formed Steel Plumbing Fixtures (DoD adopted)
ANSI A112.19.5	(1979; R 1990) Trim for Water-Closet Bowls, Tanks and Urinals
ANSI A118.4	(1992) Latex-Portland Cement Mortar avail only as part of A108.1 @ 20.00
ANSI A118.5	(1992) Chemical Resistant Furan Mortars and Grouts for Tile avail only as part of A108.1 @ 20.00
ANSI A118.6	(1992) Ceramic Tile Grouts avail only as part of A108.1 20.00
ANSI A118.9	(1992) Test Methods and Specifications for Cementitious Backer Units avail only as part of A108.1 @ 20.00
ANSI A136.1	(1992) Organic Adhesives for Installation of Ceramic Tile \$avail only as part of A108.1 @ 20.00
ANSI A137.1	(1988) Ceramic Tile
ANSI A208.1	(1993) Particleboard

ANSI C2	(1993) National Electrical Safety Code
ANSI C12.1	(1988) Code for Electricity Metering
ANSI C12.4	(1984) Mechanical Demand Registers
ANSI C12.10	(1987) Electromechanical Watthour Meters
ANSI C12.11	(1987) Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
ANSI C37.35	(1976) Application, Installation, Operation and Maintenance of High-Voltage Air Disconnecting and Load Interpreter Switches
ANSI C57.12.26	(1987) Pad-Mounted Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors,High-Voltage, 34500 Grd Y/19920 Volts and Below; 2500 kVA and Smaller
ANSI C57.12.27	(1982) Conformance Requirements for Liquid-Filled Distribution Transformers Used in Pad-Mounted Installations, Including Unit Substations
ANSI C78.380	(1984) Method for the Designation of High-Intensity Discharge Lamps
ANSI C80.1	(1983) Rigid Steel Conduit - Zinc Coated
ANSI C82.4	(1985; C82.4a-1988) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple Supply Type)
ANSI C119.1	(1986) Sealed Insulated Underground Connector Systems Rated 600 Volts
ANSI C135.30	(1988) Zinc-Coated Ferrous Ground Rods for Overhead or Underground Line Construction
ANSI C136.14	(1988) Enclosed Side-Mounted Luminaires for Horizontal-Burning High-Intensity Discharge Lamps
ANSI C136.15	(1986) High-Intensity-Discharge and Low-Pressure Sodium Lamps in Luminaires - Field Identification
ANSI Z21.10.1	(1993; Z21.10.1a) Gas Water Heaters Vol. I Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less
ANSI Z21.13	(1991;Z21.13a;Z21.13b) Gas-Fired

	Low-Pressure Steam and Hot Water Boilers
ANSI Z21.45	(1992; Z21.45a; Z21.45b) Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI Z124.2	(1987; Z124.2a) Plastic Shower Receptors and Shower Stalls

1.3.3.10 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555

ASTM A6	General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
ASTM A 36	(1994a) Carbon Structural Steel
ASTM A 48	(1983) Gray Iron Castings
ASTM A 123	(1984) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	(1982; R 1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(1994) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(1994) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 444	(1989) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Storm Sewer and Drainage Pipe
ASTM A 463	(1994) Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 467	(1993) Machine and Coil Chain
ASTM A 500	(1993) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 611	(1994) Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
ASTM A 615	(1995) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 792	(1993a) Steel Sheet, 55% Aluminum-Zinc

	Alloy-Coated by the Hot-Dip Process, General Requirements
ASTM B 8	(1986) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 88	(1993a) Seamless Copper Water Tube
ASTM B117	Method of Salt Spray (Fog) Testing (DOD adopted)
ASTM B 209	(1995) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1995a) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM C 33	(1993) Concrete Aggregates
ASTM C 36	(1995) Gypsum Wallboard
ASTM C 76	(1995) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 94	(1986) Ready-Mixed Concrete
ASTM C 144	(1993) Aggregate for Masonry Mortar
ASTM C 150	(1995) Portland Cement
ASTM C 206	(1984; R 1992) Finishing Hydrated Lime
ASTM C 207	(1991; R 1992) Hydrated Lime for Masonry Purposes
ASTM C 208	(1995) Cellulosic Fiber Insulating Board
ASTM C 373	(1988) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
ASTM C 423	(1990a) Sound Absorption and Sound
ASTM C 478	(1994) Precast Reinforced Concrete
ASTM C 518	(1991) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 552	(1991) Cellular Glass Thermal Insulation
ASTM C 612	(1993) Mineral Fiber Block and Board Thermal Insulation
ASTM C 635	(1995) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings

ASTM C 645	(1995) Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
ASTM C 648	(1984; R 1994) Breaking Strength of Ceramic Tile
ASTM C 847	(1993) Metal Lath
ASTM C 954	(1993) Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C 955	(1995) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases
ASTM C 1002	(1993) Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
ASTM C 1036	(1991) Flat Glass
ASTM C 1047	(1994) Accessories for Gypsum Wallboard
ASTM C 1071	(1991) Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material)
ASTM D117	Test Methods and Specifications for Electrical Insulating Oils of Petroleum Origin
ASTM D 256	(1993a) Determining the Pendulum Impact Resistance of Notched Specimens of Plastics
ASTM D 418	(1993) Pile Yarn Floor Covering Construction
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1989; R 1993) Specular Gloss
ASTM D 570	(1981; R 1988) Water Absorption of Plastics
ASTM D 638	(1994b) Tensile Properties of Plastics
ASTM D 714	(1987; R 1994) Evaluating Degree of Blistering of Paints
ASTM D 923	(1988) Sampling Electrical Insulating Liquids
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive

ASTM D 1117	(1980) Nonwoven Fabrics
ASTM D 1308	(1987; R 1993) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1384	(1993) Corrosion Test for Engine Coolants in Glassware
ASTM D 1499	(1992a) Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Plastics
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2241	(1993) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2244	(1993) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1994) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2262	(1983) Tearing Strength of Woven Fabric by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine)
ASTM D 2447	(1988) Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
ASTM D 2513	(1993) Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
ASTM D 2751	(1993) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3034	(1994) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3278	Flash Point of Liquids by Setaflash Closed-Cup Apparatus
ASTM D 3304	(1977; R 1983) Analysis of Environmental Materials for Polychlorinated Biphenyls
ASTM D 3350	(1993) Polyethylene Plastics Pipe and Fittings Materials
ASTM D 3359	(1995) Measuring Adhesion by Tape Test\O

ASTM D 3936	(1980) Delamination Strength of Secondary Backing of Pile Floor Coverings
ASTM D 4214	(1989) Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4397	(1991) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 5034	(1995) Breaking Force and Elongation of Textile Fabrics (Grab Test)
ASTM E 84	(1995) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 119	(1995a) Fire Tests of Building Construction and Materials
ASTM E 136	(1994) Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
ASTM E 648	(1994a) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 773	(1988) Seal Durability of Sealed Insulating Glass Units
ASTM E 774	(1992) Sealed Insulating Glass Units
ASTM E 814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E 1264	(1990) Standard Classification for Acoustical Ceiling Products
ASTM F 1066	(1995) Vinyl Composition Floor Tile
ASTM G 23	(1995) Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials

1.3.3.11 AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
United Engineering Center
345 East 47th St.
New York, NY 10017-2398
Ph: 800-548-2723
Fax: 212-705-7300

ASCE 7	(1993) Minimum Design Loads for Buildings and Other Structures

1.3.3.12 AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)
1791 Tullie Cir., NE
Atlanta, GA 30329
Ph: 404-636-8400
Fax: 404-321-5478

ASHRAE 52.1	(1992) Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter
ASHRAE 90.1	(1989; 90.1b; 90.1c; 90.1d; 90.1e; 90.1g; 90.1i) Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings \$98.00 incl addenda$

1.3.3.13 AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
22 Law Dr., Box 2300
Fairfield, NJ 07007-2300
Ph: 800-843-2763
Fax: 201-882-1717

ASME B31.8	(1992; B31.8a; B31.8b; B31.8c) Gas Transmission and Distribution Piping Systems \$98.00 incl Rev Sub Ser$
ASME BPV IV	(1995) Boiler and Pressure Vessel Code; Section IV, Heating Boilers \$170.00 incl Rev Sub Ser$

1.3.3.14 AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy
Denver, CO 80235
Ph: 800-926-7337
Fax: 303-795-1989

AWWA C300	(1989) Reinforced Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA C301	(1992) Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA C302	(1987) Reinforced Concrete Pressure Pipe, Noncylinder Type, for Water and Other Liquids
AWWA C500	(1993) Gate Valves for Water and Sewerage Systems
AWWA C502	(1985) Dry-Barrel Fire Hydrants
AWWA C700	(1990; C700a) Cold-Water Meters - Displacement Type, Bronze Main Case

AWWA C701	(1988) Cold-Water Meters - Turbine Type, for Customer Service

1.3.3.15 AMERICAN WELDING SOCIETY (AWS)
P.O. Box 351040
Miami, FL 33135
Ph: 305-443-9353
Fax: 305-443-7559

AWS D1.1	(1994) Structural Welding Code - Steel

1.3.3.16 ARCHITECTURAL WOODWORK INSTITUTE (AWI)
13924 Braddock Road
Centreville, VA 22020
Ph: 703-222-1100
Fax: 703-222-2499

AWI-02	(1994) Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program

1.3.3.17 BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)
355 Lexington Ave.
New York, NY 10017
Ph: 212-661-4261
FAX: 212-370-9047

BHMA A156.1	(1988) Butts and Hinges
BHMA A156.2	(1989) Bored and Preassembled Locks and Latches
BHMA A156.3	(1994) Exit Devices
BHMA A156.4	(1992) Door Controls - Closers
BHMA A156.5	(1992) Auxiliary Locks & Associated Products
BHMA A156.6	(1986) Architectural Door Trim
BHMA A156.8	(1994) Door Controls - Overhead Holders
BHMA A156.9	(1994) Cabinet Hardware
BHMA A156.13	(1994) Mortise Locks & Latches
BHMA A156.16	(1989) Auxiliary Hardware
BHMA A156.18	(1987) Materials and Finishes
BHMA A156.20	(1989) Strap and Tee Hinges and Hasps
BHMA A156.21	(1989) Thresholds

BHMA A156.23 (1992) Electromagnetic Locks

1.3.3.18 CARPET AND RUG INSTITUTE (CRI)
310 Holiday Ave.
P.O. Box 2048
Dalton, GA 30722-2048
Ph: 404-278-3176

CRI 104 (1994) Commercial Carpet Installation Standard

1.3.3.19 CEILINGS & INTERIOR SYSTEMS CONTRACTORS ASSOCIATION (CISCA)
579 West North Ave.
Elmhurst, IL 60126
Ph: 708-833-1919
Fax: 708-883-1940

CISCA-01 (1987) Recommended Test Procedures for Access Floors

CISCA-02 (1984) Ceiling Sound Transmission Test by Two-Room Method

1.3.3.20 COMMERCIAL ITEM DESCRIPTIONS (CID)
Order from:
Standardization Documents Order Desk
Bldg 4D
700 Robbins Av
Philadelphia, PA 19111-5094
Ph: 215-697-2179
Fax: 215-697-2978

CID A-A-1500 (Rev A) Sealer, Surface (Latex Block Filler)

CID A-A-2380 (Basic) Dispenser, Paper Towel

CID A-A-2398 (Rev B) Curtain, Shower and Window (Metric - SI)

CID A-A-2668 (Basic) Dispenser, Toilet Paper, Cabinet

1.3.3.21 FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, MA 02062-9957
Ph: 617-762-4300
Fax: 617-762-9375

FM P8016 (1995) Specification Tested Products Guide

1.3.3.22 GERMAN INSTITUTE FOR STANDARDIZATION (DEUTSCHE INDUSTRIE NORM--DIN)
Order from:
Global Engineering Documents
3130 South Harbor Blvd., Suite 330
Santa Ana, CA 92704

Ph: 800-854-7179
or
714-979-8135
Fax: 714-979-7238

DIN 54318	(1986) Machine-Made Textile Floor Coverings; Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions; Identical with Iso 2551 Edition 1981 \$43.50, German only; unofficial English translation avail from Huntsville Division Corps of Engineers, Ph: 205-955-5270$

1.3.3.22.1 ELECTRONIC INDUSTRIES ASSOCIATION (EIA)/TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

EIA/TIA 455-5	(Sep 1982) Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Connecting and Terminating Devices - Addendum No. 5 to EIA 455
EIA/TIA 455-53	(Apr 1986) FOTP-53 Attenuation by Substitution Measurement - for Multimode Graded-Index Optical Fiber or Fiber Assemblies Used in Long-Length Communications Systems
EIA/TIA-568	(Sept. 1988) Commercial Building Telecommunications Wiring Standard
EIA/TIA TSB-36	Technical Systems Bulletin. Additional Cable Specifications for Unshielded Twisted Pair Cables.
EIA/TIA TSB-40	Technical Systems Bulletin. Additional Transmission Specifications for Unshielded Twisted-Pair Connecting Hardware

1.3.3.22.2 FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P8016	Specification Tested Products Guide
FM-01	(1989; Supple I, II & III) Approval Guide: A Guide to Equipment, Materials and Services Approved by Factory Mutual Research for Property Conservation

1.3.3.23 GYPSUM ASSOCIATION (GA)
810 First St. NE, Suite 510
Washington, DC 20002
Ph: 202-289-5440
Fax: 202-289-3707

GA 600	(1994) Fire Resistance Design Manual

1.3.3.23.1 ILLUMINATING ENGINEERING SOCIETY (IES)

IES Lighting Handbook, Application Volume

IES Lighting Handbook, Reference Volume

1.3.3.24 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Ln, P. O. Box 1331
Piscataway, NJ 08855-1331
Ph: 800-678-4333
Fax: 908-981-9667

IEEE C62.41 (1991) Surge Voltages in Low-Voltage AC Power Circuits

1.3.3.25 INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS (IAPMO)
20001 Walnut Dr., So.
Walnut, CA 91789-2825
Ph: 800-854-2766
Fax: 909-594-3690

IAPMO-10-01941 (1994) Uniform Plumbing Code, Soft Cover \$50.00; supple 12.60

1.3.3.26 INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)
5360 So. Workman Mill Rd.
Whittier, CA 90601-2298
Ph: 310-699-0541
Fax: 310-692-3853

ICBO-099S94 (1994) Uniform Building Code \3 Vol set; $173.90 soft cover$

ICBO-102S94 (1994) Uniform Building Code Standards: Uniform Building Code, Vol. III \$Avail as part of 3 Vol. Set; separately @ $68.75 paperback$\

1.3.3.27 MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)
127 Park St., NE
Vienna, VA 22180-4602
Ph: 203-281-6613

MSS SP-25 (1993) Standard Marking System for Valves, Fittings, Flanges and Unions

MSS SP-58 (1993) Pipe Hangers and Supports - Materials, Design and Manufacture

MSS SP-69 (1991) Pipe Hangers and Supports - Selection and Application

MSS SP-70 (1990) Cast Iron Gate Valves, Flanged and Threaded Ends

MSS SP-80	(1987) Bronze Gate, Globe, Angle and Check Valves

1.3.3.28 NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)
11 So. LaSalle St., Suite 1400
Chicago, IL 60603
Ph: 312-201-0101
FAX: 312-201-0214

NAAMM-500 Series	(1988) Metal Finishes Manual for Architectural and Metal Products

1.3.3.29 NACE INTERNATIONAL (NACE)
P.O. Box 218340
Houston, TX 77218-8340
Ph: 713-492-0535
Fax: 713-492-8254

NACE RP0169	(1992) Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP-01	Control of External Corrosion on Underground or Submerged Metallic Piping Systems

1.3.3.30 NATIONAL ASSOCIATION OF GARAGE DOOR MANUFACTURERS (NAGDM)
1300 Sumner Avenue
Cleveland, OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105

NAGDM 102	(1988) Specifications for Sectional Overhead Type Doors

1.3.3.31 NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 N. 17th St., Suite 1847
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 202-457-8473

NEMA DC 3	(1989) Residential Controls - Electrical Wall-Mounted Room Thermostats
NEMA ICS 2	Industrial Control Devices, Controllers and Assemblies
NEMA ICS 6	Enclosures for Industrial Control and Systems
NEMA LD 3	(1991) High-Pressure Decorative Laminates
NEMA WD 1	(1983; R 1989) General Requirements for Wiring Devices
NEMA WD 6	(1988) Wiring Devices - Dimensional Requirements

1.3.3.32 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
One Batterymarch Park
Quincy, MA 02269
Ph: 800-344-3555
Fax: 800-593-6372
Internet: http://www.wpi.edu/~fpe/nfpa.html

NOTE: The complete set of NFPA National Fire Codes (13 Vol.) is available for $325.00 per year.

NFPA 13	(1994) Installation of Sprinkler Systems
NFPA 24	(1992) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 70	(1996) National Electrical Code
NFPA 72	(1993) National Fire Alarm Code
NFPA 80	(1992) Fire Doors and Windows
NFPA 101	(1994) Safety to Life from Fire in Buildings and Structures
NFPA 255	(1990) Method of Test of Surface Burning Characteristics of Building Materials
NFPA 701	(1989) Methods of Fire Test for Flame-Resistant Textiles and Films F
NFPA 780	(1992) Lightning Protection Code

1.3.3.33 NATIONAL WOOD WINDOW & DOOR ASSOCIATION (NWWDA)
1400 East Touhy Ave., Suite G-54
Des Plaines, IL 60018
Ph: 708-299-5200
Fax: 708-299-1286

NWWDA I.S. 1	(1987) Wood Flush Doors
NWWDA I.S. 4	(1994) Water-Repellent Preservative Non-Pressure Treatment for Millwork
NWWDA I.S. 6	(1991) Wood Stile and Rail Doors

1.3.3.33.1 RURAL ELECTRIFICATION ADMINISTRATION (REA)

REA Bulletin	REA Standard For Acceptance Tests 345-63, PC-4 and Measurements of Telephone Plant

1.3.3.34 SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
P.O. Box 221230
Chantilly, VA 22022
Ph: 703-803-2980
Fax: 703-803-3732

SMACNA-1013 (1993) Architectural Sheet Metal Manual
\$141.00; $99.00 govt agency$

1.3.3.35 SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)
400 Commonwealth Dr.
Warrendale, PA 15096-0001
Ph: 412-776-4970
Fax: 412-776-0790

SAE AMS 3611 (1964; Rev C) Plastic Sheet, Polycarbonate General Purpose

SAE J1545 (1986) Instrumental Color Difference Measurement for Exterior Finishes, Textiles and Color Trim

1.3.3.36 STEEL DECK INSTITUTE (SDI)
P.O. Box 9506
Canton, OH 44711
Ph: 216-493-7886
Fax: 216-493-7886 (Fax Mach distinguishes bet voice and computer)

SDI Pub No 29 (1992) Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution

1.3.3.37 STEEL DOOR INSTITUTE (SDOI)
30200 Detroit Rd.
Cleveland, OH 44145-1967
Ph: 216-899-0010
Fax: 216-892-1404

SDOI SDI-100 (1991) Standard Steel Doors and Frames

SDOI SDI-106 (1991) Standard Door Type Nomenclature

SDOI SDI-107 (1984) Hardware on Steel Doors (Reinforcement - Application)

1.3.3.38 STEEL JOIST INSTITUTE (SJI)
1205 Forty-eighth Ave. No., Suite A
Myrtle Beach, SC 29577-5424
Ph: 803-449-0487
Fax: 803-449-1343

SJI-01 (1994) Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders

1.3.3.39 STEEL STRUCTURES PAINTING COUNCIL (SSPC)
4516 Henry St., Suite 301
Pittsburgh, PA 15213-3728
Ph: 412-687-1113
Fax: 412-687-1153

NOTE: The following documents, except as noted otherwise, are available only as a part of the Steel Structures Painting Manual, Vol 2, $100.00.

SSPC Paint 5	(1991) Zinc Dust, Zinc Oxide and Phenolic Varnish Paint
SSPC Paint 21	(1991) White or Colored Silicone Alkyd Paint

1.3.3.40 TILE COUNCIL OF AMERICA (TCA)
P.O. Box 1787
Clemson, SC 29633-1787
Ph: 803-646-8453
FAX: 803-646-2821

TCA-01	(1994) Handbook for Ceramic Tile Installation

1.3.3.41 UNDERWRITERS LABORATORIES (UL)
333 Pfingsten Rd.
Northbrook, IL 60062
Ph: 708-272-8800, ext 42612
Fax: 708-272-8129

NOTE: First price below is for standard only; 2nd price is for standard with 3-yr revision subscription service.

UL-01	(1995; Supple) Building Materials Directory
UL-03	(1995) Electrical Construction Materials Directory
UL-05	(1995; Supple) Fire Resistance Directory
UL 6	(Oct 23, 1981; 9th Ed; Rev, Nov 22, 1989) Rigid Metal Conduit
UL 198E	(Jul 12, 1988; 4th Ed; Rev Jul 13, 1988) Class R Fuses
UL 467	(Nov 22, 1984, 6th Ed; Rev thru Nov 14, 1986) Grounding and Bonding Equipment
UL 486A	(Nov 24, 1980, 7th Ed; Rev thru Oct 12, 1989) Wire Connectors and Soldering Lugs for Use with Copper Conductors

UL 486B	(Apr 13, 1982; 2nd Ed; Rev thru Oct 12, 1989) Wire Connectors for Use with Aluminum Conductors
UL 514A	(Dec 1, 1983; 7th Ed; Rev thru Jan 22, 1990) Metallic Outlet Boxes
UL 543	(Jun 7, 1982; 5th Ed) Impregnated-Fiber Electrical Conduit
UL 580	(1994; Rev thru Apr 1995) Tests for Uplift Resistance of Roof Assemblies \$95.00; 190.00
UL 723	(1993; Rev Apr 1994) Test for Surface Burning Characteristics of Building Materials \$95.00; 190.00
UL 854	(Feb 9, 1987; 7th Ed; Rev thru Feb 2, 1990) Service-Entrance Cables
UL 1242	(Oct 10, 1983; 1st Ed; Rev Nov 23, 1989) Intermediate Metal Conduit
UL 1286	(1993; Rev thru Aug 1995) Office Furnishings \$330.00; 655.00
UL 1479	Fire Tests of Through Penetration Firestops
UL 1572	(Dec 10, 1984; 2nd Ed; Rev thru Mar 19, 1991; Errata Aug 22, 1990) High Intensity Discharge Lighting Fixtures

2.0 CIVIL REQUIREMENTS (SITEWORK AND UTILITIES)

2.1 General Criteria

2.1.1 Contractor Haul Route and Acces Route shall be as indicated on Sheet G3.1. Contractor shall implement, at the site exit, a passive means of removing as much of the debris, mud, and rocks as possible from the tires of vehicles before exiting the site. At no time shall a vehicle exit the site and drive directly onto Fitzgerald Blvd south of the construction site.

2.2 Temporary Facilities Available to the Contractor During Construction:

2.2.1 Construction Office will not be available.

2.2.2 Covered materials storage will not be available.

2.2.3 Uncovered materials storage will be available within the limits of the construction site.

2.2.4 Security of the Construction Site and storage area is the Contractor's responsibility. Contractor shall provide a 1.8 meter (6 foot) high temporary security fence around the storage area.

2.2.5 There are no Disposal Areas on Base.

2.2.6 There are no Earthwork Material Borrow Areas on Base.

2.3 Utilities Available to Contractor During Construction:

2.3.1 See **SECTION 00800: SPECIAL CONTRACT REQUIREMENTS.**

2.3.2 Potable water usage is limited to 37,000 liters (10,000 gallons) per day. Contractor is responsible for making the connection, providing the water meter and recording usage.

2.3.3 Contractor shall verify water quality prior to using it for mortar or concrete mixing to ensure suitability.

2.4 Coordination and Notification Required for Utilities Tie-in:

2.4.1 Point of Contact for Coordination: Contracting Officer's Representative.

2.4.2 Minimum Prenotification Times Required for Outages and Road Closures:

2.4.2.1 Electrical Power: 14 working days

2.4.2.2 Water: 14 working days

2.4.2.3 Gas: 14 working days

2.4.2.4 Roads: 14 working days

2.4.2.5 Sewer: 14 working days

2.5 Demolition Requirements.

2.5.1 A site visit is required. Note: some of the original artwork on sheet rock inside Building 765 may be removed by others prior to demolition.

2.5.2 Drawing C1.0 shows the general demolition plan.

2.5.3 Demolish Building Building 765. Remove associated existing underground utility service lines to the point where they connect to the existing mains; do not abandon them. The existing mechanical room for Building 765 is located in the southern portion of Building 775. This room also serves Building 775 and shall continue to do so at all times during demolition and new construction. The disconnection of utility service to existing Building 765 shall not interfere with the utility service to Building 775 which will remain occupied throughout the contract. Building 755 will be demolished by others during the second quarter of 1999 (estimated). Building 755 will be occupied during the first quarter of 1999 and care should be taken not to disrupt the occupants during construction.

2.5.4 The existing building to be demolished contain asbestos. Contractor shall perform removal of asbestos per all applicable federal, state and local codes. Some amounts of lead-base paint were found intact on door jambs and doors. Worker protection will be required during demolition, however, no paint must be removed from its substrate, and all waste from areas identified as having lead-base paint shall be disposed of as general construction debris. Government will move all furnishings prior to Contractor demolition. Contractor shall salvage remaining fixtures (toilets, sinks, etc.) in Building 765. Salvaged items become property of the Contractor; the government will not accept them for use or salvage.

2.5.5 No existing utilities shall remain under the new building foundation. Re-route all such utilities as required.

2.5.6 Remove all underground utility lines to be demolished. Do not simply abandon in place. This will ensure that there are no problems at some later date when some future excavation would find "unknown" lines which were simply abandoned.

2.5.7 Remove existing sidewalks, concrete curb and gutters, and landscape walls as shown on Sheet C1.0

2.6 <u>Site Layout</u>

2.6.1 Sheets C2.0 and C2.1 show the general site plan.

2.6.2 Parking layout shall be generally as shown on Sheets C2.0 and C2.1. Parking stalls shall be 2.74 meters wide by 4.87 meters long, and aisle widths shall be 7.78 meters. Pavement shall be designed for vehicles with not less than a 2700 kg, or local governing agency code, wheel load. Pavement shall be asphaltic concrete.

2.6.3 Provide two parking spaces for the physically handicapped at the new Dormitory. Parking space design shall meet the requirements of the Uniform Federal Accessibility Standards.

2.6.4 Perimeter concrete curbs shall be provided in parking areas and access drives. Concrete curb and gutter shall be provided when drainage flows along the face of the curb. Curbs shall be depressed at driveway entrancea for handicap accessibility.

2.6.5 Provide a concrete dumpster pad with 1.8 meter high (minimum) screen walls on three sides and doubleswing gates in the front.

2.6.6 Provide a vehicle service drive from the parking area to the new Dormitory mechanical room and mechanical/electrical enclosure. Provide removable guard posts to restrict access to the service drive.

2.6.7 Walks shall be constructed of nonreinforced concrete. Minimum thickness shall be 102 mm. Minimum width (exclusive of curb width) shall be 1.22 meters, or 1.82 where vehicle overhang occurs. Walks for maintenance access shall be a minimum of 1.82 meter wide. Provide walks to all entrances building.

2.6.8 Provide expansion joints in all sidewalks, curbs, and curb and gutter at 9 meter maximum spacing and extend joints continuous through sidewalks, curbs, and curb and gutter. Construct scored joints in the sidewalk at the minimum of the following: 1.8 meter maximum spacing or the width of sidewalk times 1.25.

2.7 <u>Grading</u>

2.7.1 Grading layout should capitalize on the natural character of the site to minimize cut and fill. All gradients shall provide positive drainage (no ponding).

2.7.2 Set the finished floor elevation of the new building a minimum of 150 millimeters above the highest point of the adjacent outside finished grade, except at entrances and stoops. Set elevations of entrances and stoops 12.5 millimeter below the finished floor elevation.

2.7.3 Drainage shall be away from the building in all directions. Except at entrances and stoops, outside finish grade shall slope away from the building at a 5% grade for the first 3 meters. Areas 3 meters beyond the building line shall have a 2% minimum slope in the direction of drainage and a 25% maximum slope. Swales shall have a minimum slope of ½%.

2.7.4 Pavement drainage shall be accomplished by the use of curb and gutter. Convey storm runoff to perimeter curbs and gutters by sheetflow. Concentrated flow shall not be permitted to flow from parking areas onto adjacent gravel areas or turfed areas. Pavement grades shall provide positive surface drainage with a 1% minimum slope in the direction of drainage and;

2.7.4.1 Slope in direction of parking 1-1/2% maximum.

2.7.4.2 Slope perpendicular to direction of parking 8% maximum.

2.7.4.3 Slope of gutters shall be 1/2% minimum.

2.7.5 Walks shall have a cross slope of 2%. Walks shall be accessible to and usable by the physically handicapped and shall meet the requirements of the Uniform Federal Accessibility Standards.

2.8 Geotechnical Report

2.8.1 Construction shall be supported with appropriate geotechnical engineering. The contractor shall secure the services of a geotechnical engineering consulting firm to provide the basis of for foundations, pavements, retaining walls, grading, earthwork and all other geotechnical related work and to provide engineering support during construction. The geotechnical engineering firm shall be familiar with seismic, geologic, and geotechnical conditions, hazards and issues in the region, ie. geomorphic province. The geotechnical engineering firm shall have at least 5 years experience in the region. All engineering work products shall be reviewed and approved by a senior civil or geotechnical engineer of the firm who has been registered for at least 5 years in the state of Nevada. The minimum exploration depth shall be 9 meters or refusal depth.

2.8.2 The contractor shall prepare and submit for the Government review and comment a Final Geotechnical Report and earthwork specifications with recommendations and parameters necessary to support the project development. The Final Geotechnical Report shall be based on site and project specific explorations, (drill holes and or trenches) and field and laboratory testing. All field and laboratory work shall be conducted in accordance with ASTM standards; refer to the current Annual Book of ASTM Standards, Section 4, Construction. Contractor shall coordinate explorations with the Base Environmental personnel so that they can independently obtain soil samples for analysis. This Environmental analysis is independent of the contractor’s exploration for geotechnical information. Point of contact is the Contracting Officer's Representative.

2.8.3 If in the opinion of the Government, the Final Geotechnical Report and geotechnical basis is inadequate or in error, the contractor shall have the geotechnical consultants provide additional information, testing and explorations as required by the Government. The additional work and analyses required by the Government to support the project development shall be provided by the contractor at no additional cost to the Government.

2.9 Earthwork

2.9.1 Contractor to provide the Final Geotechnical report for earthwork requirements.

2.10 Pavement

2.10.1 New pavement is required at the following locations (type as indicated):

2.10.1.1 Parking Area - flexible pavement

2.10.1.2 Service Drive to courtyard - integral colored concrete. Color to match colored concrete band in patio areas (see Sht L1.0).

2.10.1.3 Sidewalks and Pads - concrete

2.10.2 For pavement sections refer to the Final Geotechnical Report. Asphalt concrete mix shall be 12.5 millimeter maximum.

2.10.3 Concrete Strength for walks, curbs and gutters, dumpster pad and other equipment pads shall be 3,000 psi minimum. Concrete and mixing shall meet requirements of ASTM C94.

2.11 Trenching and Backfilling for Utilities

2.11.1 Sheet C3.0 show***s*** the general utility plan for existing utilites.

2.11.2 For earthwork requirements for utilities see the Preliminary Geotechnical Report.

2.11.3 Trench width shall be O.D. (outside diameter) plus 0.3 - 0.6 meter or as recommended by the manufacturer.

2.11.4 For utility trenches with depths greater than 1.5 meter, trench walls shall be shored or cut back at a slope of 2V:1H.

2.11.5 Sewer and water lines shall be set in separate trenches to maintain a minimum lateral separation of 3 meters.

2.11.6 New utility lines placed under existing roads or streets will require jacking or boring. No street cuts will be allowed.

2.12 <u>Water Lines</u>

2.12.1 Connection to the existing water distribution system shall be made at the proposer’s option. Pipe, valves, and all other materials shall meet the American Water Works Association (AWWA) standards for a 1034.2 kPa working pressure. Provide sacrificial anodes for all valves and metal pipe.

2.12.2 Minimum cover above water lines shall be 152 mm in grassed areas and 900 mm in paved areas. Lines laid with less than the minimum cover shall be encased with a minimum concrete thickness of 102 mm. Install utility marking tape 0.45 meters below finish grade.

2.12.3 Provide a new fire hydrant near the southwest corner of the new dormitary. Hydrant shall be dry-barrel type conforming to AWWA C502 with valve opening at least 125 millimeter in diameter. Hydrants shall have a 150 millimeter bell connection, two 62.5 millimeter hose connections and one 112.5 millimeter pumper connection. Outlets shall have American National Standard fire-hose coupling threads. Working parts shall be bronze. Hydrants shall be painted with one coat of red iron oxide, zinc oxide primer conforming to SSPC Paint 25 and two finish coats of silicone alkyd paint conforming to SSPC Paint 21, of the color directed by the contracting officer. Suitable bronze adapter for each outlet, with caps, shall be furnished. Valves shall conform to AWWA standard C500, Gate Valves for Water and Sewerage Systems. Hydrant shall be compatible with those presently in use, with similar pump and hose connections. Hydrant lateral shall be 150 mm, and shall not exceed 15 meters in length, and shall have an underground shutoff valve.

2.12.4 Provide a water meter and meter box within 1.5 meters of the building for all building water connections. Meters shall be of the displacement type conforming to AWWA C700 or turbine type conforming to AWWA C701. Registers may be round or straight reading type. Connection to the water line shall be as required for the particular installation. Meter boxes shall be of cast iron or concrete of sufficient size to completely enclose the meter and shut-off valve. Box height shall extend from invert of the meter to final grade at the meter location. Cover shall be cast iron with the word "WATER" cast in it.

2.12.5 Gate valves shall be selected based on a working pressure of not less than 1034.2 kPa. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening. Valves shall be iron body, bronze mounted, and shall conform to AWWA C500. Flanges shall not be buried. Valve boxes shall be cast iron or concrete, except that concrete boxes may be installed only in locations not subjected to vehicular traffic. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base.
The minimum thickness of metal shall be 4.5 millimeter. Concrete boxes shall be the standard product of a manufacturer of precast concrete equipment. The word "WATER" shall be cast in the cover. The box length shall adapt, without full extension, to the depth of cover required over the pipe at the valve location. Valves and valve boxes shall set plumb. Valve boxes shall be centered on the valves. Boxes shall be installed over each outside gate
valve. Where feasible, valves shall be located outside the area of roads and streets.

2.12.6 Provide a separate water line for the building fire protection system. Make the connection to the main with a tapping sleeve and valve to eliminate service disruption. Provide a post indicator valve (PIV) with installation according to NFPA 24 and in a location that will minimize the risk of mechanical damage. If the PIV is located closer than 3 meters from an access drive, parking area or street, provide bollards for protection. Backflow prevention is required.

2.12.7 Provide thrust blocks at changes in direction of flow for water lines larger than 100 millimeters in diameter. Thrust block sizes shall be in accordance with the manufacturer's pipe installation manual. Acceptable pipe materials for lines less than 75 millimeters in diameter shall be limited to:

2.12.7.1 Copper Tubing, ASTM B 88

2.12.7.2 Plastic Pipe (PVC), ASTM D 2241, SDR for not less than 150 psig pressure rating

2.12.8 Acceptable pipe materials for lines 75 millimeters and larger include:

2.12.8.1 Plastic Pipe (PVC), ASTM D 2241, SDR for not less than 150 psig pressure rating

2.12.8.2 Reinforced Concrete Pressure Pipe, AWWA C300, C301, C302.

2.12.9 Hydrant flow tests in the site vicinity at hydrant 338 show a static pressure of 317 kPa and a residual pressure of 206 kPa at 52 l/s. Contractor shall verify the flow and pressure by conducting a flow test on the water main. The Contractor’s new flow test results will be the basis for establishing the available flow and pressure to the new Dormitory.

2.12.10 Provide calculations showing that the flow and pressure requirements for domestic water lines and fire flows indicated in Paragraph 2.12.9 are met. Maximum velocity in the pipes shall be 2.15 m/s for domestic service lines and mains and 3.05 m/s for fire protection service lines.

2.13 Sanitary Sewer System

2.13.1 Connection to the existing sewage collection system shall be made at the location as determined by the proposer. Existing lines are shown on Sheet C3.0. Contractor shall verify location of existing line and existing pipe invert elevations and rim elevations on both sides of the sewer tie-ins.

2.13.2 The sewer system shall be sized and installed in accordance with applicable state and local codes and the National Standard Plumbing Code. All design flow will be calculated using the Manning formula. Size pipe according to the number of fixture units served. Minimum pipe size is 150 millimeters. A minimum flow velocity of 3 fps shall be provided on new lines from the building to maintain self-cleansing. Maximum velocity is 3.05 m/s.

2.13.3 Sewer lines shall be placed at a depth greater than the frost penetration. Minimum cover over the top of pipes shall be 600 mm in non-vehicle areas and 900 mm in all other areas. If the minimum cover can not be met, the length of pipe shall be concrete encased with a minimum 76 mm thickness of concrete. Install utility marking tape 450 millimeters below finish grade.

2.13.4 Provide exterior clean-outs 1.5 meters from the new building.

2.13.5 Provide manholes at all changes in direction, size, or slope of gravity sewers. Manholes shall be placed not more than 90 meters apart. Precast manhole sections shall conform to ASTM C 478. Frames and covers shall conform to ASTM A 48.

2.13.6 Acceptable pipe materials shall be limited to:

2.13.6.1 Vitrified Clay Pipe, ASTM C700

2.13.6.2 Plastic Pipe (PVC), ASTM D 3034

2.13.6.3 Acrylonitrile-Butadiene-Styrene (ABS), ASTM D 2751

2.14 Storm Drainage

2.14.1 The Contractor shall investigate the existing drainage system within and around the area of the site and verify line sizes and invert elevations of any culverts. There is no underground drainage system. The new drainage system shall be sized to best meet the operational requirements of the facility. The system shall be as economical as practicable, taking into consideration topography, outfall locations and coordination with the existing drainage system.

2.14.2 A ten-year storm with a rainfall intensity of 25 mm/hr. for a 60 minute duration shall be used to calculate the runoff. Runoff shall be controlled by a surface system minimizing the use of culverts and inlets. Storm water shall not be discharged into sanitary sewers. Size the pipe according to the area served. Detailed calculations shall be provided by Contractor.

2.14.3 Minimum pipe slope shall be 0.3% and minimum diameter shall be 300 millimeters, unless the pipe is part of the roof drain system, in which case the minimum size of laterals and collector pipes shall be 100 millimeters. Piping shall be sized to provide a minimum velocity of 3 fps and a non-erosive outfall velocity of from 1.22 to 1.83 m/s. If non-erosive velocities cannot be attained, erosion protection shall be provided.

2.14.4 Acceptable pipe materials include:

2.14.4.1 Corrugated Steel Pipe, 14 gage galvanized

2.14.4.2 Concrete Pipe, ASTM C 76
2.14.4.3 Vitrified Clay Pipe, ASTM C700

2.14.4.4 PVC Pipe ASTM D3034

2.14.5 Drain inlets shall be precast concrete with "bicycle proof" gratings, ASTM C 478. Frames, covers and grates shall be sized for H-20 vehicle loading.

2.14.6 Minimum cover over the top of pipes shall be 600 mm in non-vehicle areas and 900 mm in all other areas. If the minimum cover can not be met, the length of pipe shall be concrete encased with a minimum 76 mm thickness of concrete. Install utility marking tape 450 millimeters below finish grade.

2.14.7 The minimum slope for culverts shall be 0.5%. Concrete head walls or end sections shall be provided for all culverts.

2.14.8 Storm water discharged from downspouts onto splash blocks shall be directed away from the structure, and protective measures shall be provided where discharge is onto erodible soils or gravel surfaces.

2.15 <u>Gas Distribution System</u>

2.15.1 Connection to the existing gas distribution system with new service lines shall be made at the locations determined by the proposer.

2.15.2 Installation shall be in accordance with the National Standard Plumbing Code and applicable state and local codes or utility company regulations. Minimum pipe size shall be 25 millimeter diameter. Existing pressure is 5 psig. Provide calculations for sizing of pipe.

2.15.3 A shutoff valve, meter set assembly, and service regulator shall be installed on the service line outside the building, 450 millimeters above the ground on the riser, within 1.5 meter of the building. Meters shall conform to MS MIL-M-18294, Style B without resettable counter. Meters shall be installed in accordance with ASME B31.8. Pressure regulators shall have ferrous bodies. Regulator shall be capable of reducing distribution line pressure (psi) to pressures required for users (inches of water column). Pressure relief shall be set at a lower pressure than would cause unsafe operation of any connected user. Connections between new work and existing gas lines, where required, shall be made in accordance with ASME B31.8 using proper fittings to suit the actual conditions. When connections are made by tapping into a gas main, the connecting fittings shall be the same size as the pipe being connected.

2.15.4 Pipes shall be of the following material:

2.15.4.1 Polyethylene, ASTM D 3350 or ASTM D 2513.

2.15.5 Minimum cover over the pipe shall be 0.9 meters. Install utility marking tape 450 millimeters below finish grade.

3.0 LANDSCAPE REQUIREMENTS

3.1 Introduction: The dormitory project site is situated within an existing dormitory area of Nellis AFB near the main gate area and across from the Officer's Club. The site conditions and visibility create challenges for incorporating the new dormitory and associated outdoor facilities into the adjacent land uses and future upgrades. Landscape architectural elements will be utilized to integrate the new dormitory into the surrounding areas, and provide a functional and aesthetic focal recreation area the entire dormitory complex. The landscape plan (see L1.0) provided shows required soft and hardscape elements and the conceptual layout required.

3.1.1. Design Criteria: The landscape and site design will utilize and incorporate Nellis AFB standards established in previous dormitory projects, and apply the current Air Force design guidelines for dormitory projects as appropriate for the project conditions. The design theme will integrate desertscape principles with the surrounding land use areas while providing for a central outdoor recreation 'oasis' area for the dormitory complex.

3.1.2. Site Circulation: New walkways will be integrated into the overall site plan and adjacent building walk layout for safe and efficient pedestrian circulation to service the recreation area, dormitories, and surrounding land uses. Bike racks will be provided at each stairwell. A service access road will be provided to access the mechanical area, laundry facility, and move-in access points.

3.1.3. Adjacent Building 775: Landscape areas surrounding B775 shall have existing landscape rock mulch removed and replaced by rock mulch, river rock, and boulders to match project new landscaping. Planting and irrigation is only required in the area south of B775 to street (10 trees; 30 shrubs)

3.2 Landscaping:

3.2.1. Landscaping General: Rock mulch, river rock, mounding, and boulders will be applied throughout all landscape areas utilizing the Base standard landscape materials and color.

3.2.1.1. Physical Security: Mounding, river rock, boulders, and grading will be used to control drainage, provide visual aesthetics and screening while also providing security barriers from unauthorized vehicle access next to buildings.

3.2.1.2. Rock Mulch: River rock will be used also to define drainage and swale areas. All downspout and splash block points shall have ½ cubic yard of river rock placed to minimize erosion. All rock mulch areas shall have landscape fabric installed.

3.2.2. Planting General: The plant materials will be chosen for their adaptability to the climate and drought tolerance. Existing mature trees will be protected and saved where possible to preserve these valued shade elements. Previous dormitory and other facility plant lists provide a guideline plant list as follows:

Palms

Washingtonia robusta	Mexican Fan Palm

Trees

Cercidum floridum	Blue Palo Verde
Chilopsis linbarsis	Desert Willow
Prosopis g. var. Glanpulosa	Honey Mesquite
Yucca Elata	Soaptree Yucca
Pinus halipensis	Aleppo Pine
Lagerstroemia indica	Crape Myrtle
Pistachia chinensis	Chinese Pistache

Shrubs

Caesalpinia pulcherrima	Red Bird of Paradise
Dalea formos	Feather Dalea
Dasylirion wheeleri	Desert Spoon
Leucophyllum frutescens	Texas Ranger
Rosmarinus officinalis “prostratus”	Dwarf Rosemary

3.2.3. Requirements

The minimum landscape material requirements for this project (if all options implemented) are as follows (see L1.0):

8- 5m (brown trunk) Palms	5- 7m (brown trunk) Palms
12-610mm box Tree	70- 57 L Trees
50-19 L Shrubs	300- 4 L Shrubs
Sod = Turf areas as shown	Mounds = minimum height 800mm; vary to 1200mm

Rock Mulch Area = 75% of total landscape mulch area as shown
River rock Area = 25% of total landscape mulch area as shown
Boulders: 76-large; 76-medium; 76-small

3.2.4. 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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z60.1 (1986) American Standard for Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2607 (1969) Peats, Mosses, Humus, and Related Products

FEDERAL SPECIFICATIONS (FS)

FS 0-F-241 (Rev D) Fertilizers, Mixed, Commercial

3.2.5. Source Inspections

3.2.5.1. Plant Materials

Plant materials shall be subject to inspection at the growing site by the Contracting Officer.

3.2.6. Shipment, Delivery, Inspection, Storage, and Handling

3.2.6.1. Shipment

3.2.6.1.1 Preparation

Preparation for shipment shall be done in a manner that will not cause shock or damage to branches, trunk, or root systems. Container grown plant sizes shall be provided as recommended by ANSI Z60.1. Plants shall be grown in a container sufficiently long for new fibrous roots to have developed and for root mass to retain its shape and hold together when removed from container. Container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

3.2.6.1.2. Antidesiccant Application

Plants shall be sprayed with an antidesiccant as leaf budding occurs or when plant material has soft growth.

3.2.6.2. Delivery

3.2.6.2.1. Identification

Plants shall be identified with durable waterproof labels and weather-resistant ink. Plants shall have attached labels stating the correct plant name and size.

3.2.6.2.2 Protection During Delivery

Plants shall be protected during delivery to prevent desiccation of the plant or damage to the roots or balls. Branches of plants shall be protected by tying-in the branches and covering all exposed branches.

3.2.6.2.3. Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

3.2.6.2.4. Pesticide

Pesticide materials shall be delivered to the site in the original unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration numbers and the registered uses.

3.2.7. Inspection

Plant material shall be inspected upon arrival at the job site by the Contracting Officer for conformity to the paragraph PLANTS and paragraph Shipment, and any unacceptable plant material shall be removed from the job site.

3.2.8. Storage

3.2.8.1. Plant Storage

Plants not installed on the day of arrival at the site shall be stored and protected in areas designated by the Contracting Officer. Plants shall be protected from exposure to wind and shaded from the sun. Covering that will allow air to circulate and prevent internal heat from building up shall be provided. All plants shall be kept in a moist condition by watering with a fine mist spray until planted.

3.2.8.2. Storage of Other Materials

Soil amendments shall be stored in dry locations away from contaminants. Pesticide materials shall not be stored with other landscape materials. Storage of materials shall be in areas designated or as approved by the Contracting Officer.

3.2.8.3. Handling

Care shall be taken to avoid injury to plants. Materials shall not be dropped from vehicles. Container-grown plants shall be handled by the container. Plants shall not be handled by the trunk or stems.

3.2.8.4. Time Limitation

Mulch: Limitation of time between installing plant and placing mulch is 48 hours.

3.2.9. Warranty

Furnished plants shall be guaranteed to be in a vigorous growing condition for a period of 12 months regardless of the contract time period. A plant shall be replaced one time under this guarantee. A written calendar time period for the guarantee of plant growth shall be furnished to the Contracting Officer.

3.2.10. Plants

3.2.10.1. Varieties

Plants shall be nursery grown or plantation grown stock conforming to ANSI Z60.1 and shall be of the varieties specified in the plant list bearing botanical names listed in one or more of the publications listed under "Nomenclature" in ANSI Z60.1.

3.2.10.2. Substitutions

Substitutions will not be permitted without written request from the Contractor for approval by the Contracting Officer.

3.2.10.3. Growing Conditions

All plants shall be grown under climatic conditions similar to those in the locality of the project or acclimatized for a period of 6 months prior to installation.

3.2.10.4. Quality

Well shaped, well grown, vigorous, healthy plants having healthy and well branched root systems shall be provided. Plants shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement and

abrasion. Plants shall be provided that are typical of the species or variety and conforming to standards as set forth in ANSI Z60.1 and as specified herein.

3.2.10.5. Shade and Flowering Trees

A height relationship to caliper shall be provided as recommended by ANSI Z60.1. Height of branching should bear a relationship to the size and variety of tree specified and with the crown in good balance with the trunk. Trees shall not be "poled" or the leader removed.

a. Single stem: Trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Specimen: A plant shall be provided that is well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

3.2.10.6. Deciduous Shrub

Plants shall be provided that have the height and number of primary stems as recommended by ANSI Z60.1. An acceptable plant shall be well shaped with sufficient well-spaced side branches recognized by the trade as typical for the variety grown in the region.

3.2.10.7. Coniferous Evergreen

Trees shall be provided that have the height-to-spread ratio as recommended by ANSI Z60.1. Trees shall not be "poled" or the leader removed. An acceptable plant shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

3.2.10.8. Broadleaf Evergreen

Plants shall be provided that have ratio of height-to-spread as recommended by ANSI Z60.1. An acceptable plant shall be well shaped and recognized by the trade as typical for the variety grown in the region.

3.2.10.9. Vines

Plants shall be provided with the minimum number of runners and length of runner as recommended by ANSI Z60.1. Plants shall be furnished that have heavy, well developed and balanced top with vigorous well developed root system and shall be furnished in containers.

3.2.10.10. Palms

Palms shall be in vigorous health with no trunk or rootball damage. Plants shall be boxed or balled and burlaped for transport with fronds tied and wrapped as per industry standards for protection.

3.2.11. Size

Plants shall be furnished in sizes indicated. Plants larger in size than specified may be provided at no additional cost to the Government.

3.2.11.1. Measurement

Plant measurements shall be in accordance with ANSI Z60.1.

3.2.12. Topsoil

No topsoil is available or required for the project site.

3.2.13. Soil Test

A soil test shall be performed for Ph, particle size, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of plants specified.

3.2.14. Soil Amendments

Soil amendments consist of lime, fertilizer, bonemeal, organic soil amendments and soil conditioner.

3.2.14.1. Lime

Lime shall be agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve.

3.2.14.2. Dry Fertilizer

Dry fertilizer shall be commercial grade, free flowing, uniform in composition and conforming to FS 0-F-241. Fertilizer shall be controlled-release fertilizer consisting of nitrogen-phosphorous-potassium ratio: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium. Controlled-release fertilizer shall be in tablet form.

3.2.14.3. Bonemeal

Bonemeal shall be a finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

3.2.14.4. Soil Amendments

3.2.14.4.1. Sand

Sand shall be clean and free of toxic materials and at least 95 percent by weight shall pass a 10-mesh sieve, and 10 percent by weight shall pass a 16-mesh sieve.

3.2.14.4.2. Rotted Manure

Rotted manure shall be unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials and containing no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

3.2.14.4.3. Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, or other wood waste material free of stones, sticks, and toxic substances harmful to plants and stabilized with nitrogen and having the following properties:

Particle size	Minimum percent by weight passing
No. 4 mesh screen	95
No. 8 mesh screen	80

Nitrogen Content	Minimum percent based on dry weight
Redwood Sawdust	0.5
Fir Sawdust	0.7
Fir or Pine Bark	1.0

3.2.14.9. Soil Conditioner

For single use or in combination to meet requirements for planting backfill.

3.2.14.9.1. Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum of 95 percent calcium sulfate by volume.

3.2.14.9.2. Aluminum Sulfate

Aluminum sulfate shall be commercial grade.

3.2.15. Mulch

Mulch shall be of an inert mulch material and free from weeds, debris, and other deleterious materials.

3.2.15.1. Rock Mulch

Rock mulch shall be 25 mm minus red granite quarried material that matches base standard landscaping. Submit sample to Contracting Officer for approval.

3.2.15.2. River Rock

River rock shall be 100 mm to 300 mm natural smoothed stream bed river-run stone and red, grey, brown, and blue mixed colors. River rock shall match base standard landscaping. Submit sample to Contracting Officer for approval.

3.2.16. Boulders

Boulders shall be of locally available quarried material with colors in tans, browns, and reds. Boulders are to be surface grade or quarried rock; sandstone not acceptable. Size shall be as designated on drawings. A sample shall be approved by the Contracting Officer.

3.2.17. Weed Fabric (Geotextile):

3.2.17.1. Nonwoven Polypropylene

Nonwoven polypropylene shall be spunbonded, water permeable, non-brittle, weigh a minimum, be a 113 gm per 0.8 square meters minimum 10 mils thick and come in 2 m wide rolls.

3.2.17.2. Nonwoven polyester

Nonwoven polyester shall be spunbonded, water permeable, non-brittle, weigh a minimum 113 gm per 0.8 square meters, be a minimum 10 mils thick and come in 2 m wide rolls.

3.2.18. Staking Material

3.2.18.1. Bracing Stakes

Bracing stakes for tree support shall be pentachlorophenol treated lodge pole pine free of any defects that would impair the strength. Bracing stakes shall be minimum 50 mm diameter by 2,440 mm long and pointed at one end.

3.2.18.2. Tree Ties

Material for holding tree to stake shall be a commercially available rubber tie.

3.2.19. Water

Water shall not contain elements toxic to plant life. Water will be furnished from the project mainline or a Government fire hydrant on the base.

3.2.20. Antidesiccant

Antidesiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration, and shall not damage the plant.

3.2.21. Pre-emergent Herbicide

Pre-emergent herbicide shall be in a commercially available dry or liquid form that is easily applied and meet all local and state regulations.

3.2.22. Landscape Mounds

Landscape shall be formed from clean native soil that is free from foreign or construction debris. Coordinate with CMU wall construction and rough grading. Compact and settle by construction equipment walking. Rough grade shall be ripped to 200 mm to break up construction compaction before placement of berm material.

3.2.23. Examination

3.2.23.1. Verify Grades

The Contracting Officer shall verify the finished grades are as indicated on drawings, and smooth grading has been completed in accordance with Section 02210 GRADING before start of landscape berm placement and other landscape operations.

3.2.23.2. Underground Obstructions to Planting

The location of underground utilities and facilities shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.2.24. Site Preparation

3.2.24.1. Layout

Landscape mounds, CMU walls, plant material locations, and mulch outlines shall be staked on the project site before any excavation is made. Plant material, mounds, mulch, and boulder locations may be adjusted by the Contracting Officer to meet field conditions.

3.2.25. Excavation

3.2.25.1. Obstructions Below Ground or Poor Drainage

When obstructions below ground or poor drainage affect the contract operation, proposed adjustments to landscape element locations, type of plant and planting method or drainage correction shall be submitted to and approved by the Contracting Officer.

3.2.25.2. Plant Pits

Plant pits shall be dug to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The size of all plant pits, except for palms, shall be 1-1/2 times rootball depth and a minimum of 4 times rootball depth.

3.2.26. Rough Grading and Landscape Mounds

All grades and landscape mounds shall follow the designed slope and swales for drainage.

3.2.26.1. All rough grades shall drain away from buildings and be 50 mm below finish grade of walks, curbs, etc. to allow for mulch placement.

3.2.26.2. Landscape mounds shall be laid out and constructed as shown on plans and as adjusted to meet field conditions. Coordinate with CMU wall construction and rough grading. Mounds shall be constructed in 300 mm lifts and compacted to 80% maximum by construction equipment walking. Final shaping shall be to provide natural contours and transitions to adjacent areas with positive drainage to swales and streets.

3.2.27. Percolation Test

Test for percolation shall be done to determine positive drainage of plant pits and beds. The Contracting Officer shall be notified in writing of all soil and drainage conditions detrimental to growth of plant material and shall submit proposal for correcting the condition.

3.2.28. Planting Times and Conditions

For best results, install container grown plant material in the fall before the chance of the first frost or in the spring after the last chance of frost. Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed. Contractor shall schedule planting in the mornings to avoid stressing plants during installation, if the planting schedule calls for installation when the temperature is expected to be 32 degrees C or greater. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted to and approved by the Contracting Officer.

3.2.29. Installation

3.2.29.1. Backfill Mixtures

Backfill shall be installed as part of the installation operations. The backfill mixture shall be a proportioned mixture thoroughly mixed by volume of clean native soil and selected organic soil amendment(s) of a decomposed wood derivative nature.

3.2.29.2. Backfill Soil Mix

The basin backfill soil mixture shall be placed in the planting pits during plant installation operations. The basin backfill soil mixture shall be as follows:

Clean Native Soil	=	1 part to mixture
Organic Soil Amendment(s)	=	2 parts to mixture

3.2.29.3. Setting Plants

Plants shall be set plumb and held in position until sufficient backfill soil mix has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are even with the depth at which they were grown in the nursery, or container. Plants root crown shall be set above subgrade as specified on drawings.

3.2.29.4. Palms: Palms shall be installed as per nursery industry standards with sand backfill. Ensure palms are plumb and root balls elevated and protected from damage.

3.2.29.5. Rain Basins

A depressed rain basin shall be formed around individual plants. Basin shall be excavated from around planting, and shall be level and continuous around plant.

3.2.29.6. Dry Fertilizer

Dry fertilizer shall be placed in tablet form in the plant pit in the immediate vicinity of the feeding roots in accordance with the manufacturer's recommendations. Space tablets at equal distances from each other and the rootball. The tablets shall be allotted as follows:

Palms = 8 tablets (21 grams each or equivalent)

610 mm box container plants = 6 tablets (21 grams each or equivalent)

57 L container plants = 4 tablets (21 grams each or equivalent)
19 L container plants = 3 tablets (21 grams each or equivalent)
4 L container plants = 1 tablets (21 grams each or equivalent)

3.2.29.7. Container-Grown Plants

Non-biodegradable containers shall be removed without damage to the plant or root system. Biodegradable containers shall be split. The backfill mix shall be completed, tamped and watered.

3.2.29.8. Staking

All trees shall be held in place with two bracing stakes driven vertically into ground and placed on opposite sides. Stakes shall not injure the ball or roots. The tree shall be held firmly between the stakes with a double strand of wire. Chafing guards shall be used where the wire contacts the tree. Nursery stakes shall be untied and removed from stem, if applicable. Care shall be taken so that the stem is supported during this operation and is not allowed to bend to the point of damage before the tree stakes are in place and the tree is secured.

3.2.30. Finishing

3.2.30.1. Pruning

The total amount of foliage shall be pruned by one-fourth to one-third on installed trees and shrubs to compensate for loss of roots and transplanting shock. The typical growth habit of individual plants shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth shall not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off." Cuts or wounds measuring a minimum 15 mm in diameter shall be painted with the specified tree wound dressing.

3.2.30.1.1. Palms: Fronds shall be untied and pruned as necessary.

3.2.30.2. Pre-emergent Herbicide

Pre-emergent herbicide shall be applied as per manufacturer's specifications on all landscape areas after finish grading and prior to rock mulch installation.

3.2.30.3. Weed Fabric (Geotextile)

Before placement of rock mulches, install under all areas to be rock mulched, excluding boulders. All edges shall be heel toed into grade with all material overlaps a minimum of 300 mm. Steel stake as per manufacture's specifications.

3.2.30.4. Boulders

Boulders shall be placed in locations as shown on drawings. Locations shall be staked on the ground and approved by the Contracting Officer prior to installation. Place boulders prior to installation of mulch and plants. Place boulders individually with appropriate equipment to prevent scarring of boulder surface. Position boulders so that natural weathered surface of boulder is exposed above grade as it was in its natural native setting. Boulders which have been surface scarred by mechanical equipment or excessively chipped or cracked during mining, delivery, storage, or handling will be rejected and removed from the worksite by the contractor.

3.2.30.5. Mulch

After irrigation installation and rough grading, mulch bed outlines shall be marked on the ground as per drawings and field conditions for approval by the Contracting Officer prior to installation of any mulch or plantings. Pre-emergent herbicide shall be applied before placement of any mulch or weed fabric.

3.2.30.6. Rock Mulch

Rock mulch shall be placed after pre-emergent application and spread to a uniform depth of a minimum of 50 mm. Install rock to form smooth transitions to existing landscape. Excess stockpiled rock shall be spread out evenly over landscape areas.

3.2.30.7. River Rock

River rock shall be spread and hand placed where necessary to a minimum depth of 200 mm so that grades are not visible after placement of rock. Care shall be taken to insure the rock is well mixed so that smaller rock will fill voids left by larger rock. Excessive cracked, chipped, and broken pieces of river rock and organic debris shall be removed from installation. Location of rock shall be placed in all major drainage swales and at areas as shown on the drawings.

3.2.30.8. Water

Plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone. Run-off, puddling and wilting shall be prevented.

3.2.30.9. Antidesiccant Application

Plants requiring further protection shall be sprayed with anti-desiccant in accordance with manufacturer's recommendations.

3.2.31. Maintenance During Planting Operation

Installed plants shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed and shall continue until the plant establishment period commences. The maintenance includes irrigation system upkeep, watering, pruning, wound dressing, straightening and other necessary operations. Plant beds and earth water basins shall be kept free of weeds, grass and other undesired vegetation. Plants shall be checked for settlement and shall be reset proper grade as necessary. Run-off, puddling and wilting shall be prevented.

3.2.32. Application of Pesticide Material

When pesticide becomes necessary to remove a disease or pest, a state-certified applicator shall apply required pesticide in accordance with State EPA label restrictions and recommendations. Hydraulic equipment shall be provided for the liquid application of pesticides with a leak-proof tank, positive agitation methods, controlled application pressure and metering gauges. A pesticide treatment plan shall be provided to the Contracting Officer as specified in paragraph SUBMITTALS.

3.2.33. Restoration and Clean Up

3.2.33.1. Restoration

Pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

3.2.33.2. Clean Up

Excess and waste material from the planting operation shall be removed and disposed of off the site. Adjacent paved areas shall be cleared.

3.2.34. Maintenance Period

3.2.34.1. Commencement

On completion of the last day of the planting and landscaping operation and all other construction activity including architectural, civil, etc., the maintenance period for maintaining irrigation, hardscape, and installed plants in a healthy growing condition shall commence upon written notice of 'start of maintenance period' from the Contracting Officer. The maintenance period shall be in effect for 90 calendar days.

3.2.34.2. Maintenance During Establishment Period

3.2.34.3. General

Maintenance of plants and landscape shall include straightening plants, tightening stakes and guying material, repairing tree wrapping, protecting plant areas from erosion, maintaining erosion control material, supplementing mulch, accomplishing wound dressing, removing dead or broken tip growth by pruning, maintaining edging of beds, checking for girdling of plants and maintaining plant labels, watering, weeding, removing and replacing unhealthy plants, and adjusting and maintaining irrigation system as required.

3.2.34.4. Water

The plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone and encourage deep rooting. An adequate supply of moisture is estimated to be the equivalent of one inch of absorbed water per week delivered in the form of natural rain or augmented as required by periodic watering. Run-off, puddling and wilting shall be prevented.

3.2.34.5. Weeding

Grass and weeds in earth water basins and landscape areas shall not be allowed to reach a height of 80 mm before being completely removed, including the root growth.

3.2.34.6. Unhealthy Plants

A plant shall be considered unhealthy or dead when the main leader has died back, or 25 percent of the crown is dead. Determine the cause for an unhealthy plant. Unhealthy or dead plants shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

3.2.34.7. Settlement

Native soil or mulch material shall be added to maintain grade and coverage. Serious settlement affecting the setting of the plant in relation to the depth at which it was grown requires replanting in accordance with paragraph INSTALLATION.

3.2.34.8. Pesticide Treatment

Treatment for diseases or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE MATERIAL.

3.2.34.9. Maintenance Report

A written record shall be furnished to the Contracting Officer of the maintenance work performed, irrigation adjustments and repairs, the quality of plant losses, cause for plant loss and replacements made on each site visit.

3.2.34.10. Maintenance Instruction

Written instructions shall be furnished to the Contracting Officer for year-round care of installed plants and irrigation system.

3.2.34.11. Replacement Plants

Plants shall be provided for replacement in accordance with paragraph PLANTS. Replacement plants shall be installed in accordance with paragraph INSTALLATION. No extended plant establishment period shall be required for replacement plants. A plant will be replaced in accordance with paragraph WARRANTY.

3.2.35. Final Acceptance

3.2.35.1. Preliminary Inspection

Prior to the end of the maintenance period, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be established in writing. A checklist of items to be done will be determined, such as irrigation adjustments, plants to be replaced, mulch replacement, etc. These items will be checked for completion at the Final Inspection.

3.2.35.2. Final Inspection

At the end of the maintenance period, a final inspection shall be held by the Contracting Officer to determine that deficiencies noted in the preliminary inspection have been corrected. Time for the inspection shall be established in writing. Acceptance of the planting is subject to the guarantee of plant vigor and growth.

3.3. Turf

3.3.1. General

Designated areas shall be soil prepared and sodded with Bermuda and perennial ryegrass mix. A concrete mow band with integral color shall be provided.

3.3.2. Qualifications

All work shall be done by an experienced crew familiar with horticulture and industry methods and standards for sodding and turf installation.

3.3.3. 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.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01	(Sep 1977; Amended Oct 29, l986) Federal Seed Act Regulations (Part 20): Certified Seed Regulations

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 977	(1986) Emulsified Asphalt
ASTM D 2028	(1976; R 1986) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2607	(1969) Peats, Mosses, Humus, and Related Products

FEDERAL SPECIFICATIONS (FS)

FS O-F-241	(Rev D) Fertilizers, Mixed, Commercial
FS JJJ-S-181	(Rev B) Seeds, Agricultural

3.3.4. Source inspections

Sod material will be subject to inspection by the Contracting Officer at the growing site.

3.3.5. Delivery, Inspection, Storage, and Handling

3.3.6. Delivery

3.3.6.1. Protection

Sod shall be protected from drying out and contamination during delivery.

3.3.6.1. Topsoil

A soil test shall be provided for topsoil delivered to the site.

3.3.6.2. Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

3.3.6.3. Pesticide

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration number and the manufacturer's registered uses.

3.3.7. Inspection

Sod shall be inspected upon arrival at the job site by the Contracting Officer for conformity to type and quality in accordance with paragraph MATERIALS. Other materials shall be inspected for meeting specified requirements and unacceptable materials shall be removed from the job site.

3.3.8. Storage

Materials shall be stored in areas designated by the Contracting Officer. Sod shall be installed immediately upon delivery. Temporary stored sod shall be lightly sprinkled with water, covered with moist burlap, straw, or other covering and protected from exposure to wind and direct sunlight until planted. Covering for sod shall allow air to circulate and prevent internal heat from building up. Fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment materials shall not be stored with other landscape materials.

3.3.9. Handling

3.3.9.1. Materials

Care shall be taken to avoid injury to sod or seed. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

3.3.9.2. Time Limitation

a. Sod: Limitation of the time between harvesting and placing of sod shall be 36 hours.

3.3.10. Materials

3.3.10.1. Seed (Not Applicable)

3.3.10.2. Sod

3.3.10.3.1. Sod Classification

State-certified Nursery-grown sod shall be provided as classified by applicable state laws. Each individual sod section shall be of a size to permit rolling and lifting without breaking.

3.3.10.4. Grass Species

Grass species shall be proportioned as follows:

Botanical / Common Name	%Mixture By Weight	Pure Live Seed
Saturn Perennial Ryegrass	20	100%
Elf Perennial Ryegrass	20	100%
Nomad Perennial Ryegrass	20	100%
Sultan Bermudagrass	30	100%

3.3.10.5. Quality

The sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 50 mm. in any dimension, woody plant roots and other material detrimental to a healthy stand of turf. Sod that has become dry, moldy, or yellow from heating, or has irregularly shaped pieces of sod and torn or uneven ends shall be rejected.

3.3.10.6. Thickness

Sod shall be machine cut to a uniform thickness of 32 mm within a tolerance of 6 mm, excluding top growth and thatch. Measurement for thickness shall exclude top growth and thatch.

3.3.10.7. Anchors

Sod anchors shall be as recommended by the sod supplier as necessary.

3.3.11. Soil Amendments

Soil amendments shall consist of lime, fertilizer, organic soil amendments and manufactured soil conditioners meeting the following requirements.

3.3.11.1. Lime

Lime shall be agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve.

3.3.11.2. Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and conforming to FS O-F-241. Granular Fertilizer: As recommended by the soil test, estimated to consist of nitrogen-phosphorus-potassium ratio: 16 percent nitrogen, 20 percent phosphorus, and 0 percent potassium.

3.3.11.3. Organic Soil Amendments

a. Topsoil: The existing surface soil shall be stripped and stockpiled on the site in accordance with Section 02210 GRADING. When required beyond that available from stripping, the topsoil shall be delivered. Delivered topsoil shall conform to topsoil requirements specified in Section 02210 GRADING, and shall be amended as recommended by soil test.

b. Peat: Peat moss or humus derived from a bog, swampland or marsh shall conform to ASTM D 2607.

c. Sand: Clean, free of toxic materials; 95 percent by weight shall pass a 10-mesh sieve and 10 percent by weight shall pass a 16-mesh sieve.

d. Rotted Manure: Well rotted, horse or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials, free of stones, sticks, soil and containing no chemicals or ingredients harmful to plants.

e. Decomposed Wood Derivatives: Ground bark, sawdust, or other wood waste material free of stones, sticks, soil, and toxic substances harmful to plants, stabilized with nitrogen and having the following properties:

Particle Size: Minimum percent by weight passing:

Screen Size	Percent
No. 4 mesh Screen	95
No. 8 mesh screen	80

Nitrogen Content: Minimum percent based on dry weight:

Material	Percent
Redwood Sawdust	0.5
Fir Sawdust	0.7
Fir or Pine Bark	1.0

3.3.11.4. Soil Conditioner/Fertilizer

Soil conditioner and fertilizer shall be derived from organic materials such as decomposed animal, vegetable, and mineral matter, which has been composted, is relatively dry, friable, and pass a one inch sieve. The conditioner shall not contain poultry, animal or human waste, pathogenic viruses, fly larvae, insecticides, fungicides, and poisonous chemicals that would inhibit plant growth. The conditioner shall be the following guaranteed chemical analysis:

Ingredient	Percentage (Minimum)
Nitrogen	5
Phosphoric Acid	3
Water Soluble Potash	1
Humus	50
Humic Acids	15
Soluble Metallic Iron	1

3.3.11.5. Gypsum

Gypsum shall be commercially packaged, free flowing, minimum 95 percent calcium sulfate by volume.

3.3.11.6. Porous Silica Aggregate

Porous silica aggregate shall be of commercial grade diatomaceous earth and be free flowing.

3.3.11.7. Iron Sulfate

Iron sulfate shall be commercially packaged, free flowing with an analysis of 19% Fe and 14% S.

3.3.12. Water

Water shall be from a designated reclaimed water source.

3.3.13. Pesticide

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide and miticide. For the purpose of this specification, soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved insecticide, herbicide, fungicide, nematocide, rodenticide, miticide, and soil fumigant.

3.3.14. Sodding Times and Conditions

3.3.14.1. Sodding Time

Sod shall be placed from April to June for spring planting and from September to October for fall planting. Sod placement shall be timed to allow enough time for sod establishment before dormancy.

3.3.14.1. Turfing Conditions

Turf operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the turf operations, proposed times shall be submitted to and approved by the Contracting Officer.

3.3.15. Site Preparation

3.3.15.1. Grading

The Contracting Officer shall verify that finished grades are as indicated on drawings, and the placing of topsoil and the smooth grading has been completed in accordance with Section 02210 GRADING.

3.3.15.1.1. Soil Test

A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local and site specific growing conditions for the type and variety of turf specified.

3.3.15.2 Application of Soil Amendments

The following soil amendments shall be incorporated into the soil if a manufactured soil conditioner/fertilizer is not utilized:

3.3.15.2.1. Soil Sulfur

Soil Sulfur shall be applied at the rate recommended by the soil test, estimated rate 15 kg per 93 square meters. Sulfur shall be incorporated into the soil to a minimum depth of 150 mm or may be incorporated as part of the tillage operation.

3.3.15.2.2. Fertilizer

Fertilizer shall be applied at the rate recommended by the soil test, estimated at 3.2 kg per 93 square meters. Fertilizer shall be incorporated into the soil to a minimum depth of 150 mm or may be incorporated as part of the tillage or hydroseeding operation.

3.3.15.2.3. Compost

A nitrogen stabilized compost shall be spread uniformly over the soil at the rate of 3 cubic meters per 93 square meters and thoroughly incorporated by tillage into the soil to a minimum depth of 150 mm.

3.3.15.2.4. Iron Sulfate

Iron sulfate shall be applied and incorporated uniformly into the soil at the rate of 3.3 kg per 93 square meters.

3.3.16. Application of Soil Amendments Using Soil Conditioner/Fertilizer

The following soil amendment ratios shall be incorporated into the soil if a manufactured soil conditioner/fertilizer is used:

3.3.16.1. Soil Sulfur

Soil sulfur shall be applied at the rate recommended by the soil test, estimated rate 14.8 kg per 93 meters. Sulfur shall be incorporated into the soil to a minimum depth of 150 mm or may be incorporated as part of the tillage operation.

3.3.16.2. Soil Conditioner/Fertilizer

Soil conditioner/fertilizer shall be applied evenly at the rate of 91 kg per 93 square meters., and thoroughly incorporated as into the soil to a minimum depth of 150 mm or may be incorporated as part of the tillage operation.

3.3.17. Tillage

3.3.17.1. Minimum Depth

Soil within turf areas shall be tilled minimum depth of 150 mm. Rototiller shall be used where soil conditions and size of area permit.

3.3.18. Finished Grading

3.3.18.1. Preparation

Turf areas shall be filled as needed or have surplus soil removed to attain the finished grade. Drainage patterns shall be maintained as indicated on drawings. Turf areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of erosion or grade deficiencies shall conform to topsoil requirements specified in Section 02210 GRADING. Finished grade shall be 25 mm below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas.

3.3.18.2. Turf Area Debris

Turf areas shall have debris and stones larger than 25 mm in any dimension removed from the surface.

3.3.18.3. Protection

Finished graded areas shall be protected from damage by vehicular or pedestrian traffic and erosion.

3.3.19. Sodding

3.3.19.1. General

Areas shall be sodded as indicated. Adequate soil moisture shall be ensured prior to sodding by spraying water on the area to be sodded and wetting the soil to a minimum depth of 25 mm.

3.3.19.2. Placing Sod

Rows of sod shall be placed parallel to and tightly against each other. Joints shall be staggered laterally. The sod strips shall not be stretched or overlapped. All joints shall be butted tight. Voids and air drying of roots shall be prevented. On long slopes, sod shall be laid at right angles to slopes. In ditches, sod shall be laid at right angles to the flow of water. When required, the sod shall be anchored by placing anchors a minimum distance of 600 mm on center with a minimum of 2 anchors per sod section.

3.3.19.3. Finishing

Air pockets shall be eliminated and a true and even surface shall be provided by tamping or rolling the sod in place. Displacement of the sod shall be assured by knitting of sod to the soil. Frayed edges shall be trimmed and holes or missing corners shall be patched in the sod.

3.3.19.4. Watering Sod

Watering shall be started immediately after completing each day of sodding. Water shall be applied at a rate sufficient to ensure moist soil conditions to a minimum depth of 25 mm. Run-off and puddling shall be prevented.

3.3.20. Application of Pesticide

When pesticide becomes necessary to remove a pest or disease, a state-certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Hydraulic equipment shall be provided for the liquid application of pesticides with a leak-proof tank, positive agitation methods, controlled application pressure and metering gauges. A pesticide plan shall be provided to the Contracting Officer as stated in paragraph SUBMITTALS.

3.3.21. Restoration and Clean Up

3.3.21.1. Restoration

Existing turf areas, pavements and facilities that have been damaged from the turfing operation shall be restored to original condition at Contractor's expense.

3.3.21.2. Clean Up

Excess and waste material shall be removed from the planting operation and shall be disposed of off the site. Adjacent paved areas shall be cleaned.

3.3.22. Protection of Turfed Areas

Immediately after turfing, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed by the Contracting Officer.

3.3.23. Turf Establishment Period

3.3.23.1. Commencement

The Turf Establishment Period for establishing a healthy stand of turf shall begin on the first day of work under this contract and shall end 60 days after the last day of turfing operations required by this contract. Written calendar time period shall be furnished to the Contracting Officer for the Turf Establishment Period. When there is more than one turf establishment period, describe the boundaries of the turfed area covered for each period.

3.3.23.2. Satisfactory Stand of Turf

3.3.34.2.1. Sodded Area

A satisfactory stand of turf from the sodding operation is defined as vigorous living sod uniform in rooting and top growth.

3.3.23.3. Maintenance During Establishment Period

3.3.23.3.1. General

Maintenance of the turfed areas shall include eradicating weeds, eradicating insects and diseases, protecting embankments and ditches from erosion, maintaining erosion control materials and mulch, protecting turfed areas from traffic, mowing, watering, and post-fertilization.

3.3.23.3.2. Mowing

a. Lawn Areas: Lawn areas shall be mowed to a minimum height as recommended by the seed producer when the average height of the turf becomes 50 mm. Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas.

b. Field Areas: Field areas shall be mowed once during the season to a minimum height of 150 mm.

3.3.23.3.2. Watering

Watering shall be at intervals to obtain a moist soil condition to a minimum depth of 25 mm. Frequency of watering and quantity of water shall be adjusted in accordance with the growth of the turf. Run-off, puddling and wilting shall be prevented.

3.3.23.3.3. Post-Fertilization

Nitrogen carrier fertilizer shall be applied at the rate of 3.2 kg per 93 square meters after the first month and again every three months to the final acceptance. The application shall be timed prior to the advent of winter dormancy and shall avoid excessively high nitrogen levels.

3.3.23.3.5. Pesticide

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.3.23.3.6. Repair

The Contractor shall re-establish as specified herein, eroded, damaged or barren areas. Mulch shall also be repaired or replaced as required.

3.3.23.4. Maintenance Report

A written record shall be furnished to the Contracting Officer of the maintenance work performed.

3.3.24. Final Acceptance

3.3.24.1. Preliminary Inspection

Prior to the completion of the Turf Establishment Period, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be established in writing. The acceptability of the turf in accordance with the Turf Establishment Period shall be determined. A unacceptable stand of turf shall be repaired as soon as turfing condition permit.

3.3.24.2. Final Inspection

A final inspection shall be held by the Contracting Officer to determine that deficiencies noted in the preliminary inspection have been corrected. Time for the inspection shall be established in writing.

3.4 Irrigation

3.4.1. General: Irrigation system will be an automatic permanent underground system for all plants and turf areas. The system shall be circuited and designed for hydrozones and water efficiency. All turf heads shall be low volume rotor heads or spray heads. All shrub and tree plantings shall be of pop-up stream or flood bubbler type or drip system. Provide 1-quick coupler in valve box per 30 m. All valves shall be placed withing plastic valve box. Controller shall be pedestal vandal resistant mounted. The BPU unit shall be insulated and provided with a freeze blanket cover, and located within a low profile location and shrub area. Existing irrigation piping encountered shall be capped and/or abandoned in place.

3.4.1.1. Minimum Coverage:

Bubblers:	2 per tree/palm	1 per shrub
Drip Emitters:	6 per tree/palm	3 per shrub

Turf areas: Head to head coverage; minimum two directions

3.4.1.2. Existing Irrigation Systems: Existing irrigation system elements such as piping, valves, wiring, etc. encountered during demolition and construction shall be capped and removed/abandoned if the area affected is within the project. Irrigation systems damaged by project demolition or construction work that is outside the project area shall be repaired and/or modified to bring effected systems to a functioning order.

3.4.2. Summary

The Contractor shall provide the design and installation to achieve full irrigation coverage of all plantings and turf. Ensure each plant receives the required amounts of water without over or under saturating other plants within the same circuit. The irrigation system shall be designed based on the static pressure at the backflow preventer at the time of installation. A pressure test shall be performed prior to the start of work. Design shall meet all local codes and regulations and shall operate properly within the acceptable use of all equipment used.

3.4.3. References

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1989a) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM B 32	(1989) Solder Metal
ASTM B 43	(1988) Seamless Red Brass Pipe, Standard Sizes
ASTM B 88	(1989) Seamless Copper Water Tube
ASTM D 1785	(1989) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(1989) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2287	(1981; R 1988) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM D 2464	(1989) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1989) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	(1988) Solvent Cements for (Poly Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASTM D 2774	(1972; R 1983) Underground Installation of Thermostatic Pressure Piping
ASTM D 2855	(1983) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3261	(1988a) Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM F 441	(1989) Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A112.26.1M	(1984) Water Hammer Arresters
ASME B16.3	(1985) Malleable Iron Threaded Fittings, Classes 150 and 300
ASME B16.15	(1985) Cast Bronze Threaded Fittings, Classes 125 and 250
ASME B16.18	(1984) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(1989) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B40.1	(1985) Gauges - Pressure Indicating Dial Type - Elastic Element

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1012	(Sep 1978) Backflow Preventers with Intermediate Atmospheric Vent
ASSE 1013	(Apr 1988) Reduced Pressure Principle Backflow Preventers
ASSE 1020	(Feb 1989) Pressure Vacuum Breaker, Assembly (Recommended for Outdoor Usage)

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C509	(1987) Resilient-Seated Gate Valves, 3 through 12 NPS, for Water and Sewerage Systems
AWWA C901	(1988; Errata) Polyethylene (PE) Pressure Pipe and Tubing, ½ in. Through 3 in., for Water Service

FEDERAL SPECIFICATIONS (FS)

FS 0-F-506	(Rev C) Flux, Soldering; Paste and Liquid
FS WW-H-001220	(Basic) Head, Sprinkler, (Underground Connected)
FS WW-S-610	(Rev B; Am 1) Sprinkler, Lawn, (Surface Connected)

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCHR)

FCCHR-01	(Jun 1988; 8th Ed) Manual of Cross-Connection Control

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(1987) Bronze Gate, Globe, Angle and Check Valves
MSS SP-85	(1985) Cast Iron Globe and Angle Valves - Flanged and Threaded Ends

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(1988; Rev 1) Industrial Control Devices, Controllers and Assemblies
NEMA ICS 6	(1988; Rev 1) Enclosures for Industrial Control and Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1990) National Electrical Code

3.4.4. Performance Requirements

System shall operate with a minimum water pressure of 345 kPa at connection to main.

3.4.5. Delivery and Storage

All equipment delivered and placed in storage shall be protected from the weather; excessive humidity and temperature variation; direct sunlight (in the case of plastic or rubber materials); and dirt, dust, or other contaminants.

3.4.6. Field Measurements

The Contractor shall verify all dimensions in the field and shall advise the Contracting Officer of any discrepancy before performing the work.

3.4.7. General Materials and Equipment Requirements

3.4.7.1. Standard Products

Materials and equipment shall be the standard products of a manufacturer who has produced similar systems which have performed well for a minimum period of 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

3.4.7.2. Nameplates

Each item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

3.4.7.3. Extra Stock

The following extra stock shall be provided: Ten heads of each size and type, two valve keys for operating manual valves, two wrenches for removing and installing each type of head, two quick coupler keys and hose swivels, and four irrigation controller housing keys.

3.4.8. Piping Materials

3.4.8.1. Copper Tubing and Associated Fittings

3.4.8.1.1. Tubing

Tubing shall conform to requirements of ASTM B 88, Type K.

3.4.8.1.2. Fittings

Fittings shall conform to ASME B16.22 and ASME B16.18, solder joint. Solder shall conform to ASTM B 32 95-5 tin-antimony. Flux shall conform to FS 0-F-506, Type I.

3.4.8.2. Red Brass Pipe and Associated Fittings

3.4.8.2.1. Pipe

Pipe shall conform to requirements of ASTM B 43, regular.

3.4.8.2.2. Fittings

Fittings shall be Class 250, cast bronze threaded conforming to the requirements of ASME B16.15.

3.4.8.3. Galvanized Steel Pipe and Associated Fittings

3.4.8.3.1. Pipe

Pipe shall conform to requirements of ASTM A 53, Schedule 40.

3.4.8.3.2. Fittings

Fittings shall be Class 150 conforming to requirements of ASME B16.3.

3.4.8.4. Polyvinyl Chloride (PVC) Pipe, Fittings, Solvent Cement, and Risers

3.4.8.4.1. Pipe

Pipe shall conform to the requirements of ASTM D 1785, PVC 1120 Schedule 40; and ASTM D 2241, PVC 1120 SDR 21, Class 200.

3.4.8.4.2. Fittings

Solvent welded socket type fittings shall conform to requirements of ASTM D 2466, Schedule 40. Threaded type fittings shall conform to requirements of ASTM D 2464, Schedule 80.

3.4.8.4.3. Solvent Cement

Solvent cement shall conform to the requirements of ASTM D 2564.

3.4.8.4.4. Risers

Risers shall be schedule 80 PVC threaded at both ends and shall conform to ASTM D 2241.

3.4.8.5. Polyethylene (PE) Plastic Piping

3.4.8.5.1. Pipe

Pipe shall conform to AWWA C901, outside diameter base with dimension ratio (DR) of 9.3 to provide 1,034 kPa minimum pressure rating.

3.4.8.5.1.1. Distribution Tubing

Distribution tubing shall be linear low density polyethylene tubing. It shall have a nominal reference of 7.5 mm, outside diameter of 9 mm, inside diameter of 7.5 mm, and a average wall thickness of 1.27 mm. Tubing shall be vinyl plastic extruded from non-rigid chloride, integrally algae-resistant, homogeneous throughout, smooth inside and outside, free from foreign materials, cracks, serrations, blisters and other effects.

3.4.8.5.2. Fittings

Fittings shall conform to ASTM D 3261, DR of 9.3.

3.4.8.6. Dielectric Fittings

Fittings shall conform to ASTM F 441, Schedule 80, CPVC threaded pipe nipples, 100 mm minimum length.

3.4.9. HEADS

3.4.9.1. Multi-Outlet Emitters

Multi-outlet emitter heads shall be self-cleaning, pressure compensating diaphragm with six self-piercing barbed outlets; each capable of emitting 7.6 liters per hour flow. Emitter body shall be ultraviolet stabilized, algae, and heat resistant plastic construction.

3.4.9.2. Rotary Pop-Up Sprinklers

Sprinklers shall be gear driven with adjustable and full circle arc models. Sprinklers shall be capable providing various radius coverages at low precipitation rates. Pop-up head design shall be 95.25 mm pop up with adjustable radius capabilities. Construction shall be of high impact molded plastic with

filter screen, drain check valve, and come with multiple nozzles.

3.4.9.3. Bubblers

Bubblers shall be fully adjustable stream or flood flow with operation over a wide range of pressures. Head to be of molded plastic and stainless steel construction. Pop-up body shall be plastic with a 4" pop-up.

3.4.10. Valves

3.4.10.1. Gate Valves, Less than 80 mm

Gate valves shall conform to the requirements of MSS SP-80, Type 1, Class 150, threaded ends.

3.4.10.2. Gate Valves, 80 mm and Larger

Gate valves shall conform to the requirements of AWWA C509 and have encapsulated resilient wedge, parallel seats, non-rising stems, and open by counterclockwise turning. End connections shall be flanged. Interior construction of valves shall be bronze including stem containing a maximum 2 percent aluminum and maximum 16 percent zinc.

3.4.10.3. Quick Coupling Valves

Quick coupling valves shall have brass parts and shall be two-piece unit consisting of a coupler water seal valve assembly and a removable upper body to allow spring and key track to be serviced without shutdown of main. Lids shall be lockable vinyl with spring for positive closure on key removal.

3.4.10.4. Remote Control Valves, Electrical

Remote control valves shall be solenoid actuated globe valves of 20 mm to 80 mm size, suitable for 24 volts, 60/50 cycle, and designed to provide for shut-off in event of power failure. Valve shall be cast bronze or brass or plastic housing suitable for service at 1,034 kPa operating pressure with external flow control adjustment for shut-off capability, external plug at diaphragm chamber to enable manual operation, filter in control chamber to prevent valve body clogging with debris, durable diaphragm, and accessibility to internal parts without removing valve from system.

3.4.10.5. Automatic Drain Valves

Automatic valves shall be brass or plastic, spring loaded ball drip type, 1,034 kPa and threaded ends, designed to close at 2 m pressure head with positive seal at 21 kPa pressure or greater and be open to drain at less than 21 kPa pressure.

3.4.10.6. Reduced Pressure Backflow Preventer Assembly

Reduced pressure backflow preventer assemblies shall be tested, approved, and listed in accordance with FCCHR-01. Reduced pressure backflow preventers shall be in accordance with ASSE 1013. Backflow preventers shall be 68 kg flanged bronze mounted gate valve and strainer, stainless steel or bronze internal parts. Total pressure drop through complete assembly shall be a maximum of 69 kPa at

rated flow. Piping shall be galvanized steel pipe and fittings. Strainers shall be bronze or brass construction with gasket caps. Units shall have 200-mesh stainless steel screen elements.

3.4.11. Accessories and Appurtenances

3.4.11.1. Valve Boxes

Valve and emitter boxes shall be cast iron, plastic lockable, or precast concrete. Box sizes shall be adjustable for valve used. Cast iron box shall have bituminous coating. Boxes shall be sized as required to provide for easy access. The following inscription shall be burnt or permanently marked into the appropriate boxes lid:

Type of Box	Inscription
Drip valve assembly box	"Valve"
Quick coupling valve box	"QC"
Gate valve box	"GV"
Automatic drain valve box	"DV"
Emitter box	“EM”

3.4.11.2. Pressure Gauges

Pressure gauges shall conform to requirements of ASME B40.1, single style pressure gauge for water with 114 mm dial brass or aluminum case, bronze tube, gauge cock, pressure snubber, and siphon. Scale range shall be suitable for irrigation sprinkler systems.

3.4.11.3. Service Clamps

Service clamps shall be bronze flat, double strap, with neoprene gasket or "O"-ring seal.

3.4.11.4. Water Hammer Arresters

Water hammer arrester shall conform to the requirements of ASME A112.26.1M; stainless steel construction with an encased and sealed bellows compression chamber.

3.4.11.5. Drip Valve Assembly Accessories

3.4.11.5.1. Wye Strainer

Strainer shall be provided at inlet to each drip line. Strainer shall have stainless steel screen having equivalent of 140-mesh filtration capacity and incorporate flush valves within strainer to clean screen without disassembling unit.

3.4.11.5.2. Pressure Regulator

Pressure regulator shall be constructed of heat-resistant plastic and be provided with each remote control valve. The pre-set outlet pressure shall be 172 kPa. Pressure regulator shall have a 20 mm female threaded inlet and outlet.

3.4.11.5.3. Riser Adapters

Riser adapters shall be provided with a rigid piping system.

3.4.11.5.4. Tubing Stakes

Tubing stakes shall be plastic coated steel, or other non-corrosive strong material to secure tubing.

3.4.11.5.5. Emitter Outlet Check Valve (Insect Cap)

Check valves shall be provided at end of each emitter outlet distribution line. Caps shall permit free flow of water with minimum restriction; prevent back siphoning, entry of insects, and contamination into outlet ports.

3.4.11.5.6. Closure Caps

Closure caps shall be in accordance with manufacturer's recommendations.

3.4.12. Automatic Controllers, Electrical

Controller shall conform to the requirements of NEMA ICS 2 with 120-volt single phase service, operating with indicated stations, and grounded chassis. Enclosure shall conform to NEMA ICS 6 Type 3R, with locking hinged cover, wall-mounted. Controller shall be programmed for various schedules by setting switches and dials equipped with the following features: A switch for each day of week for two schedules, allowing each station to be scheduled individually as to days of watering; a minute switch for each station with a positive increment range of 0-99 minutes or 0-9.9 hours, set time within one percent; a switch allowing selected schedules to be repeated after each completion of initial watering schedule and allowing each operation to be scheduled throughout a 24-hour day; a circuit breaker for surge protection; and circuit for a 9-volt rechargeable NiCad battery.

3.4.13. Electrical work

Wiring and rigid conduit for electrical power shall be in accordance with NFPA 70, and Section 16375, ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.

3.4.14. Concrete Materials

Concrete shall have a compressive strength of 17,237 kPa at 28 days as specified in Section 03300, CONCRETE FOR BUILDING CONSTRUCTION.

3.4.15. Water Supply Main Materials

Tapping sleeves, service cut off valves, and connections to water supply mains shall be in accordance with Section 02660, WATER LINES.

3.4.16. Insulating Joints

Insulating joints and dielectric fittings shall be in accordance with Section 02660, WATER LINES.

3.4.17. Pea Gravel

Pea gravel shall be approximately 9.5 mm in size and shall be washed smooth gravel clean of dirt and debris.

3.4.18. Installation

Sprinkler system shall be installed after site grading has been completed. Excavation, trenching, and backfilling for sprinkler system shall be in accordance with the applicable provisions of Section 02222, EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein. Provide a 20 mm valve and capped line to shade structure for future misting system installation.

3.4.18.1. Trenching

Backfill shall be hand tamped over excavation. When rock is encountered, trench shall be excavated 100 mm deeper and backfilled with silty sand (SM) or well-graded sand (SW) to pipe grade. Trenches shall be kept free of obstructions and debris that would damage pipe. Subsoil shall not be mixed with topsoil. Existing concrete walks, drives and other obstacles shall be bored at a depth conforming to bottom of adjacent trenches. Pipe sleeves for bored pipe shall be two pipe diameters larger than irrigation pipe.

3.4.18.1.1. Underground Utility and Communications

Before start of trenching, the Contractor shall mark all known underground utility and communication line locations as shown on drawings. Work crews shall note these locations and care shall be taken when working in their vicinity.

3.4.18.2. Piping System

3.4.18.2.1. Cover

Underground piping shall be installed as to meet the minimum depth of backfill cover specified on plans.

3.4.18.2.2. Clearances

Minimum horizontal clearances between lines shall be 100 mm for pipe 50 mm and less; 300 mm for 65 mm and larger. Minimum vertical clearances between lines shall be 25 mm for lateral lines. Do not place lateral lines directly over main line.

3.4.18.2.3. Minimum Slope

Minimum slope shall be 152 mm per 30 m in direction of drain valves.

3.4.18.3. Piping Installation

3.4.18.3.1. Polyvinyl Chloride (PVC) Pipe

a. Solvent-cemented joints shall conform to the requirements of ASTM D 2855.

b. Threaded joints shall be full cut with a maximum of three threads remaining exposed on pipe and nipples. Threaded joints shall be made tight without recourse to wicks or fillers, other than polytetrafluoroethylene thread tape.

c. Piping shall be joined to conform with requirements of ASTM D 2774 or ASTM D 2855, and pipe manufacturer's instructions. Pipe shall be installed in a serpentine (snaked) manner to allow for expansion and contraction in trench before backfilling. Pipes shall be installed at temperatures over 40 degrees F.

3.4.18.3.2. Soldered Copper Tubing

Pipe shall be reamed and burrs removed. Contact surfaces of joint shall be cleaned and polished. Flux shall be applied to male and female ends. End of tube shall be inserted into fittings full depth of socket. After soldering, a solder bead shall show continuously around entire joint circumference. Excess acid flux shall be removed from tubings and fittings.

3.4.18.3.3. Threaded Brass or Galvanized Steel Pipe

Prior to installation, pipe shall be reamed. Threads shall be cut in conformance with ASME B1.2. Pipe joint compound shall be applied to male end only.

3.4.18.3.4. Insulating Joints

Insulating and dielectric fittings shall be provided where pipes of dissimilar metal are joined and at connections to water supply mains as shown. Installation shall be in accordance with Section 02660, WATER LINES.

3.4.18.4. Valves

3.4.18.4.1. Remote Control Valves, Electrical

Remote control valves shall be pressure regulating, self-cleaning, solenoid actuated globe valves of 20 mm to 65 mm size, suitable for 24 volts, 60/50 cycle, and designed to provide for shut-off in event of power failure. Valve shall a be glass filled nylon or plastic housing suitable for service at 1,034 kPa operating pressure with external flow control adjustment for shut-off capability, external plug at diaphragm chamber to enable manual operation, filter in control chamber to prevent valve body clogging with debris, durable diaphragm, and accessibility to internal parts without removing valve from system.

3.4.18.4.2. Drip Valve Assembly

With each automatic valve, provide and assemble a wye strainer and a pressure regulator as shown on drawings. Valve assembly shall be set plumb in a valve box extending from grade to below valve body, with minimum of 100 mm cover measured from grade to top of valve.

3.4.18.4.3. Drain Valves

Entire system shall be manually or automatically drainable. Low points of system shall be equipped with drain valve draining into an excavation containing 0.028 cubic meters pea gravel. Pea gravel shall be covered with weed fabric then backfilled with excavated material and covered with surface mulch as designated on drawings.

3.4.18.5. Quick Coupling Valves

Quick coupling valves in valve boxes shall be installed plumb and level with terrain.

3.4.18.6. Installation of Drip Irrigation System

3.4.18.6.1. Distribution Tubing

Distribution tubing shall be connected to multi-outlet emitter and shall extend below ground to the plant as shown on the drawings. Tubing shall surface above subgrade at the plant and shall be placed below the mulch material. Install an insect cap at the end of each distribution tubing. When cutting tubing, shearing tools such as a pipe cutter, knife, or shears shall be used. Manufacturer's recommended tool and procedures when punching hose for emitters shall be followed.

3.4.18.6.2. Multi-Outlet Emitters

Emitters shall be installed in a plastic emitter box. Emitter on a rigid PVC nipple shall be connected to PVC drip lateral with a tee or elbow. Tubing shall be attached to barbed fitting and daylight distribution tubing at root ball secured with stake, with bug cap at end of secured distribution tubing. After installing emitters and before operating system, end of drip lateral shall be opened and flushed clean. The number of emitters on a line shall not exceed manufacturer's recommendations for that hose or distribution tubing size and length. All orifices of the multi-outlet emitters that have been opened but are unused shall be installed with a closure cap.

3.4.18.6.3. Tubing Stakes

Distribution tubing shall be secured with stakes where line is above ground. Stakes shall be spaced to ensure that tubing does not shift location in presence of foot traffic, operations, gravity on slope installations, or environmental effects. Discharge of the emitter distribution tubing shall be staked to ensure that discharge point of emitter will be maintained at specified position in relation to plant material to be irrigated.

3.4.18.7. Turf heads and Pop-up Bubblers

3.4.18.7.1. Install pop up spray heads and rotary heads to provide 100% coverage of all turf areas. Adjust radius and arcs where appropriate.

3.4.18.7.2. Install pop-up bubblers within each tree or shrub planting basin.

3.4.18.8. Reduced Pressure Backflow Preventer Assembly

Reduced pressure backflow preventer assembly shall be installed in new connection to existing water distribution system, between connection and control valves. Reduced pressure type shall be installed as follows: Flush pipe lines prior to installing device and protect device by a strainer located upstream. Device shall not be installed in pits or where any part of device could become submerged in standing water. Locate in shrub beds only.

3.4.18.8.1. Insulation

All exposed piping and fittings shall be wrapped neatly with 13 mm minimum thickness of insulation tape or manufactured freeze protection blanket.

3.4.18.9. Control Wire and Conduit

3.4.18.10.1. Wires

Low voltage wires may be buried beside pipe in same trench. Rigid conduit shall be provided where wires run under paving. Wires shall be number tagged at key locations along main to facilitate service. One control circuit shall be provided for each zone and a circuit to control irrigation system.

3.4.18.10.2. Loops

A 3,050 mm loop of wire shall be provided at each valve where controls are connected.

3.4.18.10.2. Expansion and Contraction

Multiple tubes or wires shall be bundled and taped together at 3 m intervals with 3,050 mm loop for expansion and contraction.

3.4.18.10.3. Splices

Electrical splices shall be waterproof.

3.4.18.10. Automatic Controllers

Controllers shall be wall mounted to building wall, 1,220 mm above finish grade. See drawings for automatic controller location. Coordinate the electrical service to these locations. Install in accordance with manufacturer's recommendations and NFPA 70.

3.4.18.11. Thrust Blocks

Concrete shall be placed so that sides subject to thrust or load are against undisturbed earth, and valves and fittings are serviceable after concrete has set. Thrust blocks shall be as specified in Section 02660, WATER LINES.

3.4.18.12. Backfill (Minimum Cover)

Depth of cover shall be 305 mm for non-pressure lateral pipe; 610 mm for pressure mainline pipes and for pipes under traffic loads, farm operations, and freezing temperatures; and 610 mm for low-voltage wires. Remainder of trench or pipe cover shall be filled to within 55 mm of top with excavated soil, and compact soil with plate hand-held compactors to same density as undisturbed adjacent soil. Surface shall be covered with mulch as specified.

3.4.18.13. Disinfection

Irrigation system fed from a potable water system shall be disinfected upstream of backflow preventer in accordance with Section 02660, WATER LINES.

3.4.18.14. Cleaning of Piping

Prior to the hydrostatic and operation tests, the interior of the pipe shall be flushed with clean water until pipe is free of all foreign materials. Flushing and cleaning out of system pipe, valves, and components shall not be considered completed until witnessed and accepted by Contracting Officer.

3.4.19. Field tests

All instruments, equipment, facilities, and labor required to conduct the tests shall be provided by Contractor.

3.3.19.1. Hydrostatic Pressure Test

Piping shall be tested hydrostatically before backfilling and proved tight at a hydrostatic pressure of 1,034 kPa without pumping for a period of one hour with an allowable pressure drop of 34.5 mm. If hydrostatic pressure cannot be held for a minimum of 4 hours, Contractor shall make adjustments or replacements and the tests repeated until satisfactory results are achieved and accepted by the Contracting Officer.

3.3.19.2. Leakage Tests

Leakage tests for service main shall be in accordance with Section 02660, WATER LINES.

3.4.19.3. Operation Test

At conclusion of pressure test, emitter heads, quick coupling assemblies, and hose valves shall be installed and entire system tested for operation under normal operating pressure. Operation test consists of the system operating through at least one complete programmed cycle for all areas to be irrigated.

3.4.20. Posting Framed Instructions

Framed instructions containing wiring and control diagrams under glass or in laminated plastic shall be posted where directed. Condensed operating instructions, prepared in typed form, shall be framed as specified above and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the system. After as-built drawings are approved by Contracting Officer, controller charts and programming schedule shall be prepared. One chart for each controller shall be supplied. Chart shall be a reduced drawing of actual as-built system that will fit the maximum dimensions inside controller housing. Black line print for chart and a different pastel or transparent color shall indicate each station area of coverage. After chart is completed and approved for final acceptance, chart shall be sealed between two 20-mil pieces of clear plastic.

3.4.21. Field Training

A field training course shall be provided for designated operating and maintenance staff members. Training shall be provided for a total period of 2 hours of normal working time and shall start after the system is functionally complete but prior to final acceptance tests. Field training shall cover all of the items contained in the operating and maintenance manuals.

3.4.22. Cleanup

Upon completion of installation of system, all debris and surplus materials resulting from the work shall be removed.

3.4.23. Water program

3.4.23.1. The Contractor shall develop an irrigation program based on local evapotranspiration calculations, soil type, hydrozone, and plant establishment needs. The program shall provide watering rates and times for all valve circuits and provide a complete table of recommended seasonal irrigation times. Submit irrigation program along with the required As-builts to the Contracting Officer at the end of the maintenance period.

3.4.23.2. Upon completion of planting, the Contractor shall commence automatic irrigation of the plantings. Adjust and fine tune all parts of the irrigation system carefully to meet water needs and requirements for each plant and hydrozone.

3.4.24. MAINTENANCE

See 3.2.34. for maintenance period.

3.5. Outdoor Plazas, Recreation, and Site Amenities:

3.5.1. Building Courtyards (4) will be integrated with the building main entries and break areas. CMU walls will be used to screen and provide security and a sense of enclosure. Interlocking pavers with colored concrete bands will be incorporated as accent pavement to define these areas. Site amenities for each of the courtyards will include: picnic tables, benches, and trash receptacles.

3.5.1.1. The southeast courtyard area shall incorporate a shade structure with cluster mailboxes.

3.5.1.2. The northwest courtyard area will be utilized also as a service area for furniture moving and laundry/mechanical needs. A controlled access service path from the parking area will provide vehicle access to the area.

3.5.1.3. The northeast courtyard will be expanded into the outdoor recreation plaza area. The outdoor plaza will incorporate passive sitting and eating areas with active court activities. Recreation features will include a new basketball court and sand volleyball court. Site amenities for this area shall include: picnic tables, benches, trash receptacles, barbeques, and drinking fountain.

3.5.1.3.1. Basketball Court: One concrete court will be provided to replace existing one removed. Court shall be provided complete with backboards, resilient colored surfacing, and striping. Option item.

3.5.1.3.2. Sand Volleyball Court: One court will be provided that will include post and net, sand, concrete curbing, and court drainage.

3.5.1.3.3. Shade Structure: One large custom shade structure will be provided.

Structure will be equipped with a high pressure misting system with a manual timed control capability.

3.5.2. 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.

FEDERAL SPECIFICATIONS

FF-H-116E Hinges, Hardware, Builders

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 36/A 36m-87 Structural Steel

AMERICAN WELDING SOCIETY (AWS)

D1.1-86 Structural Welding Code-Steel

AMERICAN CONCRETE INSTITUTE (ACI)

318-8 Building Code Requirements for Reinforced Concrete (with Commentary)

PRESTRESSED CONCRETE INSTITUTE (PCI)

MNL-116 Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products

MNL-120-78 Design Handbook - Precast and Prestressed Concrete (2nd Ed., Errata)

3.5.3. Inspection of conditions

Examine related work, grades, and surfaces before starting work of this section and report to the Contracting Officer in writing conditions which will prevent the proper provision of this work. Beginning the work of this section without reporting unsuitable conditions to the Contracting Officer constitutes acceptance of conditions. Any required removal, repair or replacement of this work caused by unsuitable conditions shall be done at no additional cost to the Government.

3.5.4. Acceptable manufacturers

Manufacturer named items are for standard of reference and do not necessarily limit supply to named manufacturers. Contracting Officer approved items of same physical size, function, and performance are acceptable.

3.5.4.1. Footings

Site furniture tables, trash receptacle, and benches shall be capable of being located directly on concrete paving finish grade with no additional

reinforcement necessary to the pavement section to accommodate additional loads. Contractor shall verify with manufacturer and notify Government if additional footings and anchors are required by manufacturer specifications. All footing surfaces shall be cured to reach full design strength before placement of site amenities. For benches designated off of pavement areas, concrete footing pads shall be installed in coordination with manufacturer specifications.

3.5.5. Delivery and handling

Delivery shall be made to the job site and unloaded with a crane equipped-delivery truck as per manufacturer's recommendation. All site furnishings shall be unpacked and inspected for damage at time of delivery. Contractor shall also verify that model numbers, color, materials, etc. are as specified for the project. The Contracting Officer shall be notified of the visual confirmation.

3.5.6. Guarantee

Manufacturer shall guarantee, in writing, from defects in materials and workmanship all products supplied for a minimum period of one calendar year.

3.5.7. BENCH

3.5.7.1. General

Construction shall be of precast reinforced concrete material with steel reinforcing rods used throughout, welded at all points. Bench shall be designed to be set on standard concrete pavement section. Two styles with be used: backless around the Soldier Community Building and with back for all other areas of the project. See Details.

3.5.7.2. Finish

The concrete finish shall be medium sandblasted with an integral terra cotta red color. Utility surfaces shall be smooth. Concrete shall be sealed with an acrylic sealant as per manufacturer's specifications. Type and color shall be approved by the by the Contracting Officer and match picnic tables and trash receptacles.

3.5.8. Trash receptacle

3.5.8.1. General

The receptacle shall be a pre-cast concrete receptacle with rough dimensions of 635 mm square by 865 mm in height. The receptacles shall be supplied with a self-closing metal lid and plastic removable liner container.

3.5.8.2. Finish

The concrete finish shall be medium sandblasted with an integral terra cotta red color. Concrete shall be sealed with an acrylic sealant as per manufacturer's specifications. The attached lid shall be a dark brown to match building metal. Type and color shall be approved by the Contracting Officer and match picnic tables and benches.

3.5.9. Bicycle racks

3.5.9.1. General

The high security bike racks (2 pads; 3 per pad; 18 racks total) shall be of heavy duty construction, see detail. The racks shall be designed to be permanently installed in ground with concrete footings or 4 point expansion bolted to concrete pad.

3.5.9.2. Finish

Color is black or dark brown.

3.5.10. Picnic table

3.5.10.1. General

Construction shall be of precast reinforced concrete material with steel reinforcing rods used throughout, welded at all points. Bench shall be designed to be set on standard concrete pavement section with table and 2-benches as one unit.

3.5.10.2. Finish

The concrete finish shall be medium sandblasted with an integral terra cotta red color. Utility surfaces shall be smooth. Concrete shall be sealed with an acrylic sealant as per manufacturer's specifications. Type and color shall be approved by the by the Contracting Officer and match picnic tables and trash receptacles.

3.5.11. Barbecue grill

3.5.11.1. General

The barbecues shall be two all steel group sized grill with pedestal mount with rough dimensions of 915 mm x 7,112 mm. Grill shall have separate adjustable cooking grates and be heavy duty commercial grade.

3.5.11.2. Finish

The grills shall be finished in a non-toxic, heat and rust-resistant black enamel.

3.5.12. Shade structures

3.5.12.1. General

Two different size custom shade structures are required as shown on plans. Construct as per details (See A2.9). All materials shall match adjacent building color and materials.

1-Shade Structure (Mail Box)
1- Shade Structure (Outdoor Plaza)

3.5.12.2. Finish

Structure frame, roof, and columns finish and color shall be as per details.

3.5.13. Volleyball posts and nets

3.5.13.1. General

Provide complete sand volleyball net system. Posts and fittings (set of 2)

shall be competition grade galvanized steel with net tightener and side pulley. Posts shall be 90 mm O.D. Fittings shall include net tightener, side pulley, eye bolts. Net (1) shall be competition grade with steel cable top and rope bottom with nylon netting and tapes.

3.5.13.2. Finish

Posts and fittings shall be hot-dipped galvanized.

3.5.14. Volleyball court

3.5.14.1. Concrete Curb

A continuous perimeter concrete curb 200 mm x 460mm Set top of curb 0.01 m above rough grade to allow for turf placement.

3.5.14.2. Grading

Sub-grade shall be graded as shown on drawings to court low point. Drain to catch basin and cover with geotextile fabric before sand placement.

3.5.14.3. Sand

A geotextile fabric material shall be placed on sub-grade and staked in placed as per manufacturer recommendations. A layer of 406 mm minimum of clean, washed river sand shall be placed. Coordinate net post locations and installation before sand placement.

3.5.15. Basketball components

Provide one complete set of two- basketball uprights, backboards, goal rings, and nets. Basketball system shall be heavy duty commercially available components designed for outdoor heavy use.

3.5.15.1. Uprights

Uprights shall be single or double posts of 151 mm O.D. Uprights shall fitted with braceouts and appropriate fittings. Footings shall be direct burial concrete.

3.5.15.2. Backboards

Backboard shall be regulation rectangular shaped constructed of 6 mm galvanized steel painted white or high density polyethylene.

3.5.15.3. Goal Rings and Nets

Goal ring shall be a steel heavy duty double ring with steel chain net. Paint ring regulation orange.

3.5.16. Basketball court surfacing and striping

3.5.16.1. Surfacing: An outdoor integral color resilient surfacing shall be installed as per manufacturer specifications. Surfacing shall be from recycled materials and be terra cotta red in color.

3.5.16.2. Striping: Double shot 51 mm wide striping. Commercial grade pavement marking paint, white, approved by surfacing manufacturer. Layout as per industry regulations.

3.5.17. Drinking fountain

3.5.17.1. General

Drinking fountain shall be a commercially grade pedestal concrete fountain that is handicap accessible and has freeze proof components.

3.5.17.2. Finish

Fountain shall be medium sandblasted with an integral sand or tan color. Type and color shall be approved by the by the Contracting Officer and match picnic tables and trash receptacles.

3.5.18. Installation

3.5.18.1. General

All site furnishings shall be located in field, and assembled and installed as per the manufacturer's specifications. The locations of all furnishings are to be marked in the field for the Contracting Officer's review and approval. The Contractor shall notify the Contracting Officer 24 hours in advance of needed approval of location marking. Site furnishing installation schedule shall be coordinated with other contractors to avoid conflict and possible damage.

3.5.18.2. Benches

Benches shall be located, leveled, and installed on finished concrete grade in courtyard/plaza areas. Exact field spacing shall be as per Contracting Officer's direction.

3.5.18.3. Trash Receptacles

Receptacles shall be located, leveled, and set on finished concrete grade in courtyard/plaza areas. Exact field spacing shall be as per Contracting Officer's direction.

3.5.18.4. Picnic Tables

Tables shall be located, leveled, and installed on finished concrete grade in courtyard/plaza areas. Exact field spacing shall be as per Contracting Officer's direction.

3.5.18.5. Bicycle Racks

Racks shall be permanently installed and shall be coordinated with concrete installation. Layout in locations as shown on plans. Racks shall be installed as per manufacturer's specifications.

3.5.18.6. Barbecue Grills

Install in ground as per manufacturer specifications. Exact locations in field as per Contracting Officer's direction.

3.5.18.7. Shade Structures

Coordinate installation with other work of grading, concrete, landscaping, and electrical. Install as per details shown. Layout as per plans and field conditions. Contracting Officer shall approved all layouts and column locations. Roof orientations shall match those of buildings.

3.5.19. Volleyball posts and nets

Install as per manufacturer specifications. First stakeout court layout to center court and posts in court area.

3.5.20. Volleyball court

3.5.20.1. Concrete Curb

Field stake court area before excavation and curb forming. Verify grades and drainage. Install concrete curb to maintain court dimensions and grades. Layout approved by Contracting Officer.

3.5.20.2. Grading

Sub-grade shall be sloped a minimum of 2% to a corner drain inlet covered by staked filter fabric.

3.5.20.3. Sand

A continuous geotextile fabric material shall be placed on sub-grade and staked in placed as per manufacturer recommendations. A layer of 16" minimum of clean, washed river sand shall be carefully placed to not disturb grades or geotextile. Coordinate net post locations and installation before sand installation.

3.5.21. Basketball backboard

Coordinate layout and footings with court concrete installation and striping. Install as per manufacturer specifications for regulation installation.

3.5.22. Basketball court surfacing and striping

Coordinate with concrete installation. Clean and/or wash concrete area as required to provide a suitable surface for surfacing and painting. Layout all lines first for Contracting Officer approval. All over spray and drips shall be removed immediately.

3.5.23. Drinking fountain

Install as per manufacturer specification and detail. Locate drain sump in landscape area. Fountain location and orientation as per Contracting Officer's approval.

3.5.24. Clean-up

3.5.24.1. General: All areas, structures, and equipment cleaned with all tags and labels removed. All fixtures and hardware shall be tightened and aligned. All surfaces shall be cleaned from dirt and construction markings.

3.6. <u>Hardscape</u>

3.6.1. Textured colored stamped concrete: Concrete finish shall be a spanish quarry paver .3 m x .3 m pattern. Color shall be a dark terra cotta red color. Subgrade and expansion joints as per soils engineer specification to allow for vehicle loads where necessary.

3.6.2. Colored Concrete Bands: Bands shall be 0.5m wide x .01 m deep with radius edges. Integral color shall be tan. Set grade as per textured concrete requirements and soil engineer specification to allow for vehicle loads where necessary. Expansion joints as required by soils engineer.

3.6.3. Concrete Mow Bands: Bands shall be 0.3 m wide x .01 m deep with radius edges. Intergral color shall be tan. Set .01m above rough grade to allow for sod and mulch placement. Expansion joint every 2.5 m.

3.6.4. CMU Walls: Match building color, texture, and size. Footings and rebar as per civil engineer specification. Cap all walls with CMU cap blocks.

3.7. <u>Option Items</u>

The landscape plan shown on L1.0 is with all options implemented. The following scopes of work for landscaping describe if that particular option is not implemented.

3.7.1. Option 1: complete Construction and Related Necessary Design of 12 Occupant (06 Modules) Dormitory

3.7.1.1. If-Not-Implemented: Provide additional desertscaping within additional area not utilized. Work shall include: grading, rock mulch, river rock, boulders (5 of each size), plantings (3-trees; 15 shrubs) and irrigation.

3.7.2. Option 2: parking lot, complete

3.7.1.2. If-Not-Implemented: Provide additional turf and desertscaping within additional area not utilized. Work shall include: grading, soil preparation, turf, rock mulch, river rock, boulders (8 of each size), plantings (12-trees; 40-shrubs) and irrigation.

3.7.3. OPTION 3: Basketball Court, Complete

3.7.1.3. If-Not-Implemented: Provide additional turf within additional area not utilized. Work shall include: grading, soil preparation, turf, and irrigation.

4.0 ARCHITECTURAL REQUIREMENTS:

4.0.1 Qualifications

The lead designer for each discipline of the design team shall be a licensed professional with a minimum of six years experience. The interior design shall be designed/supervised by a certified or licensed (as appropriate for their State) interior designer who is NCIDQ certified or a licensed architect who can demonstrate a minimum of six years of interior experience with projects and references.

4.1 General

4.1.1 Construction for the new dormitory with Central Service Core shall be the exterior balcony scheme laid out on drawings A2.0, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6, A2.7, A2.8, A2.9, and A3.0, A3.1, A3.2, A3.3 and A7.0. The dormitory and the Central Service Core shall be constructed of noncombustible construction according to the Uniform Building Code.

4.1.2 This section describes the Structural Interior Design (SID) portion of the contract. The furniture related items are described in section 5.0.

4.1.3 This section and Section 5.0 Structural Interior Design and Furniture Related Items shall be coordinated.

4.2 Handicapped Requirements

4.2.1 All areas and rooms of the Central Service Core shall be handicapped accessible per the Uniform Federal Accessibility Standards and the Americans with Disabilities Act (ADA).

4.3 Gross Floor Area

4.3.1 The gross floor area of the new dormitory (84 PN) and Central Service Core shall be not less than 4,525 square meters (48,707 SF).

4.4 Net Floor Areas

4.4.1 Net floor area is that space within the interior faces of exterior walls and/or interior walls. The following areas are for the Central Service Core, and shall be maintained within the given Drawings. Mechanical, Electrical and Chiller Rooms may be resized to accommodate efficient layout of mechanical and electrical equipment.

	Room Name	Net Area (SM)	Net Area (SF)
FIRST FLOOR			
1.	TV/Game Room	50.44	542.9
2.	Office	12.07	129.9
3.	Linen Storage	4.72	50.8
4.	Women’s Toilet	4.08	43.9
5.	Men’s Toilet	4.08	43.9
6.	Janitor’s Closet	2.43	26.2
7.	Comm Closet	5.9	63.5
	Room Name	Net Area (SM)	Net Area (SF)

8.	Electrical Closet	10.03	108.0
9.	Laundry	36.20	389.7
10.	Mechanical Room	36.13	388.9
11.	Stair 2	13.42	144.5
12.	Outside Storage	2.64	28.4

SECOND FLOOR

1.	Bulk Storage	82.14	884.1
2.	Comm Closet	4.09	44.0
3.	Stair 2	13.42	144.5

THIRD FLOOR

1.	Bulk Storage	82.14	884.1
2.	Comm Closet	4.09	44.0
3.	Stair 2	13.42	144.5

4.4.2 **Dormitory Room Units:** Each room unit identified in the table contained in paragraphs 4.4.3 includes the following spaces and net useable floor areas unless otherwise noted:

4.4.2.1	**Living/Sleeping**	11.00	118.4
4.4.2.2	**Closet**	2.03	21.9
4.4.2.3	**Lavatory (and floor space)**	1.52	16.4
4.4.2.4	**Living/Sleeping**	11.00	118.4
4.4.2.5	**Closet**	2.03	21.9
4.4.2.6	**Lavatory (and floor space)**	1.52	16.4
4.4.2.7	**Kitchen/Dining**	8.69	93.5
4.4.2.8	**Bath**	2.98	32.07
4.4.2.9	**Duct Chase**	0.13	1.4

4.4.3 Net floor area is that space within the interior faces of exterior walls and/or interior walls. The following areas are for the dormitory (84 PN) with additive units, and shall be maintained within the given Drawings.

ROOM NAMES	NET AREA (SM)	Net Area (SF)
First Floor Dormitory (84 PN)		
1. Stair 1	13.36	138.7
2. Unit 100	40.9	440.2
3. Unit 101	40.9	440.2
4. Unit 102	40.9	440.2
5. Unit 103	40.9	440.2
6. Unit 104	40.9	440.2
7. Unit 105	40.9	440.2
8. Unit 106	40.9	440.2

ROOM NAMES NET AREA (SM) Net Area (SF)

9.	Unit 107	40.9	440.2
10.	Unit 118	40.9	440.2
11.	Unit 119	40.9	440.2
12.	Unit 120	40.9	440.2
13.	Unit 121	40.9	440.2
14.	Unit 122	40.9	440.2
15.	Unit 123	40.9	440.2
16.	Unit 124	40.9	440.2
17.	Unit 125	40.9	440.2
18.	Stair 3	13.36	138.7
	Total First Floor Net Area*	**1,408.16**	**15,157.3**
	Total First Floor Gross Area	**1,577.02**	**16,974.9**

Second Floor Dormitory (84 PN)

ROOM NAMES		NET AREA (SM)	Net Area (SF)
1.	Stair 1	13.36	138.7
2.	Unit 200	40.9	440.2
3.	Unit 201	40.9	440.2
4.	Unit 202	40.9	440.2
5.	Unit 203	40.9	440.2
6.	Unit 204	40.9	440.2
7.	Unit 205	40.9	440.2
8.	Unit 206	40.9	440.2
9.	Unit 207	40.9	440.2
10.	Unit 210	40.9	440.2
11.	Unit 211	40.9	440.2
12.	Unit 212	40.9	440.2
13.	Unit 213	40.9	440.2
14.	Unit 214	40.9	440.2
15.	Unit 215	40.9	440.2
16.	Unit 216	40.9	440.2
17.	Unit 217	40.9	440.2
18.	Stair 3	13.36	138.7
	Total Second Floor Net Area	**1,321.7**	**14,226.7**
	Total Second Floor Gross Area	**1,474.05**	**15,866.5**

Third Floor Dormitory (84 PN)

ROOM NAMES		NET AREA (SM)	Net Area (SF)
1.	Stair 1	13.36	138.7
2.	Unit 300	40.9	440.2
3.	Unit 301	40.9	440.2
4.	Unit 302	40.9	440.2
5.	Unit 303	40.9	440.2
6.	Unit 304	40.9	440.2
7.	Unit 305	40.9	440.2
8.	Unit 306	40.9	440.2
9.	Unit 307	40.9	440.2
10.	Unit 310	40.9	440.2
11.	Unit 311	40.9	440.2
12.	Unit 312	40.9	440.2
ROOM NAMES		NET AREA (SM)	Net Area (SF)

13.	Unit 313	40.9	440.2
14.	Unit 314	40.9	440.2
15.	Unit 315	40.9	440.2
16.	Unit 316	40.9	440.2
17.	Unit 317	40.9	440.2
18.	Stair 3	13.36	138.7
	Total Third Floor Net Area	**1,321.7**	**14,226.7**
	Total Third Floor Gross Area	**1,474.05**	**15,866.5**
	Total Building Gross Area	**4,525.12**	**48,707.9**

*Includes half scope balconies and breeze ways.

4.5 <u>Special requirements for various rooms or spaces in the Central Service Core</u>

4.5.1 Bulk/Storage: Provide a total of 64 1,200 mm (~4 feet) wide by 1,200 mm (~4 feet) deep by 1,200 mm (~4 feet) tall, and a total of 32 1,200 mm (~4 feet) wide by 1,200 mm (~4 feet) deep by 2,400 mm (~8 feet) tall manufacturer's standard 3.5 mm (10 gage) crimped steel, wire rectangular mesh welded to steel angle frame, bulk storage lockers in the numbers and arrangements shown on the drawings. Storage lockers shall have manufacturer's standard steel angle framed, steel mesh, nominal 1,200 mm (~4 feet) wide by 1,200 mm (~4 feet) high doors for half height lockers and nominal 1,200 mm (~4 feet) wide by 2,400 mm (~8 feet) high doors for full height lockers with provisions for securing with a padlock. Storage lockers shall be stacked two high where indicated on the drawings.

4.5.2 Linen Storage: Provide a minimum of six, 610 mm (two feet) deep adjustable, wall mounted shelves, arranged vertically, in an "L" shape, along 2 sides of the Linen Storage room as indicated on the drawings. Shelves shall extend from wall face to wall face, in one direction, and from shelf face to wall face in the other direction.

4.5.3 Laundry: Provide three, 762 mm (2 feet 6 inch) wide by 1,524 mm (5 feet) long, plastic laminate covered tables anchored to floor in location indicated on the drawings. Provide stainless steel clothes hanger rod supported a minimum of 1,000 mm centered above each table, and extending the length of each table. Accommodate washers and dryers as shown on drawings coordinating electrical and mechanical requirements. Provide plastic laminate covered dust shelf between washing machines as indicated on the drawing. Dust shelf shall be mounted on 92 mm metal stud framing a minimum of 10 mm above the top of standard washing machine control panel surface. End of dust shelf facing into the laundry room shall be finished with a plastic laminate finished end panel. All dryers shall be vented directly to the outside. Vent covers shall be a minimum 1.3 mm (18 gage) thick metal fabrication to resist denting and damage.

4.5.4 Entry: Provide recessed foot grilles in TV/Game Room as indicated on the drawings.

4.5.5 Office: The manager's office shall be provided with a surveillance window viewing the TV/Game Room located as indicated on the drawings.

4.5.6 Women's and Men's Toilets: Provide one wall mounted, stainless steel toilet tissue dispenser, and one toilet seat cover dispenser with a capacity of 200 seat covers in each toilet. Toilet tissue dispenser shall have two rolls of tissue stacked vertically that shall be roller mounted on two support brackets. Brackets shall be stainless steel. Provide one semi-recessed, wall mounted, stainless steel, combination paper towel dispenser and disposal near lavatory in

each toilet. Dispenser/receptacle shall have a capacity of 400 sheets of C-fold, single-fold, or quarter-fold paper towels. Waste receptacle shall be designed to be locked in unit and removable for service. Locking mechanism shall be tumbler key lock. Waste receptacle shall have a capacity of 45 liters (12 gallons). Unit shall be fabricated of not less than 0.8 mm (0.030 inch) stainless steel welded construction with all exposed surfaces having a satin finish. Waste receptacle that accepts reusable liner standard for unit manufacturer shall be provided. Provide one soap dispenser for the lavatory in each toilet. Soap dispenser shall be top loading, liquid type consisting of a vertical Type 304 stainless steel tank with holding capacity of 0.94 L (32 fluid ounces) with a corrosion-resistant all-purpose valve that dispenses liquid soaps. Provide minimum of 457.2 mm (18 inch) by 762 mm (30 inch) wall mounted glass mirror over lavatory in each toilet. For all dispensers, provide manufacturer part number, name and address or method of contact for dispenser refills to Nellis Housing Management Flight.

4.5.7 Janitor Room: Shall have a minimum of 3,048 linear mm(10 linear feet) of adjustable, wall mounted shelving and a floor mounted mop sink with mop rack.

4.5.8 Vending: Provide electrical outlets to accommodate a minimum of 3 vending machines located along the exterior wall indicated. Provide folding metal accordion security grill to secure vending when not in use. See plans and elevations for location.

4.5.9 TV/Game Room: Provide outlets for cable TV hook up. Provide acoustical wall treatment and chair rail.

4.6 Typical Room Unit

4.6.1 Kitchen/Dining: Provide double bowl stainless steel sink with garbage disposal in solid polymer surface counter top. Provide shelf to support manufacturer’s standard, minimum 700 watt microwave (N.I.C.) with adjacent electrical outlet. Pantry shelves shall be a melamine finish. Provide space for dishwasher (N.I.C.) under counter. Provide chair rail where dining table chairs will typically be placed. Provide a temporary cover for the dishwasher space. This cover should be finished with the same stain finish as the rest of the kitchen cabinetry. The cover shall be installed so that when it is removed for the future dishwasher installation, the adjacent cabinetry will not be damaged. All kitchen cabinets, and fronts shall be solid wood construction with solid wood raised panel door construction, and stained natural wood finish. Particle board and other laminated wood construction of cabinets, fronts and doors is not acceptable.

4.6.1.1 Refrigerator/Freezer (NOT IN CONTRACT): Provide space in the kitchen as indicated on the drawings for a minimum 342 cubic L (11 cubic foot), frost-free, two door refrigerator/freezer, with adjustable shelves.

4.6.1.2 Range/Oven: Provide combination range and oven comprised of manufacturer’s standard compact 20-inch wide unit consisting of range top with four tubular plug-in surface heating elements of minimum 4,500 total watts at 208 volts, infinite control switches, and range indicating "on" lights. Each element shall be supplied with removable chrome drip bowls. Under range oven shall be equipped with one minimum 2,000-watt tubular broil element and one minimum 700-watt tubular bake element, oven indicating light, automatic oven-heat control, two steel racks, and utensil drawer.

4.6.1.3 Range Hood: Provide metal range hood, the same length and finish as the range/oven, minimum UL 858, vented, with two-speed, 94 L/s (200 CFM) capacity

fan, permanent washable filter, top exhaust, and eye level controls. Duct the fan to the exterior.

4.6.2 Living/Sleeping: Provide a 13 mm (1/2 inch) elevation change at the threshold of the exterior door. The Living/Sleeping room shall be higher than the balcony on upper floors or adjacent exterior sidewalk on the ground floor. Provide wiring necessary for ceiling fan and controls in each Living/Sleeping area.

4.6.3 Bath: Provide wall mounted, porcelain toilet tissue dispenser adjacent to toilet in ceramic tile wainscot. Provide shower curtain rod. Provide minimum of two, wall mounted, 762 mm (30 inch) stainless steel towel bars. Bar shall be minimum 19 mm (3/4 inch) diameter. Provide minimum of one door mounted robe hook facing into bath space with concealed fastenings, and a pin integral with or permanently fastened to wall flange. Maximum projection shall be 102 mm (4 inches). Design shall be consistent with design of other accessory items. Provide shower with integral soap holder and slip resistant floor finish. Shower will be finished with matte solid surface material wall panels that are smooth and seamless. Top of shower panels shall be 2130 mm above finished floor. The trim pieces will coordinate with wall panels and fit wall panels without conspicuous seams. The soap holder will be an integral part of the shower wall system. The shower base will be a color-coordinated acrylic shower base with slip resistant finish.

4.6.4 Closet: Provide shelving as indicated with rods for hanging clothes. Provide double clothes rods where indicated on the drawings.

4.6.5 Lavatory: Provide two, minimum 914 mm (36 inch) wide by 523 mm (20 inch) deep vanities with sinks and minimum 914 mm (3 feet) by 914 mm (3 feet) wall mounted glass mirror over each sink. Countertops and sinks shall be solid surface. Sinks shall be integral, continuous seamless mount oval shape. Lavatory cabinets, fronts, and doors shall be stained natural wood finish with raised panel construction. Provide one full length mirror on door facing Living/Sleeping area as indicated on the drawings. Provide stainless steel circular towel ring at lavatory as indicated on drawings.

4.7 <u>Fire Safety</u>

4.7.1 The Central Service Core shall be constructed in accordance with applicable portions of the Uniform Building Code for the following: fire resistance requirements, allowable floor area, building height limitations, and building separation distance requirements. Building construction related to egress and safety to life shall comply with NFPA 101. Type of occupancy for this building is mixed and contains types B, F-1, and S-1 occupancies per UBC and Ordinary Hazard, Group 1, per NFPA 13. Type of construction shall be Type II N. Finishes shall be Class A or B except that smoke spread rating cannot exceed 250 for Class

4.7.2 The Dormitory and Central Service Core shall be constructed in accordance with applicable portions of the Uniform Building Code for the following: fire resistance requirements, allowable floor area, building height limitations, and building separation distance requirements. Building construction related to egress and safety to life shall comply with NFPA 101. Type of occupancy for the Dormitory is type R-1 per UBC and Ordinary Hazard, Group 1, per NFPA 13. Type of occupancy for the Central Service Core is mixed and contains types B, F-1, and S-1 occupancies. Type of construction shall be Type II One-Hour. Finishes shall be Class A or B except that smoke spread rating cannot exceed 250 for Class B.

4.8 Roof Slope

4.8.1 The roof slope shall be a minimum of 41.667% (or 5 on 12 minimum) slope.

4.9 Glass Block

4.9.1 Glass blocks shall be 198 mm x 198 mm (8 inches x 8 inches) and 98 mm (3-7/8 inches) thick. The pattern of the glass block shall be PC, Argus. This pattern has integral flutes at right angles on the inside face of the block allowing maximum light transmission while distorting views to provide maximum privacy. This pattern is non-directional.

4.9.2 The glass block shall be installed per manufacturer's recommendations. The optimum mortar mix is 1 part Portland Cement, ½ part Lime and 4 parts Sand.

4.10 Exterior Colors, Finishes and Roof Material

4.10.1 Exterior Finishes: Reference to Color and Finish Schedule for exterior colors shall be as contained below and as referenced on the Color and Finish Schedule, sheet A1.0. Five sets of color boards for exterior materials shall be submitted at the time of the 60% design submittal. Materials and finishes shall meet criteria listed in section 1.3 Technical Criteria unless otherwise noted.

The roof shall be blended mission or "S" tile, and shall be made of standard weight concrete with through color. The tile shall be attached using a wire tie system. The color mix shall match Lifetile #820 California Mission Blend or approved equal. The fascia shall be stucco or EIFS and support a 305 mm (12 inch) deep metal gutter. Downspouts shall be provided per SMACNA, in locations indicated on building elevations. Both gutter and downspouts shall have a factory finish color.

Concrete Masonry Units: All Concrete Masonry Units shall be integrally colored. Color shall match Las Vegas Block "Sandstone". Mortar shall be colored to match adjacent surfaces.

Field: Split Face Concrete Block
Stairs: Split Faced Concrete Block
Accent bands: Single Vertical score, smooth face concrete block where noted on the drawings.

Columns: Fluted, Split face concrete block

Concrete Masonry Unit Mortar: Same as concrete masonry units.
Aluminum Window and Door Frames: Anodized Dark Bronze.
Glass Block: PC, Argus

4.11 Interior Finishes

4.11.1 Interior Finishes: Reference Finish Schedule sheets A1.1 for minimum finish requirements, unless otherwise noted in the RFP. Materials and finishes shall meet criteria listed in section 1.3 Technical Criteria unless otherwise noted.

4.11.2 Interior finishes and materials shall be specified with durability, maintenance, function, life cycle costs, code requirements and aesthetics being considered. Finishes and materials shall support the architectural elements and reflect the image and style of the using agency.

4.11.4 One species of wood and/or stain to represent one species of wood shall be specified throughout the entire facility. This encompasses doors, casework, trim etc. Wood and/or wood stain shall be light to medium oak.

4.11.5 Submittal requirements for finishes and approvals are listed in Attachment 9 Comprehensive Interior Design Requirements, Submittal Requirements.

4.11.6 Upon the completion of construction, the Contractor shall provide and deliver at no additional cost, to the Contracting Officer, the following:
One percent extra of each color and texture of ceramic tile, porcelain paver tile, base, carpet, wallcovering and sheet vinyl of each total amount of each item used on the project.

4.12 <u>Interior Colors</u>

4.12.1 Finish and color selection shall be appropriate to the interior design intent to support the occupants, their activities and their customers. For the dormitory facility, to help create a holistic approach between the exterior and interior environment, it is recommended that similar colors and patterns should be developed to create a common element between the exterior and interior.

4.12.2 A neutral color palette, brown-tone, shall be incorporated for all permanent interior finishes to develop the neutral shell concept. Accent colors may be incorporated in non-permanent finishes as well as furniture.

4.12.3 Permanent finishes include ceramic tile, porcelain pavers, chair rails, plastic laminates, solid surface materials, sheet vinyl and horizontal blinds.

4.12.4 Non-permanent finishes include carpet, paint and other items that are relatively easy and inexpensive to replace.

4.12.5 All trim and resilient base shall be in the same color tone as overall facility and coordinate with the flooring and wall paint.

4.12.6 Colors and finishes shall be selected based on durability, maintenance, life cycle costs, code requirements, appearance and functional considerations. Variegated finishes and patterns are recommended to be implemented to the maximum extent possible as solids show wear and tear. Developing patterns with finishes such as ceramic tile to add visual interest, create "Dorm Identity" and mask soil is encouraged. Integral color and color through finishes shall be specified where applicable.

4.12.7 The colors and textures specified shall not date the facility and shall create an interior that will remain aesthetically pleasing over time. Finishes and materials shall support the architectural elements and reflect the image and style of the using agency.

4.13 <u>Concrete Masonry Units</u>

4.13.1 Exterior walls shall be integral-color split face concrete masonry units, and 203 mm (8") scored smooth face concrete masonry units and integral-color split face fluted block accents where shown on the Drawings.

4.13.2 Concrete masonry walls shall have control joints to accommodate movement to control cracking. Control joints shall be placed and spaced to divide walls or wythes into a series of rectangular panels. Control joints shall also be placed in areas of high stress concentration where cracking is most likely to occur. Normal spacing and desirable locations for control joints are as follows:

at vertical spacing of joint reinforcement with 2-#9 wires at 406 mm (16 inches), the maximum horizontal spacing of control joints shall be not greater than 7,315 mm (24 feet) apart. Control joints shall not be located at openings. The spacing shall be reduced approximately 50% near masonry bonded corners or other similar conditions where one end of the masonry panel is restrained. Provide control joints at regular intervals, at changes in wall height or thickness, but not at pilasters, near wall intersections in "L", "T", and "U" shaped buildings at approximately 50% of the spacing required above and at other points of stress concentration.

4.13.3 A clear water-based penetrating water repellent shall be applied over the exterior face of the concrete masonry units.

4.14 <u>Fire Extinguisher Cabinets</u>

4.14.1 All fire extinguisher cabinets shall be semi-recessed. Cabinet to be factory finished color to match concrete masonry wall with a clear, break glass door. Cabinet box shall be 1.3 mm (18 gage) steel with baked enamel finish. Steel door and trim shall be one-piece construction with a continuous hinge and door shall be lockable. Trim shall be rolled edge and finished in baked enamel. Door shall be 16 mm (5/8 inch) thick, one-piece hollow steel, full glazed steel frame with rubber roller catch and satin finish door handle, and baked enamel finish. Cabinets shall be sized to accommodate 10# ABC dry chemical capacity extinguishers.

4.14.2 As a minimum, provide fire extinguisher cabinets in the following quantities in the Central Service Core: (1) in breeze way adjacent to rooms 111, 208 and 308 Comm, and one in breeze way adjacent to room 115 Linen Storage, one in breeze way adjacent to rooms 209 and 309 Bulk Storage. Cabinets shall be located in accordance with the provisions of NFPA 10, which may require more than those listed here due to travel distance.

4.14.2.1 As a minimum, provide fire extinguisher cabinets in the following quantities in the dormitory (84 PN): (1) each in center column on north and south side balconies on all floors in both wings, and one in wall adjacent to stair 1 and stair 3 on each floor as indicated on the drawings. This will result in 8 cabinets per floor, minimum. Cabinets shall be located in accordance with the provisions of NFPA 10, which may require more than those listed here due to travel distance.

4.15 <u>Seismic Joint Covers</u>

4.15.1 Seismic joint covers shall be constructed of extruded aluminum with anodized satin finish for walls and ceilings and with standard mill finish for floor covers and exterior covers.

4.16 <u>Insulation</u>

4.16.1 Provide the minimum insulation values as follows:

	Metric “U” Value	Metric RSI Value	English “U” Value
Gross Wall	0.303	3.3 M^2"K/W	0.052
Roof	0.189	5.28 M^2"K/W	0.033

Gross Wall U-factor is the U-factor sum of each wall component (opaque wall, windows, doors, openings, etc.) times the area of that wall component, the sum divided by the total wall area.

4.16.2 Thermal and sound insulation shall have a flame spread rating of 25 or less and a smoke development rating of 50 or less exclusive of the barrier when tested in accordance with ASTM E-84. A vapor barrier shall be provided on the warm side of exterior and ceiling insulation where occurs. Insulation shall have a facing providing a permeability of 0.1 perm or less when tested in accordance with ASTM E 96.

4.16.3 Insulation: Thermal resistance of insulation shall be not less than the R-values determined from the "U" values indicated in section 4.15. R-values shall be determined at 75 degrees F in accordance with ASTM C 518. Insulation shall have a flame spread not in excess of 25 and a smoke developed rating not in excess of 50 when tested in accordance with ASTM E 84; shall be a standard product of a manufacturer, factory-marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Insulation shall have a facing providing a permeability of 0.1 perm or less when tested in accordance with ASTM E 96. Facing shall be white, either of reinforced foil with a vinyl finish or vinyl sheet except unreinforced foil with a natural finish may be used in concealed locations. Insulation shall have a facing providing a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be of .05 mm (2 mil) thick white vinyl backed with 150 mm by 150 mm (6 inch by 6 inch) glass scrim and .18 mm (0.7 mil) thick metal foil laminate. Reinforced foil with a natural finish may be used for facing in concealed locations. Facings and finishes shall be factory applied.

4.16.4 Rigid or Semirigid Board Insulation: Rigid board insulation shall conform to ASTM c 612, Form A, Class 1.

4.16.5 Blanket Insulation: Blanket insulation shall conform to FS HH-I-558, Form B, Type I, Class 6. Exposed insulation shall have a white sheet vinyl face.

4.17 <u>Casework</u>

4.17.1 All Casework shall meet the requirements of the Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program as set forth by the Architectural Woodwork Institute for architectural cabinets with high pressure decorative laminate (HPDL). Quality shall be custom grade.

4.17.2 The Contractor shall provide a schedule of casework. Items that need to be described are located in the following rooms: Dormitory: Kitchen/Dining, and Lavatories, Central Service Core: Laundry. See section **4.42** for solid surface counter tops.

4.18. <u>Gutters and Downspouts</u>

4.18.1 Unless otherwise indicated on the drawings, provide eave mounted gutters on all roof sections. Provide downspouts for all gutter locations. Provide concrete splash blocks at all downspout locations. Roof water shall be diverted away from entrances and foundations.

4.19 <u>Sheet Metalwork:</u>

4.19.1 Flashing shall be installed in conformance with the SMACNA Architectural Sheet Metal Manual.

4.20 <u>Firestopping</u>

4.20.1 Material shall have a flame spread of 25 or less, a smoke developed rating of 50 or less, and a fuel contribution of 50 or less when tested in accordance with ASTM E 84 or UL 723.

4.20.2 The materials shall be nontoxic to human beings at all stages of applications and during fire conditions.

4.20.3 Firestopping materials for through-penetrations of fire resistance rated construction shall provide fire resistance rating in accordance to ASTM E 814 or UL 1479.

4.20.4 Firestopping materials for construction joints in fire resistance rated construction shall provide a fire resistance rating in accordance to ASTM E 119 or UL 263. Construction joints include those joints used to accommodate expansion, contraction, wind or seismic movement of the building.

4.20.4 Material shall be non-combustible when tested in accordance with ASTM E 136.

4.21 Caulking and Sealants.

4.21.1 Caulking and sealants shall be selected according to materials it is being applied to for compatibility. These sealants and caulks shall be of either a two-component, rubber base, chemical-curing compound based on polysulfide and/or polyurethane; or a single-component, rubber base, chemical-curing compound such as polysulfides, polyurethanes, and silicones.

4.21.2 Caulking shall occur around all door frames, all window frames, and at all material changes. The minimum joint width shall be 6 mm (1/4 inch), and joint widths in excess of 6 mm (1/4 inch) shall have a back stop material provided in the joint, and the depth of all joints shall be equal to the width. Color to match adjacent materials.

4.22 Steel Doors and Frames.

4.22.1 Exterior doors shall be heavy duty 45 mm (1 3/4") thick steel, residential style doors with six recessed panels, and steel frames, except for aluminum/glass storefront-type doors at entrances in the Central Service Core.

4.22.2 Exterior doors shall be insulated and weatherstripped.

4.23 Aluminum Store-Front Type Doors and Exterior Windows.

4.23.1 Doors shall be glazed with insulated glass with minimum 9 mm (3/8 inch) air space and shall conform to ASTM E 773 and ASTM E 774. Glazing shall be bronze with reflective tint. Glazing shall have a maximum condensation factor of 48% in accordance with AAMA 1502.7. For anti-terrorist security measures, all exterior store-front doors and windows (excluding glass block construction) shall have a safety laminate, such as mylar, or another fragmentation retention film properly installed over glazing to reduce fragmentation.

4.23.2 Frame shall have bronze anodized finish with a minimum of 0.01 mm (0.4-mil) thick. Organic coating shall be manufacturer's standard acrylic or polyester, bake-on, electrostatically applied enamel coating of .03 mm $\pm$ .005 mm (1.0 $\pm$ .2 mils) dry film thickness minimum. All coatings shall be factory applied.

4.23.3 Windows in the Central Service Core shall be fixed, with a style that

emulates the operable windows provided for the new dormitories. Windows for the dormitory shall be horizontal sliders with bronze tinted glass, bronze anodized finished frames, and insect screens.

4.23.4 All windows shall be heavy commercial class 40 (HC-40) grade.

4.23.5 All window frames and sash shall have 25 mm (1 inch) thick glazing units consisting of two panes of glass separated by an air space.

4.23.6 All window frames and sash shall be constructed with a thermal break feature.

4.23.7 All window frames and sash shall be designed to withstand a 145 kph (90 mile per hour) wind velocity.

4.23.8 Window sills shall be solid surface polymer or other nonporous, hard surface, easily maintained product.

4.24 Wood Doors.

4.24.1 Interior doors shall be 35 mm (1 3/8") solid core, flush wood doors, stained to match wood finish throughout facility, good grade, birch.

4.25 Hardware

4.25.1 All interior hardware in this building shall be consistent and shall be a brushed aluminum finish. Special applications of brass or copper shall be applied where appropriate. The following hardware requirements are to be included:

4.25.1.1 The Dormitory Manager shall have access to all dormitory resident rooms, all storage rooms, janitors closet, vending accordion partition, and manager's office.

4.25.1.2 Each Dormitory resident shall have access to his/her room, game room, and laundry. Individual living unit doors to the exterior and to the kitchen shall be keyed alike.

4.25.1.3 All mechanical and electrical room doors shall be keyed alike and be an extension of the FY97 Dormitory keying system.

4.25.1.4 All communication room doors shall be keyed alike and be an extension of the FY97 Dormitory keying system.

4.25.1.5 Typical Room Unit Module Lockset Information:

Exterior Doors	Lockset, F13, with key removable core cylinder
Kitchen Doors	Lockset, F78 or F03, keyed lock both sides, with key removable core
Closet Doors	Latchset, F75 or F01
Bathroom Doors	Lockset, F76 or F19

The Contracting Officer shall coordinate all requirements for hardware keying.

4.25.1.6 All living unit exterior doors shall have a one way glass and metal door viewer (peep hole) mounted at 1525 mm above finished floor, centered on door.

4.25.2 Hinges:

4.25.2.1 Exterior hinges shall have nonremovable pins and be stainless steel; Grade 1 (except at doors to Mech/Elec rooms, which may be Grade 3); antifriction or ball bearing; and 3 each of 114 mm x 114 mm (4-1/2" x 4-1/2") per leaf up to 900 mm (3') wide door (127 mm x 127 mm (5" x 5") for doors 900 mm (3') to 1,200 mm (4') wide).

4.25.2.2 Interior hinges shall be Grade 1; antifriction or ball bearing; and 3 each of 114 mm x 114 mm (4-1/2" x 4-1/2")per leaf up to 900 mm (3') wide door (127 mm x 127 mm (5" x 5") for doors 900 mm (3') to 1,200 mm (4') wide). Hinges for labeled fire doors must be either steel or stainless steel.

4.25.2.3 Exterior hinges for aluminum/glass storefront type doors shall be pivot hinges or offset pivot hinges (3 per leaf).

4.25.2.4 Hinges shall conform to ANSI/BHMA A156.1 and A156.7.

4.25.3 Locksets, Latchsets, Exit Devices, and Push and Pull Plates:

For each door from the living/sleeping area to the kitchen/bath area see section 4.25.1.5, complying with ANSI/BHMA A156.13.

4.25.3.1 Exterior doors shall have mortise locks conforming to ANSI/BHMA A156.13 for metal doors and conforming to ANSI/BHMA A156.5 for aluminum/glass storefront-type doors, Grade 1.

4.25.3.2 Interior doors shall have mortise locksets conforming to ANSI/BHMA A156.13, Series 1000, Grade 1.

4.25.3.3 All doors to exterior of the Central Service Core, with the exception of the mechanical and electrical room doors, shall have full-width flush-mounted panic bars per ANSI/BHMA 156.3, narrow style concealed, and automatic door hold-open devices in the closer per ANSI/BHMA A156.4.

4.25.3.4 Men's & Women's Toilet Rooms in the Central Service Core shall have locksets conforming to ANSI/BHMA A156.13. Bath rooms in the dormitory shall have locksets conforming to ANSI/BHMA A156.13. Lavatory rooms in the dormitory shall have latchsets conforming to ANSI/BHMA A156.13.

4.25.3.5 The Entry in the Central Service Core to the TV/Game Room shall have a mortise latchset conforming to ANSI/BHMA A156.13, Series 1000, Grade 1.

4.25.3.6 All locks and latchsets shall be the product of the same manufacturer.

4.25.3.7 All locksets and latchsets shall be provided with lever handles on each side.

4.25.4 Cylinders:

4.25.4.1 Lock cylinders shall comply with BHMA A156.5 and be compatible with BEST. Lock cylinder shall have not less than six pins. Cylinders shall have key removable type cores. Provide an extension of the existing keying system. The existing locks were manufactured by BEST and have interchangeable cores. Construction cores shall be provided. All locksets, exit devices, and padlocks shall accept same interchangeable cores.

4.25.5 Closers:

4.25.5.1 Closers shall be provided on all exterior doors, fire-rated doors, and

toilet room doors in the Central Service Core.

4.25.5.2 Closers shall conform to ANSI/BHMA A156.4, Grade 1. Closers shall be surface-mounted, modern type , with cover. Closers shall be provided with options PT-4F and PT-4H (delayed action and barrier free).

4.25.6 Keying:

4.25.6.1 The entire project shall be grand master keyed into the base system and shall be an extension of the FY97 Dormitory keying system as specified by the Nellis AFB Civil Engineer. All exterior doors shall be keyed alike in one group. All interior doors shall be keyed as specified by the Nellis AFB Civil Engineer. All submittals/shop drawings referring to keys and keying shall be submitted to the Nellis AFB Civil Engineer for coordination and approval. Six sets of master keys shall be furnished to the Housing Management Flight. Furnish two sets of keys for each lock. Submaster keying required for both Central Service Core and the new dormitory room units at Nellis Air Force Base, Nevada. All boiler rooms and all mechanical rooms shall be master keyed to be compatible with BEST. Master keying shall be similar to BEST Series with six-pin tumbler removable core locks. All keying shall be done at the factory. All locks shall be furnished with removable core cylinders. Replacement cores shall be BEST removable cores. Keys and permanent cores shall be shipped directly to Housing Management Flight. Provide one master key for mechanical, electrical, and communications rooms to Housing Management Flight, and additional master keys for these rooms to CEED, CEEM of Nellis AFB, NV as applicable.

4.25.7 Thresholds:

4.25.7.1 All exterior doors (except Mech/Elec rooms) shall be provided with aluminum thresholds conforming to ANSI/BHMA A156.21 and are handicapped accessible; color to be bronze.

4.25.7.2 Doors at ceramic tile flooring shall be provided with marble thresholds that are handicapped accessible.

4.25.8 Kick Plates and Mop Plates:

4.25.8.1 Metal Kick plates or mop plates shall be provided on all wood doors in public spaces. Do not provide kick plates or mop plates inside dormitory room units. Match metal finish with door hardware finish as specified in paragraph 4.24.

4.25.8.2 Kick plates and mop plates shall comply with ANSI/BHMA A156.6, shall be 16" high by 2" less than width of door. Edges shall be beveled.

4.25.9 Door Stops:

4.25.9.1 Door stops shall be provided on all doors that swing against a wall.

4.25.9.2 Door stops shall comply with ANSI/BHMA A156.16 and shall be bronze, Grade 1.

4.26 <u>Glazing.</u>

4.26.1 Glass shall conform to the requirements of ASTM C1036.

4.26.2 Glass in doors and adjacent to doors shall conform to the requirements of CFR 16 Part 1201.

4.26.3 Glazing of interior vision panels shall conform to CFR 16 Part 1201.

4.27 Gypsum Wallboard.

4.27.1 Gypsum wallboard shall conform to the requirements of ASTM C36 and be 1200 mm (48") wide, 16 mm (5/8") thick, and tapered edged. Steel framing, furring, and related items shall conform to the requirements of ASTM C645 and C955 where applicable.

4.27.2 Joint treatment materials shall conform to the requirements of ASTM C475.

4.27.3 Screws shall conform to the requirements of ASTM C1002 and C954 where applicable.

4.27.4 Corner beads, edge trim, and control (expansion) joints shall conform to the requirements of ASTM C1047, and shall be corrosion protective-coated steel designed for its intended use. Flanges shall be free of dirt, grease, and other materials that may adversely affect the bond of joint treatment.

4.28 Ceramic Tile.

4.28.1 Ceramic tile shall conform to the requirements of ANSI A137.1

4.28.2 Porcelain paver tile shall be of standard grade quality and shall conform to requirements of ANSI A137.1, ASTM C373, ASTM C501, and ASTM C648. Coefficient of friction shall be minimum 0.5.

Type: Unglazed porcelain tile shall be unpolished

Size: Porcelain tile shall be furnished in nominal 300 mm x 300 mm (12" x 12") size.

4.28.3 Glazed wall tile and trim shall be cushion edged with bright matte glaze. Tile shall be minimum nominal 100 mm x 100 mm (4-1/4 by 4-1/4 inches). Base shall be cove type with inside and outside corners.

4.28.4 Ceramic mosaic tile and trim shall be unglazed porcelain with sharply formed face. Tile size shall be 50 mm x 50 mm (2 by 2 inches).

4.28.5 Setting beds:

a. Aggregate for Concrete Fill: Shall conform to the requirements of ASTM C 33.

b. Portland Cement: Shall conform to ASTM C 150, white for wall and gray other uses. Latex-Portland cement mortar per ANSI 1184 for porcelain paver tiles.

c. Sand shall conform to ASTM C 144.

d. Hydrated lime shall conform to ASTM C 206, Type S or ASTM C 207, Type S.

e. Metal lath shall be flat expanded type conforming to ASTM C 847, and weighing not less than 1.36 kg per square meter (2.5 pounds per square yard).

f. Reinforcing wire fabric shall conform to ASTM A185. Wire shall be either 50 mm x 50 mm (2 by 2-inch) mesh, 16/16 wire or 38 mm x 50 mm (1-1/2 inch by 2-inch) mesh, 16/13 wire.

4.28.6 Water shall be potable.

4.28.7 Latex-Portland Cement Mortar shall conform to ANSI A108.5 and ANSI 118.4.

4.28.8 Portland-Cement grout shall conform to ANSI A108.10.

4.29 Acoustical Ceilings.

4.29.1 Acoustical ceiling tile shall conform to ASTM E1264, Class A. Panel size shall be 600 mm x 600 mm (2 feet by 2 feet). Acoustical ceiling tile to have a beveled tegular edge.

4.29.2 The suspension system shall conform to ASTM C635.

4.30 Wood Cove Base

4.30.1 Wood cove base shall be used in the TV/Game room of the Central Service Core and in the living/sleeping room of the dormitory typical room unit. The wood cove base shall be 100 mm (4 inches) high, minimum of 6 mm (1/4 inch) thick and match the natural oak finish of the Thurston dormitory furniture.

4.31 Resilient Flooring

4.31.1 Sheet vinyl shall conform to FS L-F-475A (3) Type II, Grade A. Static load limit according to ASTM F 970 shall be not less than 860 kPa (125 psi). Sheet vinyl flooring shall be not less than 1800 mm (72 inches) wide and shall have an alkali and moisture resistant backing. Color and pattern shall be dispensed uniformly throughout the thickness of the wear layer. Pattern shall be as appropriate for the residential type setting, not to have a commercial look to the pattern.

4.31.2 There are two different wall bases to be used with the sheet vinyl, see sheet A1.1 for exact locations. The first type of wall base shall be manufacturer’s standard rubber, straight style (installed with carpet) and coved style (installed with resilient flooring). Base shall be 100 mm (4-inches) high, minimum 3 mm (0.125-inch) thick. The second type of wall base shall be self-coved sheet vinyl with a vinyl cap. A rubber or vinyl round cap strip and vinyl, rubber or wood fillet strip with a minimum radius of 19 mm (3/4 inch) shall provide for the self-coved sheet vinyl.

4.31.3 Edge strips of vinyl plastic, 25 mm (1-inch) wide and of thickness to match flooring.

4.31.4 Adhesive for flooring and wall base shall be as recommended by the flooring manufacturer.

4.31.5 Polish shall conform to FS P-F-430 or FS P-W-155.

4.32 Modular Carpet Tile

4.32.1 Solid color carpet tiles are not acceptable unless used as an accent. Carpet tiles shall be a multi-colored, non-directional pattern with a minimum of 3 distinct colors. Bold tweed design containing a combination of shades of same color does not meet pattern requirements. Carpet tiles shall be of commercial quality.

4.32.2 If carpet and carpet borders are specified, they shall be of same manufacturer, appearance, colors, etc..

4.32.3 Following are minimum physical characteristics:

a. Carpet Fabrication: Tufted
b. Carpet Category: Modular Tile, 450 mm x 450 mm (18 inches x

18 inches)

c. Pile Type: Level Loop recommended.
d. Pile Fiber: Branded commercial, 100% nylon with soil hiding and static control properties.
e. Gauge Pitch: 3.9/cm (1/10 inch)
f. Face Weight: minimum 881 g per square meter (26 oz. per square yard). This does not include weight of backings. Weight of actual surface yarn exposed to wear above carpet backing shall be determined in accordance with ASTM D 418.
g. Dye Method: Solution, Space Dyed are recommended.
h. Backing: Carpet shall be backed with an attached firm pad (Enhancer type backing system).

4.32.4 Following are minimum performance requirements:

a. Static Control: Shall be provided to permanently control static buildup to less than 3000 volts when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
b. Flammability and Critical Radiant Flux Requirements: Carpet shall comply with CFR 16 Part 1630. Carpet in corridors and exits shall have a minimum average critical radiant flux of 0.45 watts per square centimeter when tested in accordance with ASTM E 648.
c. Flame Resistance: Shall pass DOC-FF1-70
d. Tuft Bind: Shall be minimum 40 N (9-pound) average force when tested in accordance with ASTM D 1335.
e. Colorfastness to Crocking: Dry and wet crocking shall comply with AATCC 16 and shall have a minimum 4 grey scale rating after 40 hours.
f. Density shall be minimum 5000 as determined by using the following formula: Density = (W)(36)/T. W is pile yarn weight, T is pile thickness.

4.32.5 A 100 mm (4") carpet base may be substituted for resilient base. The carpet base shall be from the same carpet used for the floor finish. The carpet base edge shall finished (bonded or surged) and capped with a vinyl molding strip that is designed for the type of carpet being installed. The vinyl cap shall coordinate with the carpet and wall finishes.

4.32.6 Molding shall be vinyl. Vinyl molding shall be heavy-duty and design for the type of carpet being installed. Color shall coordinate with carpet and adjacent surface.

4.33 <u>Painting</u>

4.33.1 Interior surfaces, except factory prefinished material or interior surfaces receiving vinyl wallcovering, shall be painted a minimum of one prime coat and one finish coat. The prime coat for concrete masonry units shall be TT-F-1098. All spaces shall have satin or eggshell or semi-gloss finish on walls, semi-gloss finish on trim and eggshell or semi-gloss finish on ceilings per the finish schedule. Stain or natural finished interior doors are acceptable.

4.33.2 All exterior surfaces to be painted, including all utility appendages shall receive a minimum of one prime coat and two finish coats of paint.

4.33.2.1 Water repellent sealer shall be clear, water repellent solution designed to protect vertical concrete masonry surfaces from water penetration. All exterior concrete masonry unit wall surfaces of the facility and 5'-4" cmu wall shall be treated with water repellent sealer unless otherwise specified.

4.33.3 Application of paint. Paint shall be applied by brush or roller. Spray painting method shall be used only under approved conditions. Spraying shall be done only when there is no wind, or under very low wind velocity. When wind velocity increases, all spraying operation shall be stopped as directed by the Contracting Officer. Before start of spraying, all surfaces that do not require painting shall be completely masked and protected. Adequate drop cloths shall be provided over floors, adjacent sidewalks, and over all cars parked nearby that may be stained or damaged from the spray work. The Contractor shall be liable for all damage resulting from the spray painting operation. All such damages shall be satisfactorily repaired and resolved at no additional cost to the Government. Adequate ventilation shall be provided during paint application. Respirators shall be worn by all persons engaged in spray painting. Adjacent areas shall be protected by approved precautionary measures.

4.33.4 Paints shall comply with State Regulations and the following Federal and Military Specifications. No lead paints are acceptable.

TT-C-535	Epoxy, Interior For Wet Areas (Gypsum Wallboard)
TT-C-542	Polyurethane, Interior For High Degree of Sanitation (Masonry and Gypsum Wallboard)
TT-E-487E & Am-1	Enamel: Exterior, Floor and Deck.
TT-E-489J	Enamel, Alkyd, Gloss (For Exterior and Interior Surfaces).
TT-F-1098	Filler, Block, Solvent-Thinned, for Porous Surfaces, (Concrete Block, Cinder Block, Stucco, Etc.).
TT-P-19D	Paint, Latex (Acrylic Emulsion), Exterior, Wood and Masonry.
TT-P-29K & Am-1	Paint, Latex Base, Interior, Flat, White and Tints.
TT-P-31D	Paint, Oil: Iron-Oxide, Ready-Mixed, Red and Brown.
TT-P-37C & Am-4	Paint, Alkyd Resin: Exterior Trim, Deep Colors.
TT-P-38E & Am-1	Paint, Aluminum, Ready-Mixed.
TT-P-102F & Int. Am-1	Paint, Oil, Alkyd Modified, Exterior,White and Tints.
TT-P-645B	Primer, Paint, Zinc-Molybdate, Alkyd Type.
TT-P-650D & Am-1	Primer Coating, Latex Base, Interior, White (For Gypsum Wallboard).
TT-P-1511B	Paint, Latex (Glass & Semigloss, Tints & White) (For Interior Use)
TT-P-001984	Primer Coating, Latex Base, Exterior Wood
TT-S-708A	Stain, Oil: Semi-Transparent, Wood, Exterior.

& Am-2

TT-S-711C	Stain, Latex, Wood, Interior
TT-S-001992	Stain, Latex, Exterior For Wood Surface.
TT-V-121H	Varnish, Spar, Water-Resisting.
SSPC Paint 5	Paint, For Interior Galvanized Surfaces.
SSPC Paint 21	Paint, Alkyd, For Factory Primed Mechanical and Electrical Equipment.

4.33.5 Colors shall be as approved from schemes submitted with proposal. Each proposal shall include one basic exterior and interior color coordinated schemes and color samples.

4.33.6 Pipes in exposed areas and in accessible pipe spaces shall be provided with color band and titles in accordance with Mil-Std 101.

4.34 <u>Acoustical Design</u>

4.34.1 Careful attention to acoustic design is required to ensure a high degree of privacy for the residents within their living units. The designers must address isolation of noise from a variety of sources, including: Adjacent living units, units on a floor level or below, corridors, mechanical rooms and systems, and exterior generated noise such as aircraft and automobile noise, since this project is located near Las Vegas Blvd. and is just outside the 75 db line from noise generated by flight operations.

4.34.2 Walls between living units and between living units and corridors, and exterior walls of living units must have a Sound Transmission Class (STC) of at least 50. Floor and ceiling assemblies must have an STC of at least 55 and and Impact Insulation Class (IIC) of at least 60.

4.34.3 Masonry walls shall be constructed as specified in paragraph 4.12 and shall be airtight. Windows shall be constructed as specified paragraph 4.22 and shall provide a complete weather and sound seal. Sufficient insulating material shall be provided in the attic space to meet both the thermal and acoustical requirements specified herein.

4.34.4 Doors and door assembly to the exterior from the living areas, and doors and door assembly between the living areas and the kitchen shall have an STC rating of not less than 33.

4.35 <u>Chair Rails/Wall Guards</u>

4.35.1 Chair rails/wall guards shall be used as indicated on finish schedule and where wall abuse, wear and tear may occur. Chair rails/wall guards shall be provided with prefabricated end closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories standard with the manufacturer. End caps and corners shall be field adjustable to assure close alignment. Chair rails/wall guards shall consist of snap-on covers of resilient material mounted over continuous aluminum extrusion. Extruded aluminum retainers shall conform to ASTM B 2212, alloy 6063, temper T5 or T6. Chair rail/wall guard shall act as a shock absorber under impact without damaging wall to which it has been mounted.

4.35.2 Colored components shall have integral color and shall match one another. Installation shall be in accordance with the manufacturer's written instructions.

4.35.3 To the maximum extent possible, the products shall be the standard products of a single manufacturer.

4.35.4 Installation shall be in accordance with the manufacturer's written instructions.

4.36 Interior Signs.

4.36.1 Interior signage shall be provided so that a visitor entering the facility would be able to use them to find a given destination. The three types of signs to be provided are:

Information
Identification
Direction

4.36.2 Information Signs. Signs in this category are the building directory. The building directory shall consist of a permanent header panel with the name of the facility, plus a directory section that lists the primary tenants. The directory section is a changeable letter board using molded plastic letters with tabs that align the letters in the slots of the letter boards. Overall dimensions: 914 mm x 1827 mm. The permanent header panel can consist of a heading and secondary heading line. Heading: upper and lower case Helvetica medium, 51 mm capital letter height, flush left. Secondary Heading: upper and lower case Helvetica regular, 51 mm capital letter height, flush left. The heading area will accommodate two lines with a maximum line length of 30 tiles or characters per line. The directory section text shall be upper and lower case Helvetica medium, 13mm capital letter height, flush left. This text area shall be able to accommodate three columns of 19 lines each, with a maximum line length of 45 tiles or characters per line.

4.36.3 Identification Signs. Signs in this category consist of office and service identification.

4.36.3.1 Office identification signs consist of a permanent header panel with the room number and an insert panel which identifies the tenant. The insert panel is a clear sleeve which will accept a plastic insert with the name of the tenant. Permanent header panel dimensions: 229 mm x 76 mm. The insert panel dimensions: 229 mm x 76 mm. Overall sign dimensions: 229 mm x 152 mm. Room number shall be Helvetica medium, 38 mm numbers, flush left. Tenant name shall be upper and lower case Helvetica medium, 13 mm capital letter height, flush left. Insert area will accommodate two lines with a maximum of 21 tiles or characters per line.

4.36.3.2 Service identification signs are used to identify restrooms, telephones and other like services. Service signs dimensions: 152 mm x 229 mm. The standard pictograph symbols shall be used. Service name shall be Helvetica medium upper and lower case, 25mm capital letter height, centered.

4.36.4 Interior Signage Products.

4.36.4.1 Aluminum extrusions shall be at least 3 mm thick, and aluminum plate or sheet shall be at least 16 gauge, 1.3 mm thick. Extrusions shall conform to ASTM B 221; plate and sheet shall conform to ASTM B 209.

4.36.4.2 Vinyl sheeting for graphics shall conform to MS MIL-M-43719, minimum 0.76 mm film thickness. Film shall include a precoated pressure sensitive adhesive backing (Class 3).

4.36.4.3 Acrylic sheet shall conform to ASTM D 702, Type III.

4.36.4.4 Changeable message strip plaque signs shall consist of acrylic or plexiglass back laminated to matte finish acrylic plastic face with message slots as detailed for insertion of changeable message strips. Individual 1.6 mm thick message strips to permit removal, change and reinsertion shall be provided.

4.36.4.5 Signage that provides emergency information, general circulation directions or identification of rooms and spaces shall be tactile (perceptible to touch) and shall comply with ANSI A117.1, paragraph 4.27. Characters, symbols or pictographs on tactile signs shall be recessed or raised 0.80 mm minimum. Tactile letters and numbers shall be sans serif upper case. Tactile characters or symbols shall be at least 16mm high, but no higher than a nominal 51 mm inches. Characters and symbols shall contrast with their background.

4.36.4.5 Signage vendor shall provide lettering machine so user can change signage as needed.

4.37 <u>Exterior Signs</u>

4.37.1 Provide signs that comply with base architectural compatibility standard and comply with sign standards provided in ACCR 88-1 and AFP 88-40; Exterior signs. Exterior signage shall be approved by the contracting officer and shall include Identification signs.

4.37.2 Identification Signs. Signs in this category consist of dormitory room identification.

4.37.2.1 Dormitory Room identification signs shall be sun and weather resistant and shall consist of a permanent header panel with the room number. There will be two insert panels. The upper panel will contain the tenant’s name. The lower panel will have a clear cover to allow paper messages to be inserted. Overall sign dimension shall be 152 mm x 152 mm. Room number shall be Helvetica medium, 38 mm numbers, flush left.

4.38 <u>Toilet Accessories.</u>

4.38.1 Grab bars shall be provided in all handicapped accessible toilet rooms in accordance with FED-STD-795 and in conformance with FS WW-P-541.

4.38.2 Glass mirrors shall be provided in conformance with FS DD-M-411.
For Central Service Core:
a. Toilets: Provide 457 mm x 762 mm (18" x 30") tilt mirror above lavatory.

For Dormitory
b. Typical Room Units: Living/Sleeping: Provide one mirror 914 mm (3'-0") high by (length of lavatory counter) above the lavatory.
c. Provide one 457.2 mm by 1524 mm (18 inch by 5 foot) mirror on door facing Living/Sleeping room as indicated on the drawings. Mirror shall be installed per manufacturer’s instructions for installation on a door to ensure rigidity of mirror installation.

4.38.3 Paper towel dispensers with capacity of 400 C-fold towels and with 12

gallon removable waste container shall be in conformance with CID A-A-2380.

4.38.4 Combination sanitary napkin and tampon disposer and seat cover and toilet tissue dispenser shall be provided as indicated in paragraphs 4.5 and 4.6 and shall be in conformance to FS WW-P-541, Class 1.

4.38.5 Combination seat cover and toilet tissue dispenser shall be provided at all other water closets in the Central Service Core.

4.38.6 Liquid soap dispensers with a vertical Type 304 stainless steel 40 fluid ounce tank shall be in conformance with FS WW-P-541.

4.39 Freestanding Furniture

4.39.1 For general furniture requirements, see Section 5. For the typical room units furniture layouts, see Attachment 10. The rooms shall be designed to accommodate the furniture and functional requirements of the building occupant, which are found in Section 5.0, part 5.5 Requirements for Rooms and Spaces. The Contractor shall make provide the layouts for the furniture.

4.39.2 Section 5.0 Structural Interior Design (SID) and Furniture Related Items and associated Attachments 9 SID Requirements, Submittal Requirements and 10 Furniture Layout Requirements address the Freestanding Furniture requirements. Procurement and installation of freestanding furniture is NOT part of the contract but the spaces shall be configured to accommodate the furniture.

4.39.3 The Contractor is NOT required to provide NOR procure the freestanding or conventional furniture/furnishings, only to prepare the furniture layouts. The Government will procure the furniture/furnishings.

4.40 Recessed Foot Grill

4.40.1 Recessed foot grill shall be carpet tread, mechanically secured in tread rails. Carpet shall be 100 percent nylon. Tread rails shall be spaced 38 mm (1-1/2" inches) on center running perpendicular to traffic flow. Tread rails, keylock bars, and framing shall be extruded aluminum. Framing shall have standard mill finish. All grille and framing sections when installed shall be designed to support a minimum uniform load of 975 kg per square meter (200 pounds per square foot). Drain pan application shall include a 16 gauge aluminum waterproof pan with a 51 mm (2-inch) drain and strainer, pan shall be securely attached to the bottom surface of the frame. Recessed floor grid shall be as manufactured by Arden Architectural Specialties, Inc., Balco Inc., Construction Specialties Inc. or approved equal. Floor Grill may include logo design of occupant.

4.41 Tackboards

4.41.1 Tackboards shall be sized as indicated in section 4.5. Tackboards shall conform to ASTM C208, ANSI A208.1, ASTM E84, and FS CCC-W-408 (Vinyl Coated Covering) as applicable.

4.41.2 Substrate core shall be a minimum of 13 mm (1/2 inch) of cork/neoprene or fiberboard. Backing surface shall be steel or aluminum sheet.

4.41.3 Frame shall be extruded aluminum with concealed fasteners. Edge shall be self edge or vinyl or similar trim, exposed metal is not acceptable. Corner and edge detail shall be radius.

4.41.4 The outer surface of the tackboards shall be fabric covered unless

otherwise noted in the narrative under part 4.5 Requirements for Various Rooms or Spaces. Vinyl covering shall be stretched free of wrinkles.

4.41.4.1 Vinyl covering shall meet the following:

a. Covering shall be a vinyl coated woven or nonwoven fabric with acrylic backing and shall be mildew resistant.

b. Shall conform to FS CCC-W-408; Type II (medium) or III (heavy).

c. Shall include clear top overcoat of polyvinyl fluoride factory applied, 1/2 mil thick in accordance with FS L-P-1040, Type I, Grade B, Class 2.

d. A tweed or small pattern is preferable over a solid color.

4.41.5 Fire rating for the complete component system: ASTM E 84 Class A, with smoke development rating of 50 or less and flame spread rating of 25 or less.

4.42 <u>Horizontal Blinds</u>

4.42.1 Horizontal blinds shall conform to FS AA-V-00200, Type II, 25.4 mm (1 inch) slats. Blind unit shall be capable of nominally 180 degree partial tilting operation and full-height raising. The blinds shall be listed by the manufacturer as designed for extra hard use and severe service applications including heavy duty hardware. Blinds shall be inside mounted. Both controls shall be on the same side. In the typical room units window near the entry door, the controls shall be located on the side farthest from the entry door.

4.42.2 Head channel shall be steel or aluminum nominal .61 mm (.024 inches) for Type II. Slats shall be aluminum, not less than .203 mm (.008 inches) thick, and of sufficient strength to prevent sag or bow in the finished blind. A sufficient amount of slats shall be provided to assure proper control, uniform spacing, and adequate overlap.

4.42.3 The slats shall be tilted by a transparent tilting wand, hung vertically by its own weight, and shall swivel for easy operation. The tilter control shall be of enclosed construction. Moving parts and mechanical drive shall be made of compatible materials which do not require lubrication during normal expected life. The tilter shall tilt the slats to any desired angle and hold them at that angle so that any vibration or movement of ladders and slats will not drive the tilter and change the angle of slats. A mechanism shall be included to prevent over tightening. The wand shall be of sufficient length to within 1500 mm (5 feet) of the floor. The lift string control shall be provided for raising and lowering the blinds. Both the tilt wand and lift string control shall be located on the same side.

4.42.4 Intermediate brackets shall be provided for installation of blinds over 1500 mm (60 inches) wide and shall be installed as recommended by the manufacturer.

4.43 <u>Solid Surfaces</u>

4.43.1 Solid surface components shall be solid, non-porous polymer, not coated, laminated or of composite construction. Materials shall have minimum physical and performance properties specified. Superficial damage to a depth of 1/10-inch shall be repairable by sanding or polishing.

4.43.2 Material for Counter tops and window sills shall be standard 1/2 inch thick. Material for the shower stall walls shall be standard 1/4 inch thick.

4.43.3 Material shall be a small scale, variegated pattern to the extent possible. Solid color solid surface strongly discouraged. Color should be in light to medium tone as dark colors tend to show scratches and water spots more readily.

4.43.4 Sheen shall be matte satin.

4.43.5 Edge treatment for tops shall be eased, rounded edges.

4.43.6 Performance Characteristics:

PROPERTY	REQUIREMENT	TEST PROCEDURE
Tensile Strength	4500 psi	ASTM D 638
Tensile Modulus	1.0 x 10^6 psi	ASTM D 638
Elongation	0.3% minimum	ASTM D 638
Hardness	55-60	(Barcol Impressor)
Gloss (60 degree Gardner)	5-18	NEMA LD 3, 3.15
Color Stability	No change, 200 hours	NEMA LD 3-3.10
Flame Spread Smoke Developed	Class I	UL Molded Plastic 31E2
Water Absorption Weight (% maximum)	24 hours = 0.015% Long Term = 0.09%	ASTM D570
Izod Impact	0.24 -.30ft.-lbs./in. minimum	ASTM D 256
Impact Resistance (Falling Ball)	No fracture 1/4" 36-inch drop 1/2" 36-inch drop	NEMA LD 3-3.03 1/2 pound ball 1 pound ball
Boiling Water Resistance	No Effect	NEMA LD 3-3.05
High Temperature Resistance	No change	NEMA LD 3-3.06
Weatherability	No change, 1000 hours	ASTM D 1499
Stain and Chemical Resistance	Passes, no lasting effect	NEMA LD 3-3.09

4.43.7 Accessory Products

4.43.8 Seam adhesive shall follow manufacturer's recommendations. Adhesives shall be color matched to solid surface (polymer) material. Adhesive shall create inconspicuous, non-porous joints.

4.43.9 Sealant shall follow manufacturer's recommendations. Sealant shall be mildew-resistant silicone sealant and color matched to solid surface (polymer) material.

4.43.10 Fabrication: Components shall be factory fabricated to the greatest extent practicable to sizes and shapes indicated, in accordance with approved shop drawings. Joints shall be formed between components using manufacturer's standard joint adhesive. Defective and inaccurate work shall be rejected.

4.43.11 Thermoforming shall comply with manufacturer's product data. Molds shall be constructed of plywood in "male/female" sections matching component shapes. Molds shall be shaped prior to seaming and joining. Pieces shall be cut to finished dimensions with edges sanded and nicks and scratches removed. Heat the entire component uniformly between 275-375 degrees F during forming. Prevent blistering, whitening and cracking of solid polymer material during forming. Defective material shall be rejected.

4.44 <u>Robe Hook</u>

4.44.1 Robe hook shall be secured to back of bath door in Typical Dormitory Units. Robe hooks shall be rust resistant.

5.0 STRUCTURAL INTERIOR DESIGN (SID) and FURNITURE RELATED ITEMS

5.1 General

5.1.1 Interior design shall comply with all applicable criteria listed under paragraph **1.3 Technical Criteria** in STATEMENT OF WORK section. Also, design shall meet the criteria presented herein as the minimum standards for the project.

5.1.2 **Furniture Layouts:** Refer to Attachment 10 for examples of typical room module furniture layouts (not including existing equipment) as required in section 5.5 Requirements for Rooms and Spaces.

5.2 Objective:

5.2.1 To provide a functional and compatible interior by taking a cohesive approach in design and specification of Structural Interior Design (SID). The end result shall be an integrated visual theme (architectural and furniture) that reflects the interior atmosphere desired by the using agency.

5.2.1 **Structural Interior Design (SID):** Includes specification and coordination of interior materials and finishes that includes structural surfaces, built-in features and features that are integral or attached to the building structure. This includes cabinetry and such amenities as tackboards and marker boards. SID is covered in Section 4.0 Architectural Design Requirements. The SID must coordinate with the furniture finishes.

5.2.2 **Comprehensive Interior Design (CID):** Includes coordination with structural related specifications as well as space planning of the furniture, per the information provided from Base Housing. The contractor will need to submit furniture layouts to show that all of the furniture will be accommodated in the appropriate spaces.

5.2.2.1 The Contractor is NOT required to provide the furniture/furnishings. The Government will be procuring the furniture/furnishings that is shown in the furniture layouts.

5.3 Design Considerations

5.3.1 **Color:** Finish and color selection shall be appropriate to the interior design intent and support the occupants and their activities. The finishes shall be selected based on durability, maintenance, life cycle costs, code requirements, appearance and functional considerations.

5.4 Submittal Requirements:

5.4.1 See Attachment 9 Structural Interior Design Requirements/Submittal Requirements for submittal requirements.

5.4.2 Four (4) copies of the SID package shall be submitted for review. One of the color boards needs to be for the customer to review and keep as a record copy.

5.5 Requirements for Rooms and Spaces in Central Service Core and Dormitory

The following furniture requirements need to be verified by Base Housing to ensure that adequate space is provided in each area.

5.5.1 **Bulk/Storage:** No furniture requirements

5.5.2 Linen Storage: No furniture requirements

5.5.3 Laundry: No furniture requirements

5.5.4 Entry: No furniture requirements

5.5.5 Office: This office will house (2) persons. Requirements for each occupant include work surface with filing and book/manual storage, task chair. Office also needs to provide for safe (file type) and computer with printer.

5.5.6 Janitor: No furniture requirements

5.5.7 Vending: No furniture requirements

5.5.8 TV/Game Room: Upholstered lounge chairs, end tables, lamps and entertainment units as required by Using Agency.

5.5.9 Typical Room Module

5.5.9.1 Living/Sleeping: Each Living/Sleeping Room to contain (1) Single Bed to consist of (1) headboard, (1) footboard, bedspread, and mattress or equal, (1) nightstand, 1 -2 lamps, (1) entertainment unit, (1) desk unit that accommodates studying and computer, (1) desk/side chair.

5.5.9.2 Closet: No furniture requirements

5.5.9.3 Kitchen/Dining: Dining Table and (2) chairs.

5.5.9.4 Lavatory: No furniture requirements

5.5.9.5 Bath: No furniture requirements

6.0 STRUCTURAL

6.1 FOUNDATION DESIGN: The foundations and interior slabs-on-grade will be designed in accordance with the Final Geotechnical Report provided by the Contractor. Foundations will be concrete continuous spread footings supporting CMU walls.

6.2 STRUCTURAL SYSTEM: The project consists of two three-story dormitory wings separated by a one-story isolated central service core separated from the two wings by a 50mm seismic joint. Walls will be structural concrete masonry units (CMU). All exterior CMU walls exposed to weather shall be constructed of open-end CMU blocks with all vertical cells filled with grout. The dormitory and central service core shall have structural second, third floors and third floor ceiling constructed of concrete precast hollow-core planks with a minimum 65 mm concrete topping reinforced with 152 mm x 152 mm - D14 x D14 welded wire fabric. Fiber reinforced concrete shall not be used in the construction of this dormitory. The concrete tile roof will cover the metal roof deck which will be supported by open-web steel joists bearing on the CMU walls. Lateral forces at each level will be transferred through the diaphragms to the CMU shear walls, then to the ground through the continuous spread footings. The stair landings and stringers shall be laterally separated from the floor diaphragms and stair enclosure walls so they will not transfer story to story lateral forces. Stair vertical loads may be carried by the stair enclosure walls.

6.3 DESIGN LOADS: (TM 5-809-1 and TM 5-809-10)

5.3.1 Live Loads:

Roof	1.0 kN/sq.m
Floors:	
Barracks/Dorms	2.0 kN/sq.m
Storage	6.3 kN/sq.m
Corridors	5.0 kN/sq.m
Mech/Elect room	7.5 kN/sq.m
Toilet Rooms	3.0 kN/sq.m
Stair	5.0 kN/sq.m

6.3.2 Wind Load:

Basic Wind Speed . . . . . 145 km/h

Exposure = C, I = 1
p = qGhCp
p = qh(GhCp)- qh(GCi) {with internal pressure}

6.3.3 Seismic Load:

Seismic Zone 2B

Z=0.2, I=1, C=2.75, Rw=6
Cp=2.0.for.Parapets (Cp=0.75.for.others). . . . . .

V = ZICW/Rw = 0.092W
Fp= ZICp Wp = 0.20CpWp

6.4 MATERIAL STRESSES:

Concrete:

```
   General work . . . . . . . . . . . f'c =  21 MPa
   Elevated Floor topping . . . . . . f'c =  28 MPa
Reinforcing Steel:
   Column Ties, ASTM A615 . . . . . . Fy  = 400 MPa
   All Others, ASTM A615  . . . . . . Fy  = 400 MPa
Concrete Masonry Units (CMU)  . . .  f'm =  9.3 MPa
Mortar  . . . . . . . . . . . . . .  f'm = 12.4 MPa
Grout . .  . . . . . . . . . . . . . f'm = 13.8 MPa
Structural and Misc. Steel  . . . . Fy  = 248.0 MPa
Structural Steel Tubes  . . . . . . Fy  = 317.0 MPa
Light Gage Cold-Formed Steel:
   16 GA. and Heavier . . . . . .   Fy  = 345.0 MPa
   18 GA. and Lighter . . . . . . . Fy  = 228.0 MPa
Bolts in Structural Steel . . . . . . . . ASTM A325
Bolts in Concrete or CMU  . . . . . . . . ASTM A307
Allowable Soil Pressure . . . . . . qs  =   144 kPa
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A 1/3 increase is allowed for design stresses under combined wind or seismic loading for everything except connections.

6.5 FUTURE EXPANSION: These facilities will not be designed for future expansion.

7. MECHANICAL REQUIREMENTS

7.1 HVAC

7.1.1 General: HVAC systems shall be sized in accordance with ASHRAE standards and comply with NFPA 90A and 90B. The analysis and design shall be based on the energy conservation criteria of the latest edition of ASHRAE Standard 90.1 and 90.2 unless specified otherwise in this document. Additional referenced standards shall include the Uniform Building Code (UBC), Uniform Mechanical Code, applicable Occupational Safety and Health Act (OSHA) regulations, and the **Mechanical and Electrical Seismic Protection** and **Commissioning of HVAC Systems** sections of this document.

7.1.1.2 Energy Analysis: The Contractor's designer shall perform a building energy analysis using a professionally recognized and proven computer program that allows for the integration of architectural features with heating, air conditioning, lighting, and other energy producing or consuming systems. The program shall be capable of simulating the features, systems, and thermal loads used in the design. Using established weather data files, the program shall perform, as a minimum, typical or average days-per-month calculations to determine such features and systems which will result in the lowest energy usage. The Design Energy Target for Facility Type "Q", Dormitories is 14.68 kw-hours/sq.m-yr (or 510,000 kJoules/sq.m-yr).

7.1.1.2 Materials and Equipment: Materials and equipment shall be standard catalog products of manufacturers regularly engaged in production of such materials. All selected equipment shall be manufacturer's latest standard model. Exterior equipment shall be factory primed and field painted per drawing requirements. Interior equipment shall be factory finished.

7.1.1.3 Submittals: Submittals shall be provided by the Contractor to the Contracting Officer for approval in accordance with the procedures provided at the beginning of this document.

7.1.1.3.1 Calculations, Drawings, and Specifications: Installation of the HVAC equipment shall not begin until such time that all the calculations, drawings, and specifications are returned stamped "approved."

7.1.1.3.2 Operation & Maintenance (O&M) Manuals: Six (6) complete copies of the O&M manuals in bound 216 mm by 279 mm booklets shall include a brief description of all equipment and their basic operating features, piping and equipment layouts, the manufacturer's name, model number, service manual, parts list and simplified wiring and control diagrams of the systems as installed. In addition, the booklets shall list step-by-step procedures required for system startup, operation, shutdown, routine maintenance procedures, possible breakdowns and repairs, and a trouble shooting guide.

7.1.1.4 Construction Quality Control (QC): QC shall require the Contractor to perform inspections, testing, and reporting. QC for all mechanical equipment shall be implemented as specified in Specification Section: 01451 CONSTRUCTION QUALITY CONTROL which is included in this document in the Technical Specifications of the Statement of Work.

7.1.1.5 Factory Fabricated Makeup Air Handling Units (AHU): Units shall include fans, hot and chilled water coils, airtight insulated casing, panel prefilters, diffuser sections, air blender, adjustable V-belt drives, belt guards for externally mounted motors, access sections, pocket filter box, vibration isolators, and appurtenances required for specified operation. Vibration isolators shall be unhoused spring type. AHU shall have published ratings based on tests performed in accordance with ARI 430.

7.1.1.5.1 Casings: All casing sections shall be constructed of a minimum 1.3 mm thick galvanized steel, or 1.3 mm thick steel outer casing protected with a corrosion resistant paint finish. Casing shall be sized and constructed with an integral structural steel frame such that exterior panels are non-load bearing. Exterior panels shall be individually removable. Removal shall not affect the structural integrity of the unit.

7.1.1.5.2 Access: Casings shall be provided with inspection doors, access sections, and access doors. Inspection and access doors shall be insulated, fully gasketed, double-wall type, of a minimum 1.3 mm thick outer and 1.0 mm thick inner panels. Doors shall be rigid and provided with heavy duty hinges and latches. Inspection doors shall be a minimum 305 mm wide by 305 mm high. Access doors shall be minimum 710 mm wide and shall be the full height of the unit casing or a minimum of 1.8 m, whichever is less. A latched and hinged inspection door, shall be provided, as a minimum, in the fan, filter, and coil sections.

7.1.1.5.3 Insulation: Each casing section handling conditioned air shall be insulated with not less than 25 mm thick, 40 kilograms per cubic meter density coated fibrous glass material having a thermal conductivity not greater than 0.034 Watts/m/degree C at a mean temperature of 10 degrees C. Factory applied fibrous glass insulation shall conform to ASTM C 1071, except that the minimum thickness and density requirements do not apply, and shall meet the requirements of NFPA 90A. Foam-type insulation is not acceptable. Foil-faced insulation shall not be an acceptable substitute for use on double-wall access doors and inspection doors. Duct liner material, coating, and adhesive shall conform to the flame spread and smoke developed ratings in accordance with NFPA 101, NFPA 90A, AND NFPA 90B. Exposed insulation edges and joints where insulation panels are butted together shall be protected with a metal nosing strip or shall be coated to conform to meet erosion resistance requirements of ASTM C 107.

7.1.1.5.4 AHU Fans: For AHU fans, see paragraph: **Fans**.

7.1.1.6 Fan-Coil Units: Fan-coil units shall be the 4-pipe type consisting of a cabinet, supply fan and heating and cooling coils. Return air shall be taken near the back of the unit and discharge air shall be from ceiling or wall diffusers.

7.1.1.6.1 Dormitory Room Fan-Coil Units: The dormitory rooms shall be conditioned by horizontal type fan-coil units mounted in the ceiling plenum space. Each bedroom shall be furnished with its own fan-coil unit and wall-mounted thermostat. Air for the bedroom shall be directed toward the center of the room from diffuser(s). Each fan-coil unit shall discharge a small portion of its air into the common spaces (kitchen, etc). A minimum of 2.5 l/s per square meter shall be provided in the kitchen. Condensate shall be piped to the nearest waste line and shall discharge through an air-gap fitting and a P-trap. The air-gap fitting and P-trap shall be in the enclosure with the fan-coil unit and the enclosure shall be provided with an access panel to reach these items. The access panels to service the fan-coil units shall be located in the most visually unobtrusive location as possible.

7.1.1.6.2 Admin Office Fan-Coil Unit: The office shall be conditioned by a horizontal or vertical type unit.

7.1.1.6.3 TV/Game Room Fan-Coil Units: The lounge shall be conditioned by either a horizontal or vertical type unit.

7.1.1.7 Air Distribution: The systems provided shall conform to the recommendations of the ASHRAE Air Distribution Manual and SMACNA-06 Duct Construction Standards - Metal and Flexible and shall be designed so as not to permitted, under any circumstances, an exchange of air from one area with another area.

7.1.1.7.1 Ductwork: Ductwork shall be constructed of galvanized steel for general ventilation and supply/return air use. Aluminum ductwork shall be used for ventilation of toilets with showers and clothes dryer vents. Elbows shall be radius type with a centerline radius of 1-1/2 times the width or diameter of the duct.

7.1.1.7.2 Duct Sealing: Static pressure class 125, 250, and 500 Pa shall meet the requirements of Seal Class C. Static pressure class 750 through 2,500 Pa shall meet the requirements of Seal Class A. Sealant, adhesives, coatings, and other accessories shall have flame spread and smoke developed ratings in accordance with NFPA 101, NFPA 90A, and NFPA 90B. Pressure sensitive tape shall not be used as a sealant. Spiral lock seam duct and flat oval duct connections shall be made with duct sealant and locked with not less than 3 equally spaced drive screws or other approved methods as indicated by SMACNA-06.

7.1.1.7.3 Duct Runouts: Individual runouts to diffusers and registers in rooms with ceilings may be constructed of factory pre-insulated flexible ducts which shall not exceed 3 m in length. Runouts to registers or grilles in toilets, shower areas, and janitor rooms shall be metal.

7.1.1.7.4 Acoustical Duct Lining: Acoustical lining shall conform to the requirements of ASTM C 1071, Type I and II and shall be factory fabricated fibrous glass designed exclusively for lining ductwork. Lining shall be provided on the discharges of all air handler supply fans and intakes of all return and exhaust fans. Sufficient length of run shall be provide to obtain the noise reduction value specified (For noise limits, reference paragraph: **Noise Criteria**). The contractor shall certify that the sound reduction value specified will be obtained within the length of duct run provided; minimum lining duct run length shall not be less than ten (10) duct diameters or duct widths. Ductwork shall be oversized to account for the acoustical lining thickness. Where acoustical duct lining is used, liner or combination of liner and insulation applied to the exterior of the ductwork shall be the thermal equivalent of the insulation specified.

7.1.1.7.5 Diffusers: Diffusers shall be perforated face type with fully adjustable pattern and removable face. Diffusers shall be fabricated from steel, have a baked enamel finish, and be provide with opposed blade dampers and air straighteners. Diffusers in T-Bar ceilings shall be the panel type and be provided with 90-degree round neck adapters. Supply registers shall be minimum four-way directional control type with vertical front and horizontal rear deflection blades.

7.1.1.7.6 Registers: Supply register blades shall be spaced on 19 mm centers with each blade being individually adjustable. Supply register shall be fabricated from aluminum with factory clear lacquer finish and shall be provided with an opposed blade damper. Return and exhaust registers shall as specified above for supply registers except without the horizontal rear deflection blades.

7.1.1.7.7 Grilles: Ceiling grilles in acoustical T-Bar ceilings shall be the eggecrate type with 13 mm by 13 mm by squares. Grilles shall be fabricated of aluminum with a baked enamel finish. Ducted return grilles shall be provided with opposed blade dampers. Grilles shall be the panel type and sized to match the T-Bar ceiling grid.

7.1.1.7.8 Duct Smoke Dectors: Duct smoke detectors shall conform to the requirements of UL 268A. Duct smoke detectors shall have perforated sampling tubes extended into the air duct. Dector circuitry shall be mounted in a metallic enclosure exterior to the duct. Dectors shall have a manual reset. Detectors shall be rated for air velocities that include air flows between 2.5 m/s and 20.0 m/s. Detectors shall be powered from the HVAC control panel.

Detectors shall have two (2) sets of normally open alarm contacts and two (2) sets of normally closed alarm contacts. Detectors shall be connected to the building fire alarm panel for alarm initiation. A remote annunciation lamp and accessible remote reset switch shall be provided for duct detectors that are mounted 2.4 m or more above the finished floor and for detectors that are not readily visible. Remote lamps and switches as well as each affected fan unit shall be properly identified in etched rigid plastic placards

7.1.1.7.9 Fire Dampers: All duct penetrations into multi-floor vertical shafts in the living modules and main mechanical room shall be protected with a fire damper per NFPA-90A (Note: All vertical shafts shall start from the first floor, rise continuously through the attic, and attach to the roof with a fire rated connection). All duct penetrations through one (1) hour rated walls shall not require a fire damper as per NFPA-90A.

7.1.1.8 Hydronic System: The hydronic system shall be a reverse return system if economically feasible. Isolation valves, inlet strainers, 2-way valves, and calibrated balancing valves shall be provided on all hot and chilled water coils. Pressure relief or calibrated balancing valves shall be sized and provided at the far ends of the piping system to avoid circulating pump "dead heading." Branch isolation valves shall be provided where two or more fan-coil units connect to the main hot/chilled water supply and return piping.

7.1.1.8.1 Heating/Cooling Coils: Coils shall be fin-and-tube type constructed of seamless copper tubes and aluminum or copper fins mechanically bonded or soldered to the tubes. Casing and tube support sheets shall be not lighter than 1.6 mm thick galvanized steel formed to provide structural strength. When required, multiple tube supports shall be provided to prevent tube sag. Each coil shall be tested at the factory under water at not less than 2,750 kPa air pressure and shall be suitable for 1,375 kPa working pressure. Coils shall be mounted for counterflow service. Coils shall be rated and certified in accordance with ARI 410. Coils shall be installed with a pitch of not less than 10 mm per meter of the tube length toward the drain end. Headers shall be constructed of cast iron, welded steel or copper. Each coil shall be provided with a plugged vent and drain connection extending through the unit casing.

7.1.1.8.2 Chilled and Heating Hot Water Piping: Fittings for copper tubing shall be made with silver solder or wire solder of 95 percent tin and 5 percent antimony (95-5). Piping shall not be run in or through the ductwork. Chilled water piping shall be either Schedule 40 black steel or Type L hard-drawn copper. Heating hot water shall be either Schedule 40 black steel or Type L hard-drawn copper. Fittings for steel pipe 25 mm in diameter and smaller shall be threaded; fittings 32 mm in diameter through 65 mm in diameter shall be either threaded, grooved, or welded; fittings 80 mm in diameter and larger shall be either flange, grooved, or welded. Grooved mechanical joints shall be suitable for 860 kPa working pressure and 120 degrees C working temperature.

7.1.1.8.3 Water Treatment: Water to be used in the chilled and hot water systems shall be treated to maintain the conditions recommended by the manufacturers of the chiller, cooling tower, and boiler. Chemicals shall meet all required federal, state, and local environmental regulations for the treatment of hydronic systems. Chemicals shall be environmentally suitable for direct discharge to the sanitary sewer. The services of a company regularly engaged in the treatment of water systems shall be used to determine the correct chemicals required, the concentrations required, and the water treatment equipment sizes and flow rates required. Acid treatment and proprietary chemicals shall not be used.

7.1.1.9 Roof-Mounted equipment: With the exception of outdoor air intake, power roof ventilators, clothes dryer exhaust vents, and exhaust air hoods, HVAC equipment shall not be mounted on the roof. However, every attempt shall be made

to use wall louvers for intake and exhaust air. When exterior ground-mounted equipment is required, decorative screen walls, with access to facilitate the removal of the equipment, shall be designed by the project architect.

7.1.1.10 Maintenance Considerations: Each piece of equipment shall be installed so it can be properly maintained. Clearances must be provided around all equipment to allow it to be serviced, removed, and replaced as required. Convenient access shall be provided in the mechanical and chiller rooms as well as the entire building to all above and below ground utilities, cleanouts, HVAC equipment and systems, and gas fittings.

7.1.1.11 Cathodic Protection: For cathodic protection, reference paragraph: **Corrosion Control**.

7.1.1.12 Seismic Requirements: All mechanical and electrical equipment shall be seismically protected as required in section **Mechanical and Electrical Seismic Protection:** of this document.

7.1.1.13 HVAC Control Systems: All control systems shall be direct digital control (DDC). Pneumatic actuators and controls are not allowed.

7.1.1.13.1 Building Control Systems: All building DDC for HVAC equipment shall be fully software and hardware compatible with the existing Base energy monitoring and control system (EMCS).

7.1.1.13.2 Energy Monitoring and Control System (EMCS): The telephone number for the Base Civil Engineers (BCE) EMCS manager is 702-652-2297 (Mr. Jesse Young). All mechanical equipment shall be monitored for status and controlled by the existing basewide Centaurus DDC EMCS. The Centaurus system utilizes a Central Control Unit (CCU) with Pegasus application software. The phone number for Centaurus is 619-270-4552 (Mr. Bill Proctor). The CCU has connected terminal devises consisting of a color CRT and multiple printers that provide display and print out capabilities for use by system operating personal. Remote buildings are connected to the EMCS CCU through multiple serial ports utilizing the communication trunks. The building shall be connected by modem to the EMCS CCU. The EMCS system requires two (2) pairs of unloaded telephone lines from the building to the Telephone Terminal Board (TTB) using Motorola CODEX modems (LDM) model #2171 or equal. As a minimum, the following items shall be connected to the building EMCS data terminal cabinet (DTC):

Living unit fan-coil units; Each fan-coil unit shall be connected to a small EMCS controller serving four (4) rooms. The small controllers shall then be connected to the main EMCS DTC.

Building makeup air handling unit;

Building boiler;

Building chiller and cooling tower;

Building gas meter;

Building water meter;

7.1.1.14 Noise Criteria: All mechanical equipment and systems shall be selected on the basis of acoustical impact on the building occupants. Maximum noise level for general office spaces, dormitory rooms, and day/game rooms shall not exceed NC 35.

7.1.1.15 HVAC System Testing and Balancing: Testing and balancing shall be

performed on all air and hydronic systems.

7.1.1.15.1 Qualifications: The contractor shall obtain the services of a qualified testing organization independent of the installing contractor or equipment suppliers for this project. The criteria for determining qualifications shall be membership in the Associated Air Balance Council (AABC) or certification by the National Environmental Balancing Bureau (NEBB). In addition, the testing organization shall submit proof to satisfy the Contracting Officer that the organization meets the technical standards for membership in the AABC. Prior to commencing work, the testing organization shall have been approved by the Contracting Officer to perform the testing and balancing.

7.1.1.15.2 Procedures: Procedures, in general, shall be in accordance with the AABC "National Standards for Field Measurements and Instrumentation-Total System Balance" and NEBB Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems. All system and components there of shall be adjusted to perform as required by the drawings and specifications. Operating tests of heating and cooling coils, fans, chiller, cooling tower, and boilers shall be of not less than four (4) hours duration after stabilized operating conditions have been achieved. Sound level measurements shall be taken at times when the building is unoccupied. Meters shall comply with ANSI 51-11. Readings shall be made for each octave band, and shall be taken not less than 1 m from any surface. The Contracting Officer shall select not less than 10, nor more than 20 rooms for testing. The maximum allowable NC levels are as stated. See paragraph: **Noise Criteria**.

7.1.1.15.3 Agenda: Contractor shall review the plans and specification prior to the installation of any system and submit a written report to the Contracting Officer indicating deficiencies that would preclude proper balancing. 20 working days prior to start of the testing and balancing, the contractor shall submit an agenda for approval by the Contracting Officer.

7.1.1.15.4 Certified reports: After the field testing is completed, the Contractor shall submit three (3) copies of the certified reports covering air and water system performances. The reports shall be signed by a registered professional engineer (PE) who is versed in the field of air and water balancing and who is not affiliated with any firm involved in the planning or construction of this project.

7.1.1.15.5 Recheck: At the time of the final inspection, the Contractor shall recheck, in the presence of the Contracting Officer, a random selection of data recorded in the certified report. Points for recheck shall be selected by the Contracting Officer.

7.1.1.15.6 Equipment Settings: Following final acceptance of the Certified Report, the contractor shall permanently mark the settings of all dampers, valves, etc.

7.1.1.16 HVAC System Commissioning: Commission of all HVAC equipment shall be as specified in the section 7.5: **COMMISSIONING OF HVAC SYSTEMS**.

7.1.1.17 Training: Contractor shall include a training period for Base maintenance personnel. The training period shall be a minimum of six (6) hours of on-site instructions up to two (2) days.

7.1.1.18 Backflow Preventers: For equipment requiring water, see paragraph: **Water Meters and Backflow Preventers:**

7.1.2 Heating: Heating loads shall be calculated in accordance with the latest edition of the American Society of Heating Refrigeration and Air Conditioning

Engineers (ASHRAE) Handbook of Fundamentals. The calculation shall include a minimum 30 percent safety factor. Heating calculations shall exclude heat gains from internal and solar effects. All rooms shall be heated except for the vestibules and electrical rooms.

7.1.2.1 Design Conditions, Heating:

Elevation	569 m
Heating Degree Days (Based on 18 Degrees C)	1320
2.5% Dry Bulb Ambient	-3 Degree C
Dormitory Rooms, General Office Spaces, and TV/Game Rooms	21 Degree C
General Circulation Areas, Lobbies, Corridors, and Vending	21 Degree C
Toilets and Showers	21 Degree C
Storage Lockers	13 Degree C
Electrical Rooms	Ventilation Only
Communication Rooms	Ventilation Only
Laundry Rooms	13 Degree C
Mechanical and Chiller Rooms	*Ventilation Only

*Ventilation for chiller rooms shall be in accordance with ASHRAE Standard 15.

7.1.2.2 Dorm Heating: Heating shall be provided by a boiler installed in the mechanical room. This system shall be independent from the domestic water heating system. Hot water shall be pumped to fan-coil units in the dorm rooms.

7.1.2.2.1 Boilers: The boiler capacity shall be based on the ratings shown in HYI-01 or as certified by the American Boiler Manufacturers Association, or American Gas Association. Boilers shall be the gas fired low NOx type and have the output capacity in kilowatts (kw). Boilers with a capacity less than 85 kw shall have an Annual Fuel Utilization Efficiency of at least 80 percent. Boilers with a capacity of greater than or equal to 85 kw shall have a combustion efficiency of at least 80 percent when fired at the maximum and minimum ratings allowed by the controls. Contractor shall be required to provide permits for the boiler installations with inputs greater than 292 kW.

7.1.2.2.2 Boiler Accessories and Requirements: Boilers shall be constructed, and equipped in accordance with ASME BPV IV. The boiler shall be furnished complete with the natural gas burning equipment, boiler fittings and trim, automatic controls, forced or induced draft fan, electrical wiring, insulation, piping connections, and protective jacket. The boiler shall be completely assembled and tested at the manufacturer's plant. Boiler auxiliaries including fans, motors, drives, and similar equipment shall be provided with at least 10 percent excess capacity to allow for field variations in settings and to compensate for any unforeseen increases in pressure losses in appurtenant piping and ductwork. However, the boiler safety devices shall not be sized for a 10 percent excess capacity. The boiler and its accessories shall be installed to permit ready accessibility for operation, maintenance, and service. Each boiler shall be either of the firetube, watertube, or cast iron type for water service as specified herein.

7.1.2.2.3 Firetube Boiler: Boiler shall be self-contained, multipass, packaged type, complete with all accessories, mounted on a structural steel base. When the boilers is operating at maximum output, the heat input rates shall not be greater than 21 Kw per square meter of fireside heating surface. The volume heat input rate shall not be less than 2,070 Kw per cubic meter of furnace volume.

7.1.2.2.4 Watertube Boiler: Boiler shall be self-contained, packaged type, complete with all accessories, mounted on a structural steel base. The heat

input rate for finned tube styles shall not be greater than 38 Kw per square meter based on internal heater area. The heat input rate for other boilers shall not be greater than 21 Kw per square meter of fireside heating surface.

7.1.2.2.5 Cast Iron Boiler: Boiler shall be of the rectangular, sectional type, self-contained, packaged type, complete with accessories, mounted on a structural steel base. Cast iron sections shall be free of leaks under all operating conditions. Access shall be provided to permit cleaning of internal tube surfaces.

7.1.2.2.6 Gas Fired Burners and Controls: Burner shall be provided complete with fuel supply system in conformance with the following safety codes or standards: Gas fired units shall conform to UL 795, Gas fired units less than 3,660 kw input shall conform to ANSI Z21.13.

7.1.2.3 Bulk Storage and Laundry Room Unit Heaters: The storage and laundry rooms shall be conditioned by hot water unit heaters. Heaters capacity shall be as calculated, and not to exceed 125 percent of that value. Heaters shall be arranged for horizontal discharge of air. Storage unit heaters shall be equipped with. Casings shall be not less than 1 mm thick black steel and finished with lacquer or enamel. Suspension from heating pipes will not be permitted. Heating coils and radiating fins shall be of suitable nonferrous alloy with threaded or brazed fittings at each end for connecting to external piping. The heating elements shall be free to expand or contract without developing leaks and shall be properly pitched for drainage. Coils shall be suitable for use with water up to 120 degrees C.

7.1.2.4 Insulation, Heating Ductwork: Mineral fiber shall comply with Fed. Spec. HH-I-558 and cellular glass shall comply with ASTM C 552. Sheet metal supply and return ducts shall be insulated with 50 mm thick mineral fiber, except that return ducts in plenums or conditioned spaces do not need to be insulated. Insulation for ductwork used for both heating and cooling shall conform to the requirements for cooling ductwork. Insulation shall be applied to the outside of the duct.

7.1.2.5 Insulation, Heating Water Pipes: Mineral fiber shall comply with Fed. Spec. HH-I-558 and cellular glass shall comply with ASTM C 552. Heating hot water less than 100 mm in diameter shall be insulated with 50 mm mineral fiber or cellular glass. Hot water pipes 100 mm in diameter or greater shall be insulated with 65 mm thick mineral fiber or cellular glass. All pipe hangers for insulated pipes shall utilizing high-density inserts and shields (or saddles) to protect the pipe insulation.

7.1.3 Ventilating: Ventilation air quantities other than the dorm rooms shall be in accordance with ASHRAE Standard 62, Ventilation for Acceptable Air Quality. Outside air flow in other heated and air conditioned areas shall be in accordance with ASHRAE Standard 62-1989.

7.1.3.1 Design Conditions, Ventilating (Outside Air):

Dormitory Room	14 l/s per Bedroom
Admin Office	10 l/s per Person
TV/Game Room	12 l/s per Person

7.1.3.1.1 Dorm Room Ventilation: The living unit ventilation shall consist of a makeup air handling unit (AHU) installed in the main mechanical room. The unit shall provide tempered and filtered makeup air to each bedroom. From the AHU, ductwork shall pass up a vertical shaft into the attic of the dorm, branch and pass concealed over any breeze ways, and then branch down a vertical shaft provided for each living module. A smoke detector shall be provided in the AHU supply duct and shall de-energize the AHU fan and send an alarm signal to the

fire alarm control panel when activated.

7.1.3.1.2 Admin Office Ventilation: The office ventilation shall consist of an outside air duct connect directly to the fan-coil unit return duct. There will be two (2) people in the room at a time.

7.1.3.1.3 TV/Game Room Ventilation: Lounge and adjacent corridor ventilation shall consist of an outside air duct connect directly to the fan-coil unit return duct. There will be 10 persons in the room at a time.

7.1.3.1.4 Bulk Storage Ventilation: The locker ventilation shall consist of a ceiling mounted centrifugal fan connected directly to the outside.

7.1.3.2 Design Conditions, Exhaust:

Dormitory Room	24 l/s per Toilet
Laundry Rooms	(Provided by Clothes Dryers)
Bulk Storage Rooms	2.5 l/s per Square meter
Electrical Rooms	10 Air Changes/Hour (minimum)*
Mechanical and Chiller Rooms	10 Air Changes/Hour (minimum)* **

*Air changes shall limit the interior temperature to no more than 6 degrees C above the outside ambient temperature.
**Ventilation for the chiller room shall be in accordance with ASHRAE Standard 15.

7.1.3.2.1 Dorm Room Exhaust: The dorm room exhaust system shall consist of inline exhaust fans installed in the dormitory attic each with a maximum motor size (to facilitate maintenance) of 1.5 kw. From the toilet, ductwork shall pass up a vertical shaft into the attic of the dorm, through the wall of the chase (with fire damper), over to the attic exhaust fan, and then discharge the air through a dormers in the roof.

7.1.3.2.2 Bulk Storage: The storage exhaust systems shall consist of cabinet exhaust fans that operate continuously. Each exhaust fan shall be controlled by a wall-mounted thermostat. Makeup air shall enter through the unit heater and be discharged from the room by the fan.

7.1.3.2.3 Mechanical, Chiller, and Electrical Rooms: The room exhaust systems shall consist of either an inline centrifugal fan or a centrifugal power wall fan and occur only in summer when the inside temperature is 32 degrees C or above. Each exhaust fan shall be controlled by a wall-mounted thermostat. Makeup air shall enter through wall or door louvers and be discharged from the room by the fan.

7.1.3.2.4 Toilets and Showers: Ventilation air shall be supplied indirectly by exhausting conditioned air through them.

7.1.3.2.5 Laundry Room: Each clothes dryer shall be vented directly to the outside through a wall louver when possible. Common ducts exhausting two or more dryers shall <u>not</u> be permitted.

7.1.3.2.6 Kitchen Range: Exhaust air shall discharge through a vertical shaft to the outside. A separate single duct shall penetrate the vertical shaft with fire damper and run up the vertical duct shaft to the outside.

7.1.3.3 Fans: Fans shall be tested and rated in accordance with AMCA 210. Fans may be connected to the motors either directly or indirectly with V-belt drive. V-belt drives shall be sized for not less than 150 percent of the connected

driving capacity. Motor sheaves shall be variable pitch for 11.2 kilowatts and below and fixed pitch as defined by ARI Guideline D. Variable pitch sheaves shall be selected to drive the fan at a speed which will produce the specified capacity when set at the approximate midpoint of the sheave adjustment. When fixed pitch sheaves are furnished, a replaceable sheave shall be provided when needed to achieve system air balance. Motors for V-belt drives shall be provided with adjustable rails or bases. Removable metal guards shall be provided for all exposed V-belt drives, and speed-test openings shall be provided at the center of all rotating shafts. Fans shall be provided with personnel screens or guards on both suction and supply ends, except that the screens need not be provided, unless otherwise indicated, where ducts are connected to the fan. Fan and motor assemblies shall be provided with vibration-isolation supports or mountings. Vibration-isolation units shall be standard products with published loading ratings. Each fan shall be selected to produce the capacity required at the fan static pressure as calculated. Sound power level shall be indicated. The sound power level values shall be obtained in accordance with AMCA 300. Impeller and housing in the air stream of vehicle exhaust and welding exhaust fans shall be coated with neoprene, epoxy, phenolic resins, or other approved material suitable to resist the corrosive gases and temperatures produced.

7.1.3.3.1 Centrifugal Fans: Centrifugal fans shall be fully enclosed, single-width single-inlet, or double-width double-inlet, AMCA Pressure Class I, II, or III as required for the planned system pressure. Impeller wheels shall be rigidly constructed, accurately balanced both statically and dynamically. Fan blades may be forward curved, backward-inclined or airfoil shape in wheel sizes up to 760 mm. Fan blades for wheels over 760 mm in diameter shall be backward-inclined or airfoil shape. Fan wheels over 915 mm in diameter shall have overhung pulleys and a bearing on each side of the wheel. Fan wheels 915 mm or less in diameter may have one or more extra-long bearings between the fan wheel and the drive. Bearings shall be sleeve type, self-aligning and self-oiling with oil reservoirs, or precision self-aligning roller or ball-type with accessible grease fittings or permanently lubricated type. Bearing life shall be L50 rated at not less than 200,000 hrs as defined by AFBMA 9 and AFBMA 11. Fan shafts shall be steel, accurately finished, and shall be provided with key seats and keys for impeller hubs and fan pulleys. Each fan outlet shall be of ample proportions and shall be sized for the attachment of angles and bolts for attaching flexible connections. Motors, unless otherwise indicated, shall not exceed 1800 rpm.

7.1.3.3.2 In-Line Centrifugal Fans: In-line fans shall have centrifugal backward inclined blades, stationary discharge conversion vanes, internal and external belt guards, and adjustable motor mounts. Fans shall be mounted in a welded tubular casing. Air shall enter and leave the fan axially. Inlets shall be streamlined with conversion vanes to eliminate turbulence and provide smooth discharge air flow. Fan bearings and drive shafts shall be enclosed and isolated from the air stream. Fan bearings shall be sealed against dust and dirt and shall be permanently lubricated, and shall be precision self aligning ball or roller type. Bearing life shall be L50 rated at not less than 200,000 hrs as defined by AFBMA 9 and AFBMA 11.

7.1.3.3.3 Centrifugal Type Power Wall Fans: Fans shall be V-belt driven centrifugal type with backward inclined, non-overloading wheel. Motor housing shall be removable and weatherproof. Unit housing shall be designed for sealing to the building surface and for discharging any condensate accumulation away from building surface. Housing shall be constructed of heavy gauge aluminum. Unit shall be fitted with an aluminum or plated steel wire discharge bird screen, manufacturer's standard gravity damper, an airtight and liquid-tight metallic wall sleeve. Motor enclosure shall be totally enclosed fan cooled type. Lubricated bearings shall be provided.

7.1.3.3.4 Cabinet Exhaust Fans: Suspended cabinet-type ceiling exhaust fans

shall be centrifugal type, direct-driven. Fans shall have acoustically insulated housing. Integral backdraft damper shall be chatter-proof. The integral face grille shall be of egg-crate design or louver design. Fan motors shall be mounted on vibration isolators. Unit shall be provided with mounting flange for hanging unit from above. Fans shall be UL listed.

7.1.3.4 Air Filters: Air filters shall be listed according to requirements of UL 900.

7.1.3.4.1 Extended Surface Pleated Panel Filter: Pre-filters shall be 50 mm depth, sectional, disposable type of the size indicated and shall have an average efficiency of 25 to 30 percent when tested in accordance with ASHRAE 52. Initial resistance at 2.5 meters per second will not exceed 90.0 kPa. Filters shall be UL Class 2. Media shall be nonwoven cotton and synthetic fiber mat. A wire support grid bonded to the media shall be attached to a moisture resistant fiberboard frame. All four edges of the filter media shall be bonded to the inside of the frame to prevent air bypass and increase rigidity.

7.1.3.4.2 Extended Surface Non-Supported Pocket Filters: Filters shall be 760 mm depth, sectional, replaceable dry media type of the size indicated and shall have an average efficiency of 80 to 85 percent when tested according to ASHRAE 52.1. Initial resistance at 2. 5 meters per second shall not exceed 112.6 kPa. Filters shall be UL Class 1. Media shall be fibrous glass, supported in the air stream by a wire or non-woven synthetic backing and secured to a galvanized steel metal header. Pockets shall not sag or flap at anticipated air flows. Each filter shall be installed with an extended surface pleated panel filter as a prefilter in a factory preassembled, side access housing or a factory-made sectional frame bank.

7.1.4 Air Conditioning: Cooling loads shall be calculated in accordance with the latest edition of the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals. The calculation shall include a minimum 10 percent safety factor. Cooling calculations shall be based on either the Transfer Function Method or the Cooling Load Temperature Difference/Cooling Load Factors Method. All rooms shall be air conditioned except for the vestibules, toilets, showers, electrical rooms, laundry, and bulk storage.

7.1.4.1 Design Conditions, Cooling:

Elevation	569 m
Cooling Degree Days (Based on 18 Degrees C)	1716
2.5% Dry Bulb/MCWB Ambient	42/20 Degree C
Cooling Tower For Chiller (For Cooling Tower Sizing)	Increase 30%*
Evaporative Cooler Ambient 2.5% Wet Bulb (For Evap. Sizing)	22 Degree C
Dormitory Rooms, General Office Spaces, and TV/Game Room (Air Conditioned)	25 Degree C
Laundry Rooms (Evaporative Cooling)	27 Degree C
General Circulation Areas, Lobbies, Toilets and Showers	Ventilation Only
Bulk Storage	Ventilation Only
Mechanical, Chiller, and Electrical Rooms	Ventilation Only**

Communication Rooms (Air Conditioned or Ventilated)	To Be Determined By Com Room Designer

*The cooling tower capacity shall be sized to accommodate a 30 percent larger chiller.

**Ventilation shall be in accordance with ASHRAE Standard 15.

7.1.4.2 Dorm Cooling, Chiller: Cooling shall be provided by a water cooled chiller. Chiller shall be of the reciprocating, scroll, or screw compressor type. Unit shall be factory-assembled, tested, and rated in accordance with ARI 590 and come complete with piping, wiring, and accessories. Ozone depletion rate shall be a maximum of 0.05. The chiller shall be located in a dedicated chiller room. Installation shall be in accordance with ASHRAE standard 15, the Safety Code for Mechanical Refrigeration. Unit shall be provided with refrigerant and oil.

7.1.4.2.1 Outdoor Cooling Tower: Unit shall be sized for a chiller that is 30 percent larger than the one selected. The condenser water system shall be the closed circuit type eliminating water loss. The cooling tower shall be designed for exterior installation and shall be located in the screened enclosure outside the mechanical room. Motor and controls shall have weather resistant enclosures. Isolation valves, strainers, 2-way control valves, and calibrated balance valves shall be provide in the piping for each coil.

7.1.4.2.2 Piping: Piping layout shall be as specified above for heating. Chilled water shall be pumped to the coils in the fan-coil units.

7.1.4.3 Laundry Room Evaporative Cooler: The laundry room shall be cooled by an evaporative cooler. The evaporative cooler shall be located in the main mechanical room. Unit shall be a self-contained direct weather resistant drip blow through type and shall conform to UL 507 and UL 746C. The unit shall have a centrifugal fan and be complete with motor, drive equipment, and vibration-isolation supports between motor and fan housing. The fan shall have air delivery ratings based on AMCA 210 tests by an AMCA approved laboratory. Evaporative media shall be fabricated of 150 mm minimum munter media with an efficiency of 85%. Media shall conform to UL900 Class II. The cabinet shall be construction of galvanized steel sheets, stainless steel, or polymeric materials. Laundry air shall be relieved through ceiling grilles and weather resistant motorized dampers located in the plenum on an outside wall. Total dissolved solid (TDS) controls shall be provided to monitor water quality complete with LED digital display. When TDS levels reach a preset conductivity limit, the drain solenoid and pump shall be activated. Fresh water shall replace the reservoir as old water is drained. The unit shall be sized according to the ambient wet bulb stated, reference paragraph: **Design Conditions, Cooling**.

7.1.4.4 Insulation, Cooling Ductwork: Mineral fiber shall comply with Fed. Spec. HH-I-558 and cellular glass shall comply with ASTM C 552. Sheet metal supply and return ducts shall be insulated with 50 mm thick mineral fiber, except that return ducts in plenums or conditioned spaces do not need to be insulated. Insulation shall be applied to the outside of the duct. A vapor barrier coating, with a density of 12 kilograms per cubic meter, shall be provided on all cooling and cooling/heating duct insulation.

7.1.4.5 Insulation, Chilled Water Pipes: Mineral fiber shall comply with Fed. Spec. HH-I-558 and cellular glass shall comply with ASTM C 552. Chilled water piping less than 100 mm in diameter shall be insulated with 25 mm thick mineral fiber or 40 mm thick cellular glass. Chilled water piping 100 mm in diameter and larger shall be insulated with 40 mm thick mineral fiber or 50 mm thick cellular glass. Vapor barrier coating shall be provided. All pipe hangers for insulated

pipes shall utilizing high-density inserts and shields (or saddles) to protect the pipe insulation.

7.1.4.6 Condensate Drain Piping and Insulation: Condensate drains from the fan-coil units and makeup air handling unit(s) shall meet the requirements set forth in the National Standard Plumbing Code. Drain piping shall be either copper, ABS, PVC, or polyethylene. The piping shall include a trap of sufficient depth to overcome static pressure of the unit. All piping, except in the mechanical and chiller rooms, shall be insulated with 25 mm thick mineral fiber or 40 mm thick cellular glass.

7.2 Plumbing:

7.2.1 General: Plumbing systems shall be installed in accordance with the latest edition of the National Standard Plumbing Code (NAPHCC). Inspection and testing of the plumbing system shall be performed as prescribed in the National Standard Plumbing Code. Additional referenced standards shall include the Uniform Plumbing Code, Americans With Disabilities Act, Uniform Federal Accessibility Standards, applicable Occupational Safety and Health Act (OSHA) regulations, and the **Mechanical and Electrical Seismic Protection** section of this document.

7.2.1.1 Materials and Equipment: Materials and equipment shall be standard catalog products of manufacturers regularly engaged in production of such materials. All selected equipment shall be manufacturer's latest standard model.

7.2.1.2 Seismic Requirements: All mechanical and electrical equipment shall be seismically protected as required in section **Mechanical and Electrical Seismic Protection:** of this document.

7.2.1.3 Submittals: Submittals shall be provided by the Contractor to the Contracting Officer for approval in accordance with the procedures provided at the beginning of this document.

7.2.1.3.1 Calculations, Drawings, and Specifications: Installation of the plumbing equipment shall not begin until such time that all the calculations, drawings, and specifications are returned stamped "approved."

7.2.1.3.2 Operation & Maintenance (O&M) Manuals: Six (6) complete copies of an O&M manuals in bound 216 mm by 279 mm booklets shall include a brief description of all equipment and their basic operating features, piping and equipment layouts, the manufacturer's name, model number, service manual, parts list and simplified wiring and control diagrams of the systems as installed. In addition, the booklets shall list step-by-step procedures required for system startup, operation, shutdown, routine maintenance procedures, possible breakdowns and repairs, and a trouble shooting guide.

7.2.2 Plumbing Fixtures and Equipment: To minimize future maintenance efforts and associated costs, reference paragraph: **Maintenance Considerations**.

7.2.2.1 Plumbing Fixtures, General: Fixtures shall and comply with Fed. Spec. WW-P541, Plumbing Fixtures, Accessories, (Detail Specification). Fixtures shall be provided complete with fittings. All fixtures, fittings, and trim in a project shall be from the same manufacturer and shall have the same finish. Faucets shall be equipped with high efficiency faucet aerators. All faucets, shower heads, faucet handles, and miscellaneous trim shall be of metal construction with a polished chrome finish.

7.2.2.1.1 Faucets: All faucet handles shall be single-control type with seals and seats combined in one replaceable cartridge sized to be interchangeable among

similar fixtures such as lavatories and kitchen sinks or having replaceable seals and seats removable either as a seat insert or as a part of a replaceable valve unit. Water flow will be no more than 0.165 l/s from the any faucet.

7.2.2.1.2 Lavatories: Dorm unit bathroom lavatory counter tops and sinks shall be solid surface, polymer molded, integral with counter top, and have a continuous seamless mount. The lavatory shall be the oval type with a minimum size of 480 mm by 405 mm. Lavatories shall have pop-up drain stoppers.

7.2.2.1.3 Kitchen/Dining Sink: Provide double bowl stainless steel sink with garbage disposal (see reference paragraph: **Garbage Disposal**) in solid polymer surface counter top. Sinks shall be for residential use, type 302 or 304 stainless steel, 1.0 mm thick minimum, seamless drawn, and sound deadened. Sinks shall be 150 mm deep minimum, double bowl, self-mounting without mounting rings, and complete with strainer and plug.

7.2.2.1.4 Showers: Shower stalls shall be of solid polymer surface over membrane waterproofing on a cementitious substrate; conforming to ANSI Z124.2. Shower receptors shall be slip resistant sac stone. Shower stall shall be ceramic tile (One piece wainscots are prohibited). Shower heads shall be the low volume adjustable spray type, be connected to a flexible chromium hose, and fit into an adjustable height holder mounted on a vertical rod to allow height adjustment over a wide range. Shower handles shall be the washerless single-handled control type with seals and seats combined in one replaceable cartridges diverting valve. Shower diverter valve shall be a combination valve and flow control device to limit the flow to 0.165 l/s at pressures between 140 kPa and 410 kPa.

7.2.2.1.5 Water Closets: Water closets shall be the floor-mounted elongated vitreous china bowl type with low water volume flush tank type water closets and white closed-front seat and cover.

7.2.2.1.6 Water Closets, Handicapped: Handicapped type shall be provided where indicated. Top rim of bowl shall be 455 mm above the floor; other features are the same as in the paragraph: **Water Closets**.

7.2.2.1.7 Urinals: Urinals shall be the wall-mounted flush valve type made of vitreous china. Urinal flushometer valves shall be the large diaphragm type with non-hold-open feature, backcheck angle control stop and vacuum breaker. Minimum upper chamber inside diameter of not less than 65 mm at the point where the diaphragm is sealed between the upper and lower chambers. Valve shall be chrome plated and use a maximum of 3.8 liters per flushing cycle.

7.2.2.1.8 Wash Sinks: Wash sinks shall be provided for the laundry room. Sinks shall be enameled cast iron with a corrosion resistant stainless steel or copper alloy rim guard. Faucets shall have replaceable seat, the stem shall rotate onto the seat, and a backflow preventer which may be an add on item. Strainers shall have internal threads. Combination faucets shall be mounted on the tub back. Faucets shall have two lever-type handles, chrome finish, hose threaded swing spout.

7.2.2.1.9 Service Sinks: Service sinks shall be provided for the janitor closets. Sinks shall be cast or wrought copper alloy, cast iron, or stainless steel. Faucets shall have replaceable seat, the stem shall rotate onto the seat, a wall brace, and a backflow preventer which may be an add on item. Faucet handles shall be the lever-type. Strainers shall have internal threads. Spouts shall be externally threaded for hose connection and swing.

7.2.2.1.10 Floor Drains: Floor drains shall be provided in the mechanical room(s) and in areas with condensate producing equipment. Floor drains shall mot

be required (other than shower drains in bathrooms) in bathroom floors, public restrooms, laundry rooms, or shower drying areas. Floor drains shall be cast iron with integral seepage pan, and adjustable perforated or slotted chromium-plated bronze, nickel bronze, or nickel brass strainer.

7.2.2.1.11 Floor Sinks: Provide a floor sink in the mechanical and chiller rooms. All cooling coil condensate drains shall be piped to the floor sink. Sink shall be square with 300 mm nominal overall width and 250 mm nominal depth and shall have a acid resistant enamel finish with cast iron body.

7.2.2.2 Water Heaters: The building heating and domestic hot water systems shall be separate. A minimum of two (2) water heating systems shall be provided. One water heating system shall serve the dormitory units only. A second water heating system shall serve the laundry room and remaining non-dorm room plumbing fixtures. All water heaters shall be the self-contained type with storage tank, burner, controls, and safety features as a minimum.

7.2.2.2.1 Capacity: The water heating system shall be sized in accordance with **Attachment 1:**

7.2.2.2.2 Type: The water heater shall be a gas-fired automatic storage type, and shall comply with the requirements of ASHRAE 90A. The storage tanks shall be either the vertical or horizontal type and be glass lined. The heater shall be complete with a control system and shall have ASME rated pressure and temperature relief valves. Gas fired heaters shall conform to ANSI Z21.10.1 when input is 75,000 btuh or less and ANSI Z21.10.3 for heaters with input greater than 75,000 btuh.

7.2.2.2.3 Hot Water Circulating Pumps: Circulating pumps shall be electrically driven, single stage, centrifugal, mechanical seals, and suitable for the intended service.

7.2.2.2.4 Thermostatic Mixing Valves: Building thermostatic mixing valve(s) shall be located in the mechanical room next to the water heater(s) and shall be designed and manufactured specifically for domestic hot water temperature control. A separate thermostatic mixing valve shall be installed on each domestic hot water branch originating from the mechanical room. The thermostatic mixing valve(s) shall be capable of maintaining a constant a constant 45 degrees C (plus or minus 2 degrees C) water temperature under minimum and maximum hot water demands. The thermostatic mixing valve shall be equipped with a separate low-demand valve and a high-demand valve to ensure water temperature reliability at different flow rates.

7.2.2.3 Garbage Disposals: Garbage disposal shall have a minimum 0.37 kw motor, stainless steel grinding elements, two 360-degree stainless steel swivel impellers, manual motor reset, and sound insulation. A plug connector is required.

7.2.2.4 Water Meters and Backflow Preventers: Provide a water meters, reduced pressure backflow preventer assemblies, and drain valves on the domestic cold water lines serving the facility. Domestic cold water shall be taken from an exterior water main. The meter shall be equipped with a digital readout and shall be connected to the Base energy monitoring and control system (EMCS). The backflow preventer shall be approved by AWWA C506. A separate backflow preventer shall be installed on the building potable water system for makeup water to equipment requiring water. The fire sprinkler system shall be isolated by a double check backflow preventer. See paragraph: **Fire Riser and Fire Department Connection**.

7.2.2.5 Gas Regulator/Meter Assembly: Regulator/meter assembly shall be sized

for the building gas requirements. The regulator/meter shall be located outside next to the mechanical room. The meter shall be equipped with a remote digital readout located in the mechanical room and shall be connected to the Base energy monitoring and control system (EMCS). The assembly shall be provided with plug cocks on the inlet and outlet with provisions to remove the meter for service with minimal downtime. A building shut off valve on the gas line serving the facility shall be provided.

7.2.3 Domestic Water Piping: All domestic water piping shall be concealed. Stops will be provided on water supply lines to all plumbing fixtures except showers. All above grade water piping shall be installed inside the building thermal envelope.

7.2.3.1 Pipe: Copper joints shall be soldered with wire solder of 95 percent tin and 5 percent antimony. Di-electric isolation shall be provided water heaters and between all equipment with dissimilar metals.

7.2.3.1.1 Above Ground Water Piping: All above ground piping shall be Type L hard-drawn copper. Fittings for hard-drawn copper shall conform to ANSI B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

7.2.3.1.2 Below Ground Water Piping: All underground piping shall be seamless copper water tube, ASTM B 88 type K with brazed joints, or type F soft copper without joints. Joints under the slabs are prohibited. Under slab supply piping shall be limited to building service entrance only.

7.2.3.1.3 Clothes Washer Connections: Hot and cold water supply shall be provided for government supplied government installed clothes washers. Washer connections shall be complete with wall-mounted 20 mm hose threaded valves.

7.2.3.1.4 Wall Hydrants and Hose Faucets: Provide wall hydrants on the exterior walls of the building at 15 m intervals. In addition, hose faucets shall be installed in the mechanical and chiller rooms. All wall hydrants shall have an integral vacuum breaker backflow preventer, detachable kit handle, and 20 mm hose connection.

7.2.3.1.5 Dishwasher Connections: Hot and cold water supply shall be stubbed out and capped for future dishwashers. See Arch for exact location.

7.2.3.1.6 Water Softener: Rough plumbing with floor sink for a future water softener in the mechanical room shall be provided. The domestic hot and cold water piping will be plumbed such that all water for plumbing fixtures, except hose faucets and wall hydrants, will pass through the water softener.

7.2.4 Natural Gas Piping: Installation of the gas system shall be in accordance with NFPA 54, the National Fuel Gas Code, UL-06, the Gas and Oil Equipment Directory, and all local/seismic codes. All above ground gas piping shall be schedule 40 black steel. All underground shall be Polyethylene with tracer wire. The use of semirigid tubing and flexible connectors is prohibited except for final connections to gas equipment and appliances. Buried pipe under the building shall not be permitted.

7.2.4.1 Gas Service: The available gas line pressure is approximately 21 kPa gauge. the existing gas line are steel and are installed approximately 0.6 m underground. The underground gas lines are protected by an impressed current cathodic protection system. Additional wire shall be provided for continuity of the cathodic protection system when polyethylene pipe is provided for the new gas service; this is in addition to the tracer wire.

7.2.4.2 Gas Connections: Final connections for gas equipment and appliances

shall be made using flexible connectors conforming to ANSI Z21.45. Flexible connectors shall be all metal construction manufactured for gas equipment and appliances and not more than 1 m long. Accessible gas shutoff valves and couplings shall be provided for each gas equipment and appliance connection.

7.2.5 Insulation: All pipe hangers for insulated pipes shall utilizing high-density inserts and shields (or saddles) to protect the pipe insulation.

7.2.5.1 Domestic Water Piping: Domestic hot water pipes shall be insulated as per paragraph: **Insulation, Heating Water Pipes**. Domestic cold water piping shall be insulated as per paragraph: **Insulation, Chilled Water Pipes**. Condensate drain piping shall be insulated as per paragraph: **Condensate Drain Piping and Insulation**.

7.2.5.2 Handicapped Fixtures: For Handicapped lavatories, exposed traps shall be insulated.

7.2.6 Sanitary Piping: All sanitary piping shall be concealed. Each fixture and piece of equipment, except water closets and urinals, requiring connection to the drainage system shall be provided with a trap.

7.2.6.1 Drain, Waste, and Vent Piping: Drain, waste, and vent piping shall be either cast iron (no hub) or ABS.

7.2.6.2 Waste Traps: Deep seal trapped drain shall be provided on all cooling coil condensate drains. Traps for lavatories shall be chromium-plated, adjustable-bent tube, 20-gauge brass, or plastic (ABS). For Handicapped lavatories, see paragraph: **Insulation, Handicapped Fixtures**.

7.2.6.3 Cloth Washer Drains: Drainage shall be provided for government supplied government installed clothes washers. Washer connections shall be complete with wall-mounted 100 mm drain with trap.

7.2.6.4 Dishwasher Drains: Stubbed out drain connection shall be provided for future government supplied government installed dishwashers. Washer may be connected to the kitchen sink/garbage disposal drain if located within one (1) meter, otherwise washer shall have a dedicated drain line with p-trap..

7.2.7 Corrosion Control: Cathodic protection shall be provided on all buried or submerged ferrous piping (including cast iron), tanks, and related facilities. Under no circumstances shall underground facilities be installed without cathodic protection.

7.2.7.1 Design: All cathodic protection shall be designed by an engineer accredited by the National Association for Corrosion Engineers (NACE). The Design shall be based upon specific field tests made at the construction site.

7.2.7.2 Cast Iron Pipe: All buried or submerged cast iron pipe joints shall be bonded with No.2 AWG insulated wire. Thermit wire connections shall be coated.

7.2.7.3 Impressed Current Systems: All installed cathodic protection systems shall be the impressed current type and shall comply with the corrosion protection criteria outlined in NACE Standard RP-01-69-9 (revised).

7.3 <u>Fire Protection:</u>

7.3.1 General: The entire facility shall be protected by a wet pipe sprinkler system, which shall be installed in accordance with NFPA-13 and NFPA-13R. The system shall be hydraulically calculated. Reference paragraph: **HVAC** and ensuing

HVAC paragraphs for fire protection requirements of mechanical equipment. To minimize future maintenance efforts and associated costs, reference paragraph: **Maintenance Considerations**.

7.3.1.1 Materials and Equipment: Materials and equipment shall be standard catalog products of manufacturers regularly engaged in production of such materials. All selected equipment shall be manufacturer's latest standard model. Materials and equipment shall have been tested by Underwriters Laboratories (UL) and listed un UL-04 or approved by Factory Mutual (FM) and listed in FM P7825.

7.3.1.2 Submittals: Submittals shall be provided by the Contractor to the Contracting Officer for approval in accordance with the procedures provided at the beginning of this document.

7.3.1.2.1 Designer Qualifications: All hydraulic calculations and drawings showing the layout of the sprinkler system shall be done by a registered Fire Protection Engineer who has had at least four (4) years of current experience in the sizing of fire protection systems. Written proof of registration and experience shall be submitted to the Contracting Officer for approval.

7.3.1.2.2 Calculations, Drawings, and Specifications: All calculations and drawings shall be signed by a registered Fire Protection Engineer. Installation of fire protection equipment shall not begin until such time that the calculations, drawings, and specifications are returned stamped "approved."

7.3.1.2.3 Operation & Maintenance (O&M) Manuals: Six (6) complete copies of an O&M manuals in bound 216 mm by 279 mm booklets shall include a brief description of all equipment and their basic operating features, piping and equipment layouts, the manufacturer's name, model number, service manual, parts list and simplified wiring and control diagrams of the systems as installed. In addition, the booklets shall list step-by-step procedures required for system startup, operation, shutdown, routine maintenance procedures, possible breakdowns and repairs, and a trouble shooting guide.

7.3.2 Occupancy Ratings: The occupancy ratings shall be as follows:

Area:	Occupancy:	Density: (l/min/sq.m)
Dorm Rooms	Residential	(See NFPA 13R)
Bulk Storage	Ord. Haz. Group 2	8.15
Laundry Rooms	Ord. Haz. Group 2	8.15
Mechanical and Chiller Rooms	Ord. Haz. Group 2	8.15
Com Rooms	Ord. Haz. Group 1	6.11
Electrical Rooms	Ord. Haz. Group 1	6.11
All Others (Admin Offices, TV/Game Room, Corridors, Balconies, Stairwells, etc.)	Lt. Haz.	4.07

7.3.3 Hydraulic Calculations: Two (2) separate hydraulic calculations shall be performed. One calculation shall be performed for the dorm rooms and a second calculation shall be performed for all remaining areas.

7.3.3.1 Calculations: Hydraulic calculations shall be based on hydrant number

338 pressure and flow test data as indicated in the **Civil Requirements**. The pressures and flows shall be assumed to exist at the point-of-connection of the new water line to the existing main that supplies hydrant number 338. The Contractor shall minimize the pressure drop from the Base water main point-of-connection, by doing things like increasing line sizes, reducing sprinkler head spacing, and providing low pressure drop backflow preventers, in order to meet the specified area requirements with the available water supply. In all cases, sprinkler and hose stream demands shall be assumed to take place simultaneously.

7.3.3.1.1 Dorm Room Calculations: Hydraulic calculations for the dorm rooms shall be based on the requirements of NFPA 13R at the most hydraulically remote area from the Base water main point-of-connection with a hose stream flow of 950 l/min assumed to be at the base of the riser.

7.3.3.1.2 Calculations Except for Dorm Rooms: Hydraulic calculations for all areas, except the dorm rooms, shall be based on an Area of Sprinkler 0peration of 140 sq.m at the most hydraulically remote area from the Base water main point-of-connection with a hose stream flow of 950 l/min assumed to be at the base of the riser.

7.3.4 Fire Riser and Fire Department Connection: The riser assembly shall be installed above grade in the main mechanical room and shall be a minimum of 150 mm in diameter. As a minimum, the riser shall comprise of a pressure gauge, O.S.&Y. supervised control valve, FM approved double check valve backflow assembly, second pressure gauge, 100 mm check valve connected to a 65 mm x 65 mm x 100 mm fire department connection, third pressure gauge, main sprinkler system drain, and water flow indicator. Flow indicator shall be connected to a local-alarm circuit, transmitted-alarm circuit, and power-supply circuit. 65 mm x 65 mm x 100 mm fire department connection shall be installed outside the building as indicated in the **Civil Requirements**.

7.3.5 Local Fire Alarm: Building exterior fire alarm indication shall be by an electrically operated bell located on an outside wall adjacent to the sprinkler riser. The transmitted alarm signal to the main fire station shall be under the electrical portion of this contract.

7.3.6 Sprinkler Heads: Closet sprinkler heads shall centered in the room. Sprinkler heads in T-bar ceilings, unless indicated otherwise, shall be centered on the ceiling tiles in one direction. The sprinkler temperature ratings shall be suitable for the hazard being protected.

7.3.6.1 Areas With Finished Ceilings: Sprinkler heads in areas with suspended or gypsum board ceilings such as dorm units (including toilet/shower and closets), corridors, and public restrooms, lounges, main interior stairwells, and etc. shall be the concealed type. Sprinkler heads in the dorm rooms shall be listed for residential occupancies.

7.3.6.2 Exterior Areas and Areas <u>Without</u> Finished Ceilings: Freeze-proof pendant type sprinklers shall be installed in the exterior stairwells and balconies to avoid the freezing of smaller pipe. Areas <u>without</u> suspended or gypsum board ceilings such as mechanical and chiller rooms, electrical rooms, com rooms, and etc. shall be protected by exposed pendant type sprinkler heads. Sprinklers other than the freeze-proof type shall be the quick response type.

7.3.6.3 Covers And Escutcheons: All concealed sprinkler heads shall have a white covers and escutcheon rings. The exposed and semi-recessed sprinkler heads shall be polished chrome with white escutcheon rings.

7.3.7 Standpipe riser: A standpipe risers shall <u>not</u> be provided in accordance with the June 1997 Facility Design Guide for Enlisted Dormitories which only

requires standpipe risers for four (4) stories or more.

7.3.8 Backflow Preventers: For backflow preventer requirements, see paragraph: **Water Meters and Backflow Preventers:**

7.4 <u>Mechanical and Electrical Seismic Protection:</u>

7.4.1 General: All mechanical and electrical equipment shall be protected for Seismic Zone 2B with no other zone values used to establish bracing requirements, and be installed in accordance with ASTM E 488 Strength of Anchors in Concrete and Masonry Elements, ICBO-01 Uniform Building Code (3 Vol.), SMACNA-12 Seismic Restraint Manual Guidelines for Mechanical Systems, UL 1570 Fluorescent Lighting Fixtures, UL 1571 Incandescent Lighting Fixtures, and any other requirements called for in other parts of this document. Lateral support against earthquake induced forces shall be accomplished by positive attachments without consideration of friction resulting from gravity loads.

7.4.1.1 Specifications:

7.4.1.2 Mechanical/Electrical Equipment: The designer shall ensure that, from the examples below as a minimum, all electrical and mechanical items and systems to be braced.

7.4.1.2.1 Example Items: Mechanical/electrical equipment shall include, but not be limited to, the following items: Boilers, Water Heaters, Water and Gas Piping, Expansion and Air Separator Tanks, Water Chiller Units, Control Panels, Air Handling Units, Cooling Towers, Air Terminal Units, Fan-Coils, Pumps with Motors, Light Fixtures, Motor Control Centers, Transformers, Switchboards (Floor Mounted), Suspended Ceiling Assemblies, Ducts, Unit Heaters, Exhaust Fans.

7.4.1.2.2 Example Systems: Mechanical/electrical systems shall include, but not be limited to, the following items: All Piping Inside the Building, Chilled Water Systems Outside of Buildings, All Water Supply Systems, Sanitary Sewer Systems, Condenser Water Piping Outside the Building, All Cable Trays Inside the Building.

7.4.2 Equipment Items and Systems: The bracing for the following mechanical/electrical equipment items and systems shall be developed by the Contractor in accordance with the requirements of this document

7.4.2.1 Exclusion: Seismic protection of piping for fire protection systems shall be installed as specified in NFPA. Seismic restraints may be omitted from the following installations: Gas piping less than 25 mm inside diameter, Piping in boiler and mechanical equipment rooms less than 32 mm inside diameter, All other piping less than 38 mm inside diameter, Electrical conduit less than 64 mm inside diameter, Rectangular air handling ducts less than 0.37 square meters, Round air handling ducts less than 457 mm in diameter, Piping suspended by individual hangers 300 mm or less in length from the top of pipe to the bottom of the supporting structural member where the hanger is attached, except as noted, and Ducts suspended by hangers 300 mm or less in length from the top of the duct to the bottom of the supporting structural member, except as noted. Note: All hangers shall meet the length requirements. If the length requirement is exceeded by one hanger in the run, the entire run shall be braced.

7.4.2.2 All Other Interior Piping, Conduit, and Ducts: Piping, conduit, and ducts not covered by paragraphs Exclusion or Pipes and Ducts Requiring No special Seismic Restraints shall be seismically protected in accordance with the provisions herein.

7.4.3 Submittals: Submittals shall be provided by the Contractor to the

Contracting Officer for approval in accordance the procedures provided at the beginning of this document.

7.4.3.1 Calculations and Drawings: All calculations and drawings shall be stampeded by a registered engineer. Calculations shall verify the capability of structural members to which bracing is attached for carrying the load from the brace. Detail drawings shall include catalog cuts, templates, and erection and installation details, as appropriate, for the items listed. shall be complete in detail, shall indicate thickness, type, grade, class of metal, and dimensions, and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.

7.4.3.2 Specifications:

7.4.3.3 Operation & Maintenance (O&M) Manuals: Six (6) complete copies of an O&M manuals in bound 216 mm by 279 mm booklets shall include a brief description of all equipment and their basic operating features, piping and equipment layouts, the manufacturer's name, model number, service manual, parts list and simplified wiring and control diagrams of the systems as installed. In addition, the booklets shall list step-by-step procedures required for system startup, operation, shutdown, routine maintenance procedures, possible breakdowns and repairs, and a trouble shooting guide.

7.4.4 Materials and Equipment:

7.4.4.1 Flexible Couplings: Flexible couplings shall have same pressure and temperature ratings as adjoining pipe.

7.4.4.1.1 Flexible Mechanical Couplings: Mechanical couplings for steel or cast iron pipe shall be of the sleeve type and shall provide a tight flexible joint under all reasonable conditions, such as pipe movement caused by expansion, contraction, slight settling or shifting of the ground, minor variations in trench gradients, and traffic vibrations. Where permitted in other parts of this document, joints utilizing split-half couplings with grooved or shouldered pipe ends may be used.

7.4.4.1.2 Sleeve-type Couplings: Sleeve-type couplings shall be used for joining plain-end pipe sections. The coupling shall consist of one steel middle ring, two steel followers, two gaskets, and necessary steel bolts and nuts to compress the gaskets. Underground bolts shall be the high-strength type.

7.4.4.2 Lighting Fixtures: Fixture supports shall be malleable iron. Lighting fixtures and supports shall conform to applicable UL requirements.

7.4.5 Execution:

7.4.5.1 Bracing and Coupling: Bracing and coupling provisions of this paragraph apply to all piping within a 1.5 m line around outside of building unless buried in the ground. Piping grouped for support on trapeze-type hangers shall be braced at the same intervals as determined by the smallest diameter pipe of the group. No trapeze-type hanger shall be secured with less than two 13 mm bolts. Bracing rigidly attached to pipe flanges, or similar, shall not be used where it would interfere with thermal expansion of piping.

7.4.5.2 Building Drift: Sway braces for a run shall not be attached to two dissimilar structural elements of a building that may respond differentially during an earthquake unless a flexible joint is provided. Joints capable of accommodating seismic displacements shall be provided where pipes pass through a building seismic or expansion joint, or where rigidly supported pipes connect to equipment with vibration isolators. For threaded piping, swing joints shall

be provided. For piping with manufactured ball joints, the seismic drift shall be 0.005 meters per meter of height above the base where the seismic separation occurs; this drift value shall be used in place of the expansion given in the manufacturer's selection table.

7.4.5.3 Flexible Couplings or Joints:

7.4.5.3.1 Building Piping: Flexible couplings or joints in building piping shall be provided at bottom of all pipe risers larger than 90 mm in diameter. Flexible couplings or joints shall be braced laterally without interfering with the action of the flexible coupling or joint. Cast iron waste and vent piping need only comply with these provisions when caulked joints are used. Flexible bell and spigot pipe joints using rubber gaskets or no-hub fittings may be used at each branch adjacent to tees and elbows for underground waste piping inside of building to comply with these requirements.

7.4.5.3.2 Underground Piping: In Seismic Zone 2, 3, and 4, underground piping and 100 mm or larger conduit, except heat distribution system, shall have flexible couplings installed where the piping enters the building. The couplings shall accommodate 76 mm of relative movement between the pipe and the building in any direction.

7.4.5.3.3 Pipe Sleeves: Pipe sleeves in interior non-fire rated walls shall be sized to provide clearances that will permit differential movement of piping without the piping striking the pipe sleeve.

7.4.5.3.4 Spreaders: Spreaders shall be provided between adjacent piping runs to prevent contact during seismic activity whenever pipe or insulated pipe surfaces are less than 100 mm apart. Spreaders shall be applied at same interval as sway braces at an equal distance between the sway braces. If rack type hangers are used where the pipes are restrained from contact by mounting to the rack, spreaders are not required for pipes mounted in the rack. Spreaders shall be applied to surface of bare pipe and over insulation on insulated pipes utilizing high-density inserts and pipe protection shields.

7.4.5.3.5 Anchor bolts: It will be the Contractor's responsibility to design the support and anchorage for the equipment in accordance with the specified requirements. The Contractor will ensure that foundations and anchor bolts for pad-mounted or floor-mounted equipment are detailed and designed in accordance with this document.

Cast-In-Place: Floor or pad mounted equipment shall use cast-in-place anchor bolts, except as specified below. In Seismic Zone 1 and 2, one nut shall be provided on each bolt. In Seismic Zone 3 and 4, two (2) nuts shall be provided on each bolt. Anchor bolts shall conform to the following tabulation for the various equipment weights or the manufacturer's installation recommendations, whichever is the most stringent. Anchor bolts that exceed the normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths.

Minimum Bolt Sizes for Cast-In-Place Anchor Bolts: Maximum Equipment Weight/Minimum Bolt Sizes are as follows:

Maximum Equipment			Minimum Bolt Sizes (mm)*		
Weight(Kg)	Zone 4	Zone 3	Zone 2A	Zone 2B	Zone 1
225	13	13	13	13	13
450	13	13	13	13	13
2,250	13	13	13	13	13
4,500	13	13	13	13	13

9,000	13	13	13	13	13
13,500	16	13	13	13	13
22,500	22	16	13	13	13
45,000	**	**	16	22	13

*Based on four bolts per item, a minimum embedment of 12 bolt diameters, a minimum bolt spacing of 16 bolt diameters and a minimum edge distance of 12 bolt diameters. Equivalent total cross-sectional area shall be used when more than four bolts per item are provided. Anchor bolts shall conform to ASTM A 307. Anchor bolts shall have an embedded straight length equal to at least 12 times nominal diameter of the bolt.
**Equipment weighing more than 22,500 kg in Zones 3 and 4 shall have at least six bolts per item.

Expansion or Chemically Bonded Anchors: Expansion or chemically bonded anchors shall not be used unless test data has been provided to verify the adequacy of the specific anchor and application. The expansion anchor size shall be not less than that required for cast-in-place anchor bolts. Expansion and chemically bonded anchors shall be installed in accordance with the manufacturer's recommendations. The allowable forces shall be adjusted for the spacing between anchor bolts and the distance between the anchor bolt and the nearest edge, as specified by the manufacturer.

Anchor Bolt Testing: Expansion or chemically bonded anchors shall not be used unless test data has been provided to verify the adequacy of the specific anchor and application. The expansion anchor size shall be not less than that required in paragraph **Cast-In-Place**. Expansion and chemically bonded anchors shall be installed in accordance with the manufacturer's recommendations. The allowable forces shall be adjusted for the spacing between anchor bolts and the distance between the anchor bolt and the nearest edge, as specified by the manufacturer. Torque wrench testing shall be done on not less than 50 percent of the total installed expansion anchors and at least one anchor anchor for every piece of equipment containing more than two anchors. The test torque shall equal the minimum required installation torque as required by the bolt manufacturer. Torque wrenches shall be calibrated at the beginning of each day the torque tests are performed. Torque wrenches shall be recalibrated for each bolt diameter whenever tests are run on bolts of various diameters. The applied torque shall be between 20 and 100 percent of wrench capacity. The test torque shall be reached within one half turn of the nut, except for 9 mm sleeve anchors which shall reach their torque by one quarter turn of the nut. If any anchor fails the test, similar anchors not previously tested shall be tested until 20 consecutive anchors pass. Failed anchors shall be retightened and retested to the specified torque; and if the anchor still fails the test it shall be replaced again.

7.4.5.4 Resilient Vibration Isolation Devices: Selection of anchor bolts for vibration isolation devices and/or snubbers for equipment base and foundations shall follow the same procedure as in paragraph **Cast-In-Place** except that an equipment weight equal to five times the actual equipment weight shall be used

7.4.5.4.1 Resilient and Spring-Type Vibration Devices:

Seismic Zone 1 or 2: Vibration isolation devices shall be selected so that the maximum movement of equipment from the static deflection point shall be 15 mm.

Seismic Zone 3 or 4: Multidirectional seismic snubbers employing elastomeric pads shall be installed on all floor- or slab-mounted equipment. These snubbers shall provide 6 mm free vertical and horizontal

movement from the static deflection point. Snubber medium shall consist of multiple pads of cotton duct and neoprene or other suitable materials arranged around a flanged steel trunnion so both horizontal and vertical forces are resisted by the snubber medium.

7.4.5.5 Sway Bracing for Piping: Sway braces shall be provided to prevent movement of the pipes under seismic loading. Braces shall be provided in both the longitudinal and transverse directions, relative to the axis of the pipe. The bracing shall not interfere with thermal expansion requirements for the pipes as described in other parts of this document.

7.4.5.5.1 Traverse Sway Bracing: Transverse sway bracing for steel and copper pipe shall be provided at intervals not to exceed those given in the tabulation below as modified for each seismic zone. All runs shall have a minimum of two transverse braces. Transverse sway bracing for pipes of materials other than steel and copper shall be provided at intervals not to exceed the hanger spacing as specified by the manufacturer.

7.4.5.5.2 Maximum Span for Transverse Sway Braces in Seismic Zone:

Pipe Diameter (mm)	Std. Wgt. Steel Pipe - 40S *L(m)	** F(kN)	Ex. Strong Steel Pipe - 80S *L(m)	**F(kN)	Copper Tube Type L *L(m)	**F(kN)
25	6.7	0.30	6.7	0.4	3.4	0.08
40	7.6	0.60	7.9	0.8	3.7	0.16
50	8.8	1.0	9.1	1.3	4.3	0.30
65	9.8	1.7	10.0	2.1	4.8	0.50
80	10.4	2.5	10.7	3.2	5.2	0.70
90	11.0	3.3	11.6	4.1	5.5	1.0
100	11.9	4.3	12.2	5.3	5.8	1.3
125	12.5	6.4	13.4	8.5	6.1	2.1
150	13.7	9.4	14.0	12.2	6.7	3.3
200	14.9	16.6	16.5	22.9	7.9	6.9
250	16.5	27.1	18.0	34.1	8.5	11.7
300	17.7	38.1	18.6	46.0	9.4	17.6

*L = Maximum span between lateral supports multiplied by 1.1 for Zone 3, 1.25 for Zone 2A, 1.2 for Zone 2B, or 1.35 for Zone 1
**F = Horizontal force on the brace multiplied by 0.8 for Zone 3, 0.5 for Zone 2A, 0.6 for Zone 2B, or 0.3 for Zone 1.
NOTE: Bracing shall consist of at least one vertical angle 50 x 50 mm x 16 gauge and one diagonal angle of the same size.

7.4.5.5.3 Longitudinal Sway Bracing: Longitudinal sway bracing shall be provided at 12 m intervals. All runs shall have one longitudinal brace minimum. Branch lines, walls, or floors shall not be used as sway braces.

7.4.5.5.4 Vertical Runs: Vertical runs of piping shall be braced at not more than 3 m vertical intervals. For tubing, bracing shall be provided at no more than 1.2 m spacing. Vertical braces shall be above the center of gravity of the span being braced. Branch lines, walls, or floors shall not be used as sway braces.

7.4.5.5.5 Anchor Rods, Angles, and Bars: Anchor rods, angles, and bars shall be bolted to either pipe clamps or pipe flanges at one end and cast-in-place concrete or masonry insert or clip angles bolted to the steel structure on the other end. Rods shall be solid metal or pipe as specified below. Anchor rods, angles, and bars shall not exceed lengths given in the tabulation below.

Maximum Allowable

Type	Size (millimeters)	Length* (meters)	Loads* (kiloNewtons)
Angles	38 x 38 x 6	1.5	25.5
	50 x 50 x 6	2.0	34.5
	64 x 38 x 6	2.5	43.5
	75 x 64 x 6	2.5	48.0
	75 x 75 x 6	3.0	53.0
Rods	91	1.0	16.5
	22	1.0	22.0
Flat Bars	38 x 6	0.4	14.0
	50 x 6	0.4	18.0
	50 x 10	0.5	28.5
Pipes (40s)	25	2.0	18.0
	32	2.8	24.5
	40	3.2	29.5
	50	4.0	39.5

*Based on the slenderness ratio of l/r = 200 and ASTM A 36 steel, where l is the length of the brace and r is the least radius of gyration of the brace.

7.4.5.5.6 Clamps and Hangers: Clamps or hangers on uninsulated pipes shall be applied directly to pipe. Insulated piping shall have clamps or hangers applied over the insulation utilizing high-density inserts and pipe protection shields.

7.4.5.5.7 Bolts: Bolts used for attachment of anchors to pipe and structure shall be not less than 13 mm diameter.

7.4.5.6 Sway Braces for Ducts:

7.4.5.6.1 Braced Ducts: Bracing details and spacing for rectangular and round ducts shall be in accordance with SMACNA-12, including Appendix E. Select the appropriate SMACNA Seismic Hazard Level (SHL) and Connection Level (CL) according to the design seismic zone:

Zone	SHL	CL
1	C	*
2A	C	*
2B	B	*
3	B	*
4	A	3

*Connection levels are not required to be designated in Seismic Zones 1, 2, and 3.

7.4.5.6.2 Unbraced Ducts: Hangers for unbraced ducts shall be positively attached to the duct within 50 mm< of the top of the duct with a minimum of two #10 sheet metal screws. Unbraced ducts shall be installed with a 150 mm minimum clearance to vertical ceiling hanger wires.

7.4.5.7 Sway Braces for Conduit: Conduit shall be braced as for an equivalent weight pipe.

7.4.5.8 Equipment Sway Bracing: Equipment sway bracing shall be provided for items supported from overhead floor or roof structures. Braces shall consist of angles, rods, wire rope, bars, or pipes arranged as shown and secured at both

ends with not less than 13 mm bolts. Braces shall conform to paragraph **Anchor Rods, Angles, and Bars**. Sufficient braces shall be provided for equipment to resist a horizontal force equal to the Lateral Force Coefficient (g) times the weight of equipment without exceeding safe working stress of the bracing components. Details of equipment bracing shall be submitted for approval. In lieu of bracing with vertical supports, these items may be supported with hangers inclined at 45 degrees directed up and radially away from equipment and oriented symmetrically in 90-degree intervals on the horizontal plane, bisecting the angles of each corner of the equipment, provided that supporting members are properly sized to support operating weight of equipment when hangers are inclined at a 45-degree angle.

7.4.5.8.1 Suspended Equipment: Select the appropriate lateral force coefficient (as a portion of gravity) according to the seismic zone:

Zone	Lateral Force Coefficient (g)*
1	0.28
2A	0.56
2B	0.75
3	1.13
4	1.50

*The values listed above assume the equipment is nonrigid or flexibly mounted above grade in the building. Equipment weighing more than one-fifth of the dead load of off-grade slabs at the equipment level or equipment weighing more than one-tenth of the building weight must be checked by structural analysis to conform with building seismic provisions. The following items shall be checked structurally: Equipment supported by large pole or frame; Storage tanks for water and oil; Storage racks with upper storage level more than 2.4 m in height; Smoke stacks taller than 15 m in height.

7.4.5.8.2 Floor or Pad Mounted Equipment:

Shear Resistance: Floor mounted equipment shall be bolted to the floor. Requirements for the number and installation of bolts to resist shear forces shall be in accordance with paragraph **Anchor Bolts**.

Overturning Resistance: The ratio of the height of the equipment (measured from the base to the center of gravity of the equipment) to the minimum distance between anchor bolts shall be used to determine if overturning forces need to be considered in the sizing of anchor bolts. If this ratio is greater than the values listed below, then the bolt values in paragraph **Minimum Bolt Sizes, Cast-In-Place Anchor Bolts** shall not be used and calculations shall be provided to verify the adequacy of the anchor bolts for combined shear and overturning. Select the appropriate h/d ratio for equipment according to the seismic zone:

Zone	h/d Ratio
1	8.89
2A	4.44
2B	3.33
3	2.22
4	1.67

7.4.5.9 Miscellaneous Equipment:

7.4.5.9.1 Rigidly Mounted Equipment: Rigidly mounted equipment is defined as having a period of vibration of 0.06 seconds or less. Equipment with a fundamental period greater than 0.06 seconds should be assumed to be flexibly mounted or nonrigid. For ground-mounted equipment use 2/3 of the values listed below. Examples of items that may require additional reinforcements (internally) to meet the specified requirements include boilers, chillers, cooling towers, and engine-driven generators, which consist of a number of individual components built into an assembly by the manufacturers. For emergency generators, auxiliary items required for the generator to operate, such as battery racks and day tanks, shall be included. Select the appropriate lateral force coefficient (as a portion of gravity) according to the seismic zone:

Zone	Lateral Force Coefficient (g)
1	0.06
2A	0.11
2B	0.15
3	0.23
4	0.30

Examples Rigidly Mounted Equipment: The following are examples of specific equipment to be constructed and assembled to withstand the horizontal Lateral Force Coefficient (g) times the operating weight of the equipment, at vertical center of gravity of the equipment without causing permanent deformation, dislocations, separation of components, or other damage, which would render the equipment inoperative for significant periods of time following an earthquake: Boilers; Chillers; Air-Handling Units; Cooling Towers; Water Heaters; Engine-Generators; Substations; Transformers; Switch Boards and Switch Gears; Motor Control Centers; Free Standing Electric Motors; Surge Tanks.

7.4.5.9.2 Nonrigid or Flexibly-Mounted Equipment: Nonrigid or flexibly-mounted equipment shall be constructed and assembled to resist a horizontal lateral force of 0.75 times the operating weight of the equipment at the vertical center of gravity of the equipment.

7.4.5.10 Lighting Fixtures in Buildings: Lighting fixtures and supports for Seismic Zones 2, 3, and 4 shall conform to the following:

7.4.5.10.1 Pendant Fixtures: Loop and hook or swivel hanger assemblies for pendant fixtures shall be fitted with a restraining device to hold the stem in the support position during earthquake motions. Pendant-supported fluorescent fixtures shall also be provided with a flexible hanger device at the attachment to the fixture channel to preclude breaking of the support. The motion of swivels or hinged joints shall not cause sharp bends in conductors or damage to the insulation.

7.4.5.10.2 Recessed Fluorescent Fixtures: Recessed fluorescent individual or continuous-row mounted fixtures shall be supported by a seismic-resistant suspended ceiling support system and shall be fastened thereto at each corner of the fixture with bolts or approved clips; or shall be provided with fixture support wires attached to the building structural members using two wires for individual fixtures, attached to opposite corners, and one wire per unit of continuous row mounted fixtures. Each wire support shall be capable of supporting four times the weight of the fixture. Recessed lighting fixtures not over 25 kg in weight and suspended or pendant-hung fixtures not over 10 kg in weight may be supported by and attached directly to the ceiling system runners by a positive attachment such as screws or bolts, number and size as required by design seismic zone. For fixtures in essential and hazardous facilities, accessories, including louvers, diffusers, and lenses shall have lock or screw attachments.

7.4.5.10.3 Assembly Mounted on Outlet Box: A supporting assembly that is intended to be mounted on an outlet box shall be designed to accommodate mounting features on 100 mm boxes, 75 mm plaster rings, and fixture studs.

7.4.5.10.4 Surface-Mounted Fluorescent Fixtures: Surface-mounted fluorescent individual or continuous-row fixtures shall be attached to a seismic-resistant ceiling support system. Fixture support devices for attaching to suspended ceilings shall be a locking-type scissor clamp or a full loop band that will securely attach to the ceiling support. Fixtures attached to underside of a structural slab shall be properly anchored to the slab at each corner of the fixture.

7.4.5.10.5 Wall-Mounted Emergency Light Unit: Each wall-mounted emergency light unit shall be secured to remain in place during a seismic disturbance.

7.4.5.10.6 Lateral Force: Light fixture bracing shall be designed to resist the Lateral Force Coefficient (g) times the fixture weight. Select the appropriate lateral force coefficient (as a portion of gravity) for the fixture weight according to the seismic zone:

Zone	Lateral Force Coefficient (g)
1	0.28
2A	0.56
2B	0.75
3	1.13
4	1.50

7.4.5.11 Suspended Ceiling Assemblies: The structural members of ceiling support systems, used primarily to support acoustical tile panels or acoustical panel lay-in tiles, with or without lighting fixtures, ceiling-mounted air terminals, and ceiling-mounted services, shall conform to the following:

7.4.5.11.1 Design Loads: The main runners and cross-runners and their splices and intersection connections shall be designed for two times the design load or ultimate axial tension or compression (minimum 550 N). The connections at the splices and intersections shall be of a mechanical interlocking type that cannot easily be disengaged. Ceiling structural systems shall be designed to withstand required vertical load as well as a lateral force of a Percent of the ceiling weight. The ceiling weight shall include all lighting fixtures and other equipment that are laterally supported by the ceiling and shall be not less than 200 Pa. Select the appropriate percent of ceiling weight according to the Seismic Zone 2, 3, and 4:

Zone	Percent
2	11.3
3	23
4	30

7.4.5.11.2 Exception: Ceiling areas of 13 square meters or less surrounded by walls that connect directly to the structure above will be exempt from the lateral-load standards of this specification.

7.4.5.11.3 Installation Requirements: Installation requirements shall be in accordance with ASTM E 580 except as follows:

> **Vertical Support:** Hanger wires supporting a maximum tributary ceiling area of 1.5 square meters shall be a minimum of 10 gauge in diameter. The size of wires supporting a tributary ceiling area greater than 1.5 square meters shall be substantiated by design calculations. Hanger attachment

devices used in ceiling systems not exceeding 200 Pa shall be capable of supporting a minimum allowable load of 1.3 kN. Hanger attachment devices used in ceiling systems exceeding00 Pa shall be capable of supporting the design load and shall be substantiated by design calculations. If hangers must be splayed more than one horizontal to six vertical, the resulting horizontal force shall be offset by bracing or counter-splaying, and substantiated by design calculations.

Lateral Support: In lieu of the design criteria stated above, where ceiling loads do not exceed 200 Pa, lateral support for the ceiling system may be provided by four galvanized wires of minimum No. 12 gauge, as indicated in ASTM E 580, paragraph 4.4.6.

7.4.5.11.4 Lighting Fixture and Air Diffuser Supports: Lighting fixture and air diffuser supports shall be designed and installed to meet the requirements of equipment supports in the preceding paragraphs of this document with the following exceptions: Recessed lighting fixtures not over 25 kg in weight and suspended and pendent-hung fixtures not over 10 kg in weight may be supported and attached directly to the ceiling system runners by a positive attachment such as screws or bolts; Air diffusers that weigh not more than 10 kg and that receive no tributary loading from ductwork may be positively attached to and supported by the ceiling runners.

7.4.5.12 Bridge Cranes and Monorails: Bridges cranes and monorails, when required, shall be designed to accommodate the following horizontal Lateral Force Coefficient (g) times the crane and/or monorail weight, applied in any direction to the center of gravity of the equipment. The weight of such equipment need not include any live load, and the equivalent static force so computed will be assumed to act nonconcurrently with other prescribed non-seismic horizontal forces when considering the design of the crane and monorails. The crane design shall be suitable for the forces previously specified in addition to the normal horizontal loads prescribed by standards cited in other sections of this document. The lateral force coefficient is based on a value of Cp=1.5. Select the appropriate lateral force coefficient (as a portion of gravity) according to the seismic zone:

Zone	Lateral Force Coefficient (g)
1	0.11
2A	0.23
2B	0.30
3	0.45
4	0.60

7.5 <u>Commissioning of HVAC Systems:</u>

7.5.1 General:

7.5.1.1 Submittals: Submittals shall be provided by the Contractor to the Contracting Officer for approval in accordance with the procedures provided at the beginning of this document.

7.5.1.1.1 Commissioning Team: List of team members who will represent the Contractor in the pre-commissioning checks and functional performance testing, at least two (2) weeks prior to the start of pre-commissioning checks. During the commissioning process, the Contractor shall require, as a minimum, the participation of the following personnel:

Contractor's Chief Quality Control Representative
Contractor's Mechanical Representative
Contractor's Electrical Representative

Contractor's Testing, Adjusting, and Balancing Representative
Contractor's Controls Representative
Contractor's Design Agent Representative

The Contractor shall plan, into the budget, the presence of the above representatives for a minimum of two (2) working days; however, the amount of time that the commissioning representatives must be present may exceed two (2) days depending on the thoroughness of the Contractor's pre-commissioning checks.

7.5.1.1.2 Test Procedures: Detailed procedures for pre-commissioning checks and functional performance tests, at least 4 weeks prior to the start of pre-commissioning checks.

7.5.1.1.3 Test Schedules: Schedule for pre-commissioning checks and functional performance tests, at least 2 weeks prior to the start of pre-commissioning checks.

7.5.1.1.4 Test Reports: Completed pre-commissioning checklists and functional performance test checklists organized by system and by subsystem and submitted as one package. The results of failed tests shall be included along with a description of the corrective action taken.

7.5.1.2 Sequencing and Scheduling: The work described in this section of the document shall begin only after all work required in the **HVAC** section of this document has been successfully completed, and all test and inspection reports and operation and maintenance manuals required in this section of the document have been submitted and approved.

7.5.2 Execution:

7.5.2.1 Commissioning Team: The Contractor shall designate team members to participate in the pre-commissioning checks and the functional performance testing. In addition, the Government will be represented by a representative of the Contracting Officer and the Using Agency. The team members shall be as follows: Contractor's HVAC Designer Representative, Contractor's Chief Quality Control Representative, Contractor's Mechanical Representative, Contractor's Electrical Representative, Contractor's Testing, Adjusting, and Balancing (TAB) Representative, Contractor's Controls Representative, Contracting Officer's Representative, and Using Agency's Representative

7.5.2.2 Commissioning Checklists: Each checklist shown in appendices A and B shall be completed by the commissioning team. Acceptance by each commissioning team member of each pre-commissioning checklist item shall be indicated by initials and date unless an "X" is shown indicating that participation by that individual is not required. Acceptance by each commissioning team member of each functional performance test checklist shall be indicated by signature and date.

7.5.2.3 Tests: The pre-commissioning checks and functional performance tests shall be performed in a manner which essentially duplicates the Quality Control (QC) methods of checking, testing, and inspection established for the project. Testing and verification required by this section of the document shall be performed during the Commissioning phase. Requirements in related sections of this document are independent from the requirements specified here and shall not be used to satisfy any of the requirements specified in this section of the document. The Contractor shall provide all materials, services, and labor required to perform the pre-commissioning checks and functional performance tests. A pre-commissioning check or functional performance test shall be aborted if any system deficiency prevents the successful completion of the test or if any participating non-Government commissioning team member of which participation is specified is not present for the test. The Contractor shall reimburse the Government for all costs associated with effort lost due to tests that are

aborted. These costs shall include salary, travel costs and per diem (where applicable) for Government commissioning team members.

7.5.2.3.1 Pre-Commissioning Checks: Pre-commissioning checks shall be performed for the items indicated on the checklists in Appendix A. Deficiencies discovered during these checks shall be corrected and retested in accordance with the applicable contract requirements.

7.5.2.3.2 Functional Performance Tests: Functional performance tests shall be performed for the items indicated on the checklists in Appendix B. Functional performance tests shall begin only after all pre-commissioning checks have been successfully completed. Tests shall prove all modes of the sequences of operation, and shall verify all other relevant contract requirements. Tests shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance test checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.

APPENDIX A

PRE-COMMISSIONING CHECKLISTS

Each checklist in appendix A shall be completed by the commissioning team. Acceptance by each commissioning team member of each pre-commissioning checklist item shall be indicated by initials and date unless an "X" is shown indicating that participation by that individual is not required.

Q	Contractor's Chief Quality Control Representative
M	Contractor's Mechanical Representative
E	Contractor's Electrical Representative
T	Contractor's Testing, Adjusting, and Balancing Representative
C	Contractor's Controls Representative
D	Contractor's Design Agent Representative
O	Contracting Officer's Representative
U	Using Agency's Representative

Pre-commissioning checklist - Piping

For _____ Piping System

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Piping complete.	___	___	X	___	X	___	___	___
b. As-built shop drawings submitted.	___	___	X	___	X	___	___	___
c. Piping flushed and cleaned.	___	___	X	___	X	___	___	___
d. Strainers cleaned.	___	___	X	___	X	___	___	___
e. Valves installed as required.	___	___	X	___	X	___	___	___
f. Piping insulated as required.	___	___	X	___	X	___	___	___
g. Thermometers and gauges installed as required.	___	___	X	___	X	___	___	___
h. Verify operation of valves.	___	___	X	X	X	___	___	___
I. Air vents installed on water coils with shutoff valves.	___	___	X	X	X	___	___	___
j. Flexible connectors installed as specified.	___	___	X	X	X	___	___	___
k. Verify that piping has been labeled and valves identified as specified.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Hydrostatic test complete.	___	___	X	___	X	___	___	___
b. TAB operation complete.	___	___	X	X	X	___	___	___

Pre-commissioning Checklist - Ductwork

For Air Handler: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Ductwork complete.	___	___	X	___	X	___	___	___
b. As-built shop drawings submitted.	___	___	X	___	X	___	___	___
c. Ductwork leak test complete.	___	___	X	___	X	___	___	___
d. (Army projects) Fire dampers, smoke dampers, and access doors installed as required.	___	___	X	___	X	___	___	___
d. (Air Force projects) Fire dampers, smoke dampers, and access doors installed as required with installation of each verified by the specified team members initialing each location on a copy of the as-built drawings.	___	___	X	___	X	___	___	___
e. Ductwork insulated as required.	___	___	X	___	X	___	___	___
f. Thermometers and gauges installed as required.	___	___	___	___	___	___	___	___
g. Verify open/closed status of dampers.	___	___	X	___	X	___	___	___
h. Verify smoke dampers operation.	___	___	X	X	X	___	___	___
I. Flexible connectors installed as specified.	___	___	X	___	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. TAB operation complete.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Multizone Air Handling Unit

For Air Handling Unit: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Vibration isolation devices installed and free to float with adequate movement and seismic restraint] as specified.	___	___	X	X	X	___	___	___
b. Inspection and access doors are operable and sealed.	___	___	X	___	X	___	___	___
c. Casing undamaged.	___	___	X	X	X	___	___	___
d. Insulation undamaged.	___	___	X	X	X	___	___	___
e. Condensate drainage is unobstructed. (Visually verify pan drains completely by pouring a cup of water into drain pan.)	___	___	X	X	X	___	___	___
f. Fan belt adjusted.	___	___	X	___	X	___	___	___
g. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Proper motor rotation verified.	___	___	___	___	X	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
e. Power available to electric heating coil.	___	___	___	X	___	___	___	___
Coils								
a. Chilled water or refrigerant piping properly connected.	___	___	X	X	X	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
b. Chilled water or refrigerant piping pressure tested.	___	___	X	X	X	___	___	___
c. Hot water or steam/ condensate piping properly connected.	___	___	X	X	X	___	___	___
d. Hot water or steam/ condensate piping pressure tested.	___	___	X	X	X	___	___	___
e. Air vents installed on water coils with shutoff valves.	___	___	X	X	X	___	___	___
f. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	X	X	___	___	___
b. Control valves/actuators operable.	___	___	X	X	X	___	___	___
c. O.A. dampers/actuators properly installed.	___	___	X	X	X	___	___	___
d. O.A. dampers/actuators operable.	___	___	X	X	X	___	___	___
e. Zone dampers/actuators properly installed.	___	___	X	X	X	___	___	___
f. Zone dampers/actuators operable.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	X	___	___	___
b. TAB report submitted.	___	___	X	___	X	___	___	___
c. TAB results within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___
d. TAB results for outside air intake within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Variable Volume Air Handling Unit

For Air Handling Unit: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Vibration isolation devices installed.	___	___	X	X	X	___	___	___
b. Inspection and access doors are operable and sealed.	___	___	X	___	X	___	___	___
c. Casing undamaged.	___	___	X	X	X	___	___	___
d. Insulation undamaged.	___	___	X	X	X	___	___	___
e. Condensate drainage is unobstructed (Visually verify drainage by pouring a cup of water into drain pan.).	___	___	X	X	X	___	___	___
f. Fan belt adjusted.	___	___	X	___	X	___	___	___
g. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	X	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Proper motor rotation verified.	___	___	___	___	X	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
e. Power available to electric heating coil.	___	___	___	X	X	___	___	___
Coils								
a. Chilled water or refrigerant piping properly connected.	___	___	X	X	X	___	___	___
b. Chilled water or refrigerant piping pressure tested.	___	___	X	X	X	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
c. Hot water or steam/ condensate piping properly connected.	___	___	X	X	X	___	___	___
d. Hot water or steam/ condensate piping pressure tested.	___	___	X	X	X	___	___	___
e. Air vents installed on water coils with shutoff valves.	___	___	X	X	X	___	___	___
f. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	X	X	___	___	___
b. Control valves/actuators operable.	___	___	X	X	X	___	___	___
c. Dampers/actuators properly installed.	___	___	X	X	X	___	___	___
d. Dampers/actuators operable.	___	___	X	X	X	___	___	___
e. Verify proper location, installation and calibration of duct static pressure sensor.	___	___	X	X	X	___	___	___
f. Fan air volume controller operable.	___	___	X	X	X	___	___	___
g. Air handler controls system operational.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	X	___	___	___
b. TAB report submitted.	___	___	X	___	X	___	___	___
c. TAB results within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___
d. TAB results for outside air intake within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - VAV Terminal

For VAV Terminal: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. VAV terminal in place.	___	___	X	X	X	___	___	___
b. VAV terminal ducted.	___	___	X	X	X	___	___	___
c. VAV terminal connected to controls.	___	___	X	X	___	___	___	___
d. Reheat coil connected to hot water pipe.	___	___	X	___	X	___	___	___
e. Electric reheat coil connected to local disconnect.	___	___	___	___	X	___	___	___
f. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Controls								
a. Cooling only VAV terminal controls set.	___	___	X	X	___	___	___	___
b. Cooling only VAV controls verified.	___	___	X	X	___	___	___	___
c. Reheat VAV terminal controls set.	___	___	X	X	___	___	___	___
d. Reheat terminal/coil controls verified.	___	___	X	X	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Verify terminal maximum air flow set.	___	___	X	X	X	___	___	___
b. Verify terminal minimum air flow set.	___	___	X	X	X	___	___	___
c. TAB operation complete.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - DX Air Cooled Condensing Unit

For Condensing Unit: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Condensing unit piped.	___	___	X	X	X	___	___	___
b. Refrigerant pipe leak tested.	___	___	X	X	X	___	___	___
c. Refrigerant pipe evacuated and charged in accordance with manufacturer's instructions.	___	___	X	X	X	___	___	___
d. Check condenser fans for proper rotation.	___	___	X	___	X	___	___	___
e. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
f. Manufacturer's required maintenance/operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	X	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Controls								
a. Unit safety/protection devices tested.	___	___	X	X	___	___	___	___
b. Control system and interlocks installed.	___	___	X	X	___	___	___	___
c. Control system and interlocks operational.	___	___	X	X	___	___	___	___

Pre-commissioning Checklist - Pumps

For Pump: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Pumps grouted in place.	___	___	X	X	X	___	___	___
b. Pump vibration isolation devices functional.	___	___	X	X	X	___	___	___
c. Pump/motor coupling alignment verified.	___	___	X	X	X	___	___	___
d. Piping system installed.	___	___	X	X	X	___	___	___
e. Piping system pressure tested.	___	___	X	X	X	___	___	___
f. Pump not leaking.	___	___	X	X	X	___	___	___
g. Field assembled couplings aligned to meet manufacturer's prescribed tolerances.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to pump disconnect.	___	___	___	X	X	___	___	___
b. Pump rotation verified.	___	___	___	X	X	___	___	___
c. Control system interlocks functional.	___	___	___	X	___	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Pressure/temperature gauges installed.	___	___	X	___	X	___	___	___
b. Piping system cleaned.	___	___	X	X	X	___	___	___
c. Chemical water treatment complete.	___	___	X	X	X	___	___	___
d. Water balance complete.	___	___	X	___	X	___	___	___
e. Water balance with design maximum flow.	___	___	X	___	X	___	___	___
f. TAB Report submitted.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Packaged Air Cooled Chiller

For Chiller: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Chiller properly piped.	___	___	X	X	X	___	___	___
b. Chilled water pipe leak tested.	___	___	X	X	X	___	___	___
c. Verify that refrigerant used complies with specified requirements.	___	___	X	X	X	___	___	___
d. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
e. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Separate power is supplied to electric heating tape.	___	___	___	X	___	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Controls								
a. Factory startup and checkout complete.	___	___	X	X	___	___	___	___
b. Chiller safety/protection devices tested.	___	___	X	X	___	___	___	___
c. Chilled water flow switch installed.	___	___	X	X	___	___	___	___
d. Chilled water flow switch tested.	___	___	X	X	___	___	___	___
e. Chilled water pump interlock installed.	___	___	X	X	X	___	___	___
f. Chilled water pump interlock tested.	___	___	___	X	___	___	___	___

Pre-commissioning Checklist - Centrifugal Chiller

For Chiller: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Chilled water connections properly piped.	___	___	X	X	X	___	___	___
b. Condenser water connections properly piped.	___	___	X	X	X	___	___	___
c. Chilled water pipe leak tested.	___	___	X	X	X	___	___	___
d. Condenser water pipe leak tested.	___	___	X	X	X	___	___	___
e. High efficiency purge unit installed and operating as specified.	___	___	X	X	X	___	___	___
f. Refrigerant leak detector installed.	___	___	___	___	___	___	___	___
g. Oxygen sensor installed and tested.	___	___	___	___	___	___	___	___
h. Chiller room ventilation installed as specified.	___	___	___	___	___	___	___	___
I. Manufacturer's required maintenance clearance provided.	___	___	X	X	___	___	___	___
j. Field assembled couplings aligned to meet manufacturer's prescribed tolerances.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit starter.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
Controls								
a. Factory startup and checkout complete.	___	___	X	X	___	___	___	___
b. Chiller safety/protection devices tested.	___	___	___	X	___	___	___	___
c. Chilled water flow switch installed.	___	___	X	X	___	___	___	___
d. Chilled water flow switch tested.	___	___	X	X	___	___	___	___
e. Chilled water pump interlock installed.	___	___	___	X	___	___	___	___
f. Chilled water pump interlock tested.	___	___	___	X	___	___	___	___
g. Condenser water flow switch installed.	___	___	X	X	X	___	___	___
h. Condenser water flow switch tested.	___	___	___	X	___	___	___	___
I. Condenser water pump interlock installed.	___	___	___	X	___	___	___	___
j. Condenser water pump interlock tested.	___	___	___	X	___	___	___	___

Pre-commissioning Checklist - Cooling Tower

For Cooling Tower: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Cooling tower in place.	___	___	X	X	X	___	___	___
b. Cooling tower piped.	___	___	X	X	___	___	___	___
c. Cooling tower fan drive adjusted.	___	___	___	___	X	___	___	___
d. Cooling tower makeup water supply piped.	___	___	X	X	___	___	___	___
e. Verify makeup control valve shutoff.	___	___	X	___	X	___	___	___
f. Fan lubricated and blade pitch adjusted.	___	___	X	___	X	___	___	___
g. Manufacturer's required maintenance/operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to tower disconnect.	___	___	___	X	___	___	___	___
b. Power available to electric sump heater.	___	___	___	X	___	___	___	___
c. Control system interlocks functional.	___	___	___	X	___	___	___	___
d. Motor and fan rotation checked.	___	___	___	X	___	___	___	___
e. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Piping								
a. Tower basin is clean and filled.	___	___	X	X	X	___	___	___
b. Condenser water treatment functional.	___	___	X	X	X	___	___	___
c. Water balance with design flow verified.	___	___	X	___	X	___	___	___
d. Water distribution headers balanced.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Hot Water Boiler

For Boiler: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Boiler flue installed.	___	___	X	X	X	___	___	___
b. Boiler hot water piping installed.	___	___	X	X	X	___	___	___
c. Boiler hot water piping tested.	___	___	X	X	___	___	___	___
d. Boiler makeup water piping installed.	___	___	X	X	X	___	___	___
e. Boiler fuel oil piping installed.	___	___	X	X	X	___	___	___
f. Boiler fuel oil piping tested.	___	___	X	X	X	___	___	___
g. Boiler gas piping installed.	___	___	X	X	X	___	___	___
h. Boiler gas piping tested.	___	___	X	X	X	___	___	___
I. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Startup								
a. Boiler system cleaned and filled with treated water.	___	___	X	X	X	___	___	___
b. Boiler safety/protection devices, including high temperature burner shut-off, low water cutoff, flame failure, pre and post purge, have been tested.	___	___	___	X	___	___	___	___
c. Verify that PRV rating conforms to boiler rating.	___	___	___	X	___	___	___	___
d. Boiler water treatment system functional.	___	___	X	X	___	___	___	___
e. Boiler startup and checkout complete.	___	___	X	X	___	___	___	___
f. Combustion efficiency demonstrated.	___	___	X	___	X	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
Electrical								
a. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Controls								
a. Hot water pump interlock installed.	___	___	___	X	___	___	___	___
b. Hot water pump interlock tested.	___	___	___	X	___	___	___	___
c. Hot water heating system balanced.	___	___	X	X	___	___	___	___
d. Hot water heating controls operational.	___	___	X	X	___	___	___	___

Pre-commissioning Checklist - Steam Boiler

For Boiler: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Boiler flue installed.	___	___	X	X	X	___	___	___
b. Boiler steam piping installed.	___	___	X	X	X	___	___	___
c. Boiler steam piping tested.	___	___	X	X	X	___	___	___
d. Boiler makeup water piping installed.	___	___	X	___	X	___	___	___
e. Boiler makeup water piping tested.	___	___	X	X	X	___	___	___
f. Boiler fuel oil piping installed.	___	___	X	X	X	___	___	___
g. Boiler fuel oil piping tested.	___	___	X	X	X	___	___	___
h. Boiler gas piping installed.	___	___	X	X	X	___	___	___
I. Boiler gas piping tested.	___	___	X	X	X	___	___	___
j. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Startup								
a. Boiler system cleaned and filled with treated water.	___	___	X	X	X	___	___	___
b. Boiler safety/protection devices, including high temperature burner shut-off, low water cutoff, flame failure, pre and post purge, have been tested.	___	___	___	X	___	___	___	___
c. Verify that PRV rating conforms to boiler rating.	___	___	___	X	___	___	___	___
d. Boiler feed water system operational.	___	___	___	X	___	___	___	___
e. Boiler water treatment system functional.	___	___	X	X	X	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
f. Boiler startup and checkout complete.	___	___	___	X	___	___	___	___
g. All steam traps operational.	___	___	X	X	X	___	___	___
h. All condensate return pumps operational.	___	___	___	___	X	___	___	___
I. Combustion efficiency demonstrated.	___	___	X	___	X	___	___	___
Electrical								
a. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___

Pre-commissioning Checklist - Steam/Hot Water Converter

For Converter: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Converter steam piping installed.	___	___	X	___	X	___	___	___
b. Converter steam piping tested.	___	___	X	X	X	___	___	___
c. Hot water piping installed.	___	___	X	X	X	___	___	___
d. Hot water piping tested.	___	___	X	X	X	___	___	___
e. Makeup water piping installed.	___	___	X	X	X	___	___	___
f. Vacuum breaker installed on shell of shell and tube unit.	___	___	X	X	X	___	___	___
g. Air vent installed as specified.	___	___	X	X	X	___	___	___
h. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Startup								
a. Hot water system cleaned and filled.	___	___	X	X	X	___	___	___
b. All steam traps operational.	___	___	X	X	X	___	___	___
c. All condensate return pumps operational.	___	___	___	X	___	___	___	___
d. Converter safety/ protection devices tested.	___	___	X	X	X	___	___	___
e. Converter startup and checkout complete.	___	___	X	X	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	X	X	___	___	___
b. Control valves/actuators operable.	___	___	X	X	X	___	___	___

Pre-commissioning Checklist - Fan-Coil Unit

For Fan-Coil Unit: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Vibration isolation devices installed.	___	___	X	X	X	___	___	___
b. Access doors/removable panels are operable and sealed.	___	___	X	___	X	___	___	___
c. Casing undamaged.	___	___	X	X	X	___	___	___
d. Insulation undamaged.	___	___	X	X	X	___	___	___
e. Condensate drainage is unobstructed.	___	___	X	X	X	___	___	___
f. Fan belt adjusted.	___	___	X	___	X	___	___	___
g. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
h. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Proper motor rotation verified.	___	___	___	___	X	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
e. Power available to electric heating coil.	___	___	___	X	X	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
Coils								
a. Dual temperature or chilled water piping properly connected.	___	___	X	X	X	___	___	___
b. Dual temperature or chilled water piping pressure tested.	___	___	X	X	X	___	___	___
c. Hot water piping properly connected.	___	___	X	X	X	___	___	___
d. Hot water piping pressure tested.	___	___	X	X	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	X	X	___	___	___
b. Control valves/actuators operable.	___	___	X	X	___	___	___	___
c. Verify proper location and installation of thermostat.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	X	___	___	___
b. TAB report submitted.	___	___	X	___	X	___	___	___
c. TAB results within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Unit Heater

For Unit Heater: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Hot water or steam/ condensate piping properly connected.	___	___	X	X	X	___	___	___
b. Hot water or steam/ condensate piping pressure tested.	___	___	X	X	X	___	___	___
c. Air vent installed on hot water coil with shutoff valve as specified.	___	___	X	X	X	___	___	___
d. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
e. Manufacturer's required maintenance/operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Proper motor rotation verified.	___	___	___	___	X	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
d. Power available to electric heating coil.	___	___	___	X	___	___	___	___
Controls								
a. Control valves properly installed.	___	___	X	X	X	___	___	___
b. Control valves operable.	___	___	X	X	___	___	___	___
c. Verify proper location and installation of thermostat.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. TAB Report submitted.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Exhaust Fan

For Exhaust Fan: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Fan belt adjusted.	___	___	X	___	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Proper motor rotation verified.	___	___	___	___	X	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Controls								
a. Control interlocks properly installed.	___	___	___	X	___	___	___	___
b. Control interlocks operable.	___	___	___	X	___	___	___	___
c. Dampers/actuators properly installed.	___	___	X	X	X	___	___	___
d. Dampers/actuators operable.	___	___	X	X	X	___	___	___
e. Verify proper location and installation of thermostat.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. TAB report submitted.	___	___	X	___	X	___	___	___
b. TAB results within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Computer Room Unit

For Computer Room Unit: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Unit properly supported.	___	___	X	X	X	___	___	___
b. Access doors are operable and sealed.	___	___	X	___	X	___	___	___
c. Casing undamaged.	___	___	X	X	X	___	___	___
d. Insulation undamaged.	___	___	X	X	X	___	___	___
e. Condensate drainage is unobstructed and routed to floor drain.	___	___	X	X	X	___	___	___
f. Fan belt adjusted.	___	___	X	___	X	___	___	___
g. Manufacturer's required maintenance operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Proper motor rotation verified.	___	___	___	___	X	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
d. Power available to reheat coils.	___	___	___	___	X	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
Coils/Humidifier								
a. Chilled water or refrigerant piping properly connected.	___	___	X	X	X	___	___	___
b. Chilled water or refrigerant piping pressure tested.	___	___	X	X	X	___	___	___
c. Hot water or steam/ condensate piping properly connected.	___	___	X	X	X	___	___	___
d. Hot water or steam/ condensate piping pressure tested.	___	___	X	X	___	___	___	___
e. Humidifier makeup water connected.	___	___	X	X	X	___	___	___
Controls								
a. Control valves operable.	___	___	X	X	___	___	___	___
b. Unit control system operable and verified.	___	___	___	X	___	___	___	___
c. Verify proper location and installation of thermostat.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	X	___	___	___
b. TAB report submitted.	___	___	X	___	X	___	___	___
c. TAB results within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - HVAC System Controls

For HVAC System: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. As-built shop drawings submitted.	___	___	X	X	___	___	___	___
b. Layout of control panel matches drawings.	___	___	X	X	___	___	___	___
c. Framed instructions mounted in or near control panel.	___	___	X	X	___	___	___	___
d. Components properly labeled (on inside and outside of panel).	___	___	X	X	___	___	___	___
e. Control components piped and/or wired to each labeled terminal strip.	___	___	X	X	___	___	___	___
f. EMCS connection made to each labeled terminal strip as shown.	___	___	X	X	___	___	___	___
g. Control wiring and tubing labeled at all terminations, splices, and junctions.	___	___	X	X	___	___	___	___
h. Shielded wiring used on electronic sensors.	___	___	X	X	___	___	___	___
I. Air dryer installed as specified.	___	___	X	X	___	___	___	___
j. Water drain installed as specified.	___	___	X	X	___	___	___	___
Main Power and Control Air								
a. 110 volt AC power available to panel.	___	___	___	X	___	___	___	___
b. 138 kPa gauge compressed air available to panel.	___	___	X	X	___	___	___	___
Testing, Commissioning, and Balancing								
a. Testing, Commissioning, and Balancing Report submitted.	___	___	X	X	X	___	___	___

Pre-commissioning Checklist - Single Zone Air Handling Unit

For Air Handling Unit: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Vibration isolation devices installed.	___	___	X	X	X	___	___	___
b. Inspection and access doors are operable and sealed.	___	___	X	___	X	___	___	___
c. Casing undamaged.	___	___	X	X	X	___	___	___
d. Insulation undamaged.	___	___	X	X	X	___	___	___
e. Condensate drainage is unobstructed and routed to floor drain.	___	___	X	X	X	___	___	___
f. Fan belt adjusted.	___	___	X	___	X	___	___	___
g. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
h. Manufacturer's required maintenance operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Proper motor rotation verified.	___	___	___	___	X	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
e. Power available to electric heating coil.	___	___	___	X	___	___	___	___

Checklist Item	Q	M	E	T	C	D	O	U
Coils								
a. Chilled water or refrigerant piping properly connected.	___	___	X	X	X	___	___	___
b. Chilled water or refrigerant piping pressure tested.	___	___	X	X	X	___	___	___
c. Hot water or steam/ condensate piping properly connected.	___	___	X	X	X	___	___	___
d. Hot water piping pressure tested.	___	___	X	X	___	___	___	___
e. Air vents installed on water coils with shutoff valves.	___	___	X	X	X	___	___	___
f. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	X	X	___	___	___
b. Control valves/actuators operable.	___	___	X	X	X	___	___	___
c. Dampers/actuators properly installed.	___	___	X	X	X	___	___	___
d. Dampers/actuators operable.	___	___	X	X	X	___	___	___
e. Verify proper location and installation of thermostat.	___	___	X	X	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	X	___	___	___
b. TAB report submitted.	___	___	X	___	X	___	___	___
c. TAB results within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___
d. TAB results for outside air intake within +10%/-0% of L/s as shown on drawings.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Energy Recovery System

For Energy Recovery System: [_____]

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Recovery system piping installed.	___	___	X	___	X	___	___	___
b. Recovery system piping tested.	___	___	X	X	X	___	___	___
c. Air vent installed as specified.	___	___	X	X	X	___	___	___
d. Manufacturer's required maintenance operational clearance provided.	___	___	X	X	X	___	___	___
Startup								
a. Recovery system piping cleaned and filled.	___	___	X	X	X	___	___	___
b. Converter startup and checkout complete.	___	___	X	X	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	___	___	___	___	___
b. Control valves/actuators operable.	___	___	X	___	___	___	___	___

APPENDIX B

FUNCTIONAL PERFORMANCE TESTS CHECKLISTS

Each checklist shown in appendix B shall be completed by the commissioning team. Acceptance by each commissioning team member of each functional performance test checklist shall be indicated by signature and date.

Functional Performance Test Checklist - Pumps

For Pump: _____

Prior to performing this checklist, ensure that for closed loop systems, system is pressurized and the make-up water system is operational or, for open loop systems, that the sumps are filled to the proper level.

1. Activate pump start using control system commands (all possible combination, on/auto, etc.). ON_____ AUTO_____ OFF_____

a. Verify pressure drop across strainer:

Strainer inlet pressure	_____	kPa
Strainer outlet pressure	_____	kPa

b. Verify pump inlet/outlet pressure reading, compare to Testing, Adjusting, and Balancing (TAB) Report, pump design conditions, and pump manufacturer's performance.

	DESIGN	TAB	ACTUAL
Pump inlet pressure (kPa gauge)	_____	_____	_____
Pump outlet pressure (kPa gauge)	_____	_____	_____

c. Operate pump at shutoff and at 100 percent of designed flow when all components are in full flow. Plot test readings on pump curve and compare results against readings taken from flow measuring devices.

	SHUTOFF	100 percent
Pump inlet pressure (kPa gauge)	_____	_____
Pump outlet pressure (kPa gauge)	_____	_____
Pump flow rate (L/s)	_____	_____

d. Operate pump at shutoff and at minimum flow or when all components are in full by-pass. Plot test readings on pump curve and compare results against readings taken from flow measuring devices.

	SHUTOFF	100 percent
Pump inlet pressure (kPa gauge)	_____	_____
Pump outlet pressure (kPa gauge)	_____	_____
Pump flow rate (L/s)	_____	_____

2. Verify motor amperage each phase and voltage phase to phase and phase to ground for both the full flow and the minimum flow conditions.

a. Full flow:

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	
Voltage	_____		
Voltage to ground	_____	_____	_____

b. Minimum flow:

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	
Voltage	_____		
Voltage to ground	_____	_____	_____

3. Check and report unusual vibration, noise, etc.

_____

_____

4. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative _____/_/__

Contractor's Mechanical Representative _____/_/__

Contractor's Electrical Representative _____/_/__

Contractor's Testing, Adjusting and Balancing Representative _____/_/__

Contractor's Controls Representative _____/_/__

Contracting Officer's Representative _____/_/__

Using Agency's Representative _____/_/__

Functional Performance Test Checklist - Centrifugal Chiller

For Chiller: _____

1. Functional Performance Test: Contractor shall demonstrate operation of chilled water system as per specifications including the following: Start building air handler to provide load for chiller. Activate controls system chiller start sequence as follows:

a. Time of day startup program initiates chiller start: _____

b. Start condenser water pump and establish condenser water flow. Verify chiller condenser water proof-of-flow switch operation. _____

c. Start chilled water pump and establish chilled water flow. Verify chiller chilled water proof-of-flow switch operation. _____

d. Verify control system energizes chiller start sequence. _____

e. Verify chiller senses chilled water temperature above set point and control system activates chiller start. _____

f. Verify functioning of "soft start" sequence. _____

g. Shut off air handling equipment to remove load on chilled water system. Verify chiller shutdown sequence is initiated and accomplished after load is removed. _____

h. Restart air handling equipment one minute after chiller shut down. Verify condenser water pump, cooling tower, and chiller restart sequence. _____

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Cooling Tower

For Cooling Tower: _____

1. Functional Performance Test: Contractor shall demonstrate operation of the cooling tower as per specification and the following:

a. Activate cooling tower fan start using control system command. This should first start condenser water pump, establish flow, delay start, as specified, to equalize flow in distribution basin and sump. Verify fan start after timed delay. _____

b. After chiller startup, control system should modulate bypass valve and two-speed fan motor to maintain condenser water set point. Verify function of bypass valve under varying loads. _____

c. Verify cooling tower interlock with chiller. _____

d. Verify makeup water float valve is functioning: _____
Activate chemical treatment feed valve, verify makeup of chemical treatment system, pump, and controls: _____

e.

Entering water temperature	_____	degrees C
Leaving water temperature	_____	degrees C
Air volume measured	_____	L/s
Air volume calculated	_____	L/s
Entering wet bulb temperature	_____	degrees C
Measured water flow	_____	L/s

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - VAV Terminals

The Contracting officer will select VAV terminals to be spot-checked during the functional performance test. The number of terminals shall not exceed 10 percent.

1. Functional Performance Test: Contractor shall demonstrate operation of selected VAV boxes as per specifications including the following:

a. Cooling only VAV boxes:

(1) Verify VAV box response to room temperature set point adjustment. Turn thermostat to 3 degrees C above ambient and measure maximum air flow. Turn thermostat to 3 degrees C below ambient and measure minimum air flow.

Maximum flow _____ L/s
Minimum flow _____ L/s

(2) Check damper maximum/minimum flow settings.

Maximum flow _____ L/s
Minimum flow _____ L/s

b. Cooling with reheat VAV boxes:

(1) Verify VAV box response to room temperature set point adjustment. Turn thermostat to 3 degrees C above ambient and measure maximum air flow. Turn thermostat to 3 degrees C below ambient and measure minimum air flow.

Maximum flow _____ L/s
Minimum flow _____ L/s

(2) Check damper maximum/minimum flow settings.

Maximum flow setting _____ L/s
Minimum flow setting _____ L/s

Reheat coil operation range (full open to full closed)
_____

c. Fan powered VAV boxes:

(1) Verify VAV box response to sensor call for heating via set point adjustment. Changes to be cooling setpoint to heating set point and return to cooling set point. _____ Verify cooling damper closes to minimum position, blower fan energizes according to sequence of operation, and upon further drop in space temperature, heating coil activation and deactivation. _____

(2) Check primary air damper maximum/minimum flow settings.

Maximum flow setting _____ L/s
Minimum flow setting _____ L/s

(3) Check blower fan flow. _____ L/s

(4) Verify free operation of fan backdraft damper (insure no primary air is being discharged through the recirculated air register). _____

(5) Verify that no recirculated air is being induced when box is in full cooling. _____

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Variable Volume Air Handling Unit

For Air Handling Unit: _____

Ensure that a slight negative pressure exists on inboard side of the outside air dampers throughout the operation of the dampers. Modulate OA, RA, and EA dampers from fully open to fully closed positions.

1. Functional Performance Test: Contractor shall verify operation of air handling unit as per specification including the following:

a. The following shall be verified when the supply and return (if installed) fans operating mode is initiated:

(1) All dampers in normal position and fan inlet vanes modulate (if installed) to maintain the required static pressure. _____

(2) All valves in normal position. _____

(3) System safeties allow start if safety conditions are met. _____

(4) VAV fan controller shall "soft-start" fan. _____

(5) Modulate all VAV boxes to minimum air flow and verify that the static pressure does not exceed the design static pressure Class shown. _____

b. Occupied mode of operation - economizer de-energized.

(1) Outside air damper at minimum position. _____

(2) Return air damper open. _____

(3) Relief air damper at minimum position or closed. _____

(4) Chilled water control valve modulating to maintain leaving air temperature set point. _____

(5) Fan VAV controller receiving signal from duct static pressure sensor and modulating fan to maintain supply duct static pressure set point. _____

c. Occupied mode of operation - economizer energized.

(1) Outside air damper modulated to maintain mixed air temperature set point. _____

(2) Relief air damper modulates with outside air damper according to sequence of operation. _____

(3) Chilled water control valve modulating to maintain leaving air temperature set point. _____

(4) Hot water control valve modulating to maintain leaving air temperature set point. _____

(5) Fan VAV controller receiving signal from duct static pressure sensor and modulating fan to maintain supply duct static pressure set point. _____

d. Unoccupied mode of operation

(1) All dampers in normal position. _____

(2) Verify low limit space temperature is maintained as specified in sequence of operation. _____

e. The following shall be verified when the supply and return (if installed) fans off mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) Fan de-energizes. _____

f. Verify the chilled water coil control valve operation by setting all VAV's to maximum and minimum cooling.

	Max cooling	Min cooling
Supply air volume (_____ L/s)	_____	_____
Supply air temp. (_____ degrees C)	_____	_____

g. Verify safety shut down initiated by smoke detectors. _____

h. Verify safety shut down initiated by low temperature protection thermostat. _____

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Single Zone Air Handling Unit

For Air Handling Unit: _____

1. Functional Performance Test: Contractor shall verify operation of air handling unit as per specification including the following:

a. The following shall be verified when the supply and return (if installed) fans operating] mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) System safeties allow start if safety conditions are met. _____

b. Occupied mode of operation - economizer de-energized.

(1) Outside air damper at minimum position. _____

(2) Return air damper open. _____

(3) Relief air damper at minimum position or closed. _____

(4) Chilled water control valve modulating to maintain space cooling temperature set point. _____

(5) Hot water control valve modulating to maintain space heating temperature set point input from outside air temperature controller. _____

c. Occupied mode of operation - economizer energized. _____

(1) Outside air damper modulated to maintain mixed air temperature set point. _____

(2) Relief air damper modulates with outside air damper according to sequence of operation. _____

(3) Chilled water control valve modulating to maintain space cooling temperature set point. _____

d. Unoccupied mode of operation

(1) All dampers in normal position. _____

(2) Verify low limit space temperature is maintained as specified in sequence of operation. _____

e. The following shall be verified when the supply and return (if installed) fans off mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) Fan de-energizes. _____

f. Verify cooling coil and heating coil operation by varying thermostat set point from cooling set point to heating set point and returning to cooling set point. _____

g. Verify safety shut down initiated by smoke detectors. _____

h. Verify safety shut down initiated by low temperature protection thermostat. _____

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Multizone Air Handling Unit

For Air Handling Unit: _____

Ensure that a slight negative pressure exists on inboard side of the outside air dampers throughout the operation of the dampers. Modulate OA, RA, and EA dampers from fully open to fully closed positions.

1. Functional Performance Test: Contractor shall verify operation of air handling unit as per specification including the following:

a. The following shall be verified when the supply and return fans operating mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) System safeties allow start if safety conditions are met. _____

b. Occupied mode of operation - economizer de-energized.

(1) Outside air damper at minimum position. _____

(2) Return air damper open. _____

(3) Relief air damper at minimum position or closed. _____

(4) Chilled water control valve modulating to maintain cold deck supply air temperature set point. _____

(5) Hot water control valve modulating to maintain hot deck supply air temperature set point input from outside air temperature controller. _____

c. Occupied mode of operation - economizer energized.

(1) Outside air damper modulates to maintain mixed air temperature set point. _____

(2) Relief air damper modulates with outside air damper according to sequence of operation. _____

(3) Chilled water control valve modulating to maintain cold deck supply air temperature set point. _____

(4) Hot water control valve modulating to maintain hot deck supply air temperature set point input from outside air temperature controller. _____

d. Unoccupied mode of operation

(1) All dampers in normal position. _____

(2) Verify low limit space temperature is maintained as specified in sequence of operation. _____

e. The following shall be verified when the supply and return fans off mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) Fan de-energizes. _____

f. Verify zone damper operation by varying zone thermostat set points from cooling set point to heating set point and returning to cooling set point. _____

g. Verify safety shut down initiated by smoke detectors. _____

h. Verify safety shut down initiated by low temperature protection thermostat. _____

I. Index room thermostats to full cooling then to full heating. Measure and record cold deck, hot deck, and supply air temperatures and determine damper leakage for a minimum of 2 zones.

Cold deck temperature	_____	degrees C
Hot deck temperature	_____	degrees C
Zone _____		
Cooling temperature	_____	degrees C
Heating temperature	_____	degrees C
Damper leakage cooling	_____	degrees C
Damper leakage heating	_____	degrees C
Zone _____		
Cooling temperature	_____	degrees C
Heating temperature	_____	degrees C
Damper leakage cooling	_____	degrees C
Damper leakage heating	_____	degrees C

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Packaged Air Cooled Chiller

For Chiller: _____

1. Functional Performance Test: Contractor shall demonstrate operation of chilled water system as per specifications including the following: Start building air handler to provide load for chiller. Activate controls system chiller start sequence as follows.

a. Start chilled water pump and establish chilled water flow. Verify chiller-chilled water proof-of-flow switch operation. _____

b. Verify control system energizes chiller start sequence. _____

c. Verify chiller senses chilled water temperature above set point and control system activates chiller start. _____

d. Verify functioning of "soft start" sequence. _____

e. Shut off air handling equipment to remove load on chilled water system. Verify chiller shutdown sequence is initiated and accomplished after load is removed. _____

f. Restart air handling equipment one minute after chiller shut down. Verify chiller restart sequence. _____

2. Verify chiller inlet/outlet pressure reading, compare to Testing, Adjusting, and Balancing (TAB) Report, chiller design conditions, and chiller manufacturer's performance data.

	DESIGN	TAB	ACTUAL
Chiller inlet pressure (kPa gauge)	_____	_____	_____
Chiller outlet pressure (kPa gauge)	_____	_____	_____

3. Verify chiller amperage each phase and voltage phase-to-phase and phase-to-ground.

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	
Voltage	_____		
Voltage to ground	_____	_____	_____

4. Record the following information:

Ambient dry bulb temperature	_____	degrees C
Ambient wet bulb temperature	_____	degrees C
Entering chilled water temperature	_____	degrees C
Leaving chilled water temperature	_____	degrees C

5. Check and report unusual vibration, noise, etc.

_____

_____

6. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Air Cooled Condensing Unit

For Condensing Unit: _____

1. Functional Performance Test: Contractor shall demonstrate operation of refrigeration system as per specifications including the following: Start building air handler to provide load for condensing unit. Activate controls system start sequence as follows.

a. Start air handling unit. Verify control system energizes condensing unit start sequence. _____

b. Shut off air handling equipment to verify condensing unit de-energizes. _____

c. Restart air handling equipment one minute after condensing unit shut down. Verify condensing unit restart sequence. _____

2. Verify condensing unit amperage each phase and voltage phase to phase and phase to ground.

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	
Voltage	_____		
Voltage to ground	_____	_____	_____

3. Record the following information:

Ambient dry bulb temperature	_____	degrees C
Ambient wet bulb temperature	_____	degrees C
Suction pressure	_____	kPa gauge
Discharge pressure	_____	kPa gauge

4. Check and report unusual vibration, noise, etc.

_____

_____

5. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Hot Water Boiler

For Boiler: _____

1. Functional Performance Test: Contractor shall demonstrate operation of hot water system as per specifications including the following: Start building heating equipment to provide load for boiler. Activate controls system boiler start sequence as follows.

a. Start hot water pump and establish hot water flow. Verify boiler hot water proof-of-flow switch operation. _____

b. Verify control system energizes boiler start sequence. _____

c. Verify boiler senses hot water temperature below set point and control system activates boiler start. _____

d. Shut off building heating equipment to remove load on hot water system. Verify boiler shutdown sequence is initiated and accomplished after load is removed. _____

2. Verify boiler inlet/outlet pressure reading, compare to Test and Balance (TAB) Report, boiler design conditions, and boiler manufacturer's performance data.

	DESIGN	TAB	ACTUAL
Boiler inlet pressure kPa gauge)	_____	_____	_____
Boiler outlet pressure (kPa gauge)	_____	_____	_____
Boiler flow rate (L/s)	_____	_____	_____
Flue-gas temperature at boiler outlet (degrees C)		_____	_____
Percent carbon dioxide in flue-gas		_____	_____
Draft at boiler flue-gas exit		_____	_____
Draft or pressure in furnace		_____	_____
Stack emission pollutants concentration	_____	_____	_____
Fuel type	_____	_____	_____
Combustion efficiency	_____	_____	_____

3. Record the following information:

Ambient temperature	_____	degrees C
Entering hot water temperature	_____	degrees C
Leaving hot water temperature	_____	degrees C

4. Verify temperatures in item 3 are in accordance with the reset schedule.
_____

5. Verify proper operation of boiler safeties. _____

6. Check and report unusual vibration, noise, etc.
_____
_____

7. Visually check refractory for cracks or spalling and refractory and tubes for flame impingement.
_____

8. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Steam Boiler

For Boiler: _____

1. Functional Performance Test: Contractor shall demonstrate operation of steam heating system as per specifications including the following: Start building heating equipment to provide load for boiler. Activate controls system boiler start sequence as follows.

a. Start steam heating system. Verify control system energizes boiler start sequence. _____

b. Verify boiler senses steam pressure below set point and control system activates boiler start. _____

c. Shut off building heating equipment to remove load on steam heating system. Verify boiler shutdown sequence is initiated and accomplished after load is removed. _____

d. Verify that water level and makeup water system are operational.
_____

2. Verify boiler inlet/outlet pressure reading, compare to boiler design conditions and manufacturer's performance data.

	DESIGN	TAB	ACTUAL
Boiler inlet water temp (degrees C)	_____	_____	_____
Boiler outlet pressure (kPa gauge)	_____	_____	_____
Flue-gas temperature at boiler outlet (degrees C)		_____	_____
Percent carbon dioxide in flue-gas		_____	_____
Draft at boiler flue-gas exit		_____	_____
Draft or pressure in furnace		_____	_____
Stack emission pollutants concentration	_____	_____	_____
Fuel type	_____	_____	_____
Combustion efficiency	_____	_____	_____

3. Record the following information:

Ambient temperature _____ degrees C

4. Verify proper operation of boiler safeties. _____

5. Check and report unusual vibration, noise, etc.
_____
_____

6. Visually check refractory for cracks or spalling and refractory and tubes for flame impingement. _____

7. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Fan-Coil Units

The Contracting Officer will select fan-coil units to be spot-checked during the functional performance test. The number of terminals shall not exceed 10 percent.

1. Functional Performance Test: Contractor shall demonstrate operation of selected fan-coils as per specifications including the following:

a. Cooling only fan-coils:

(1) Verify fan-coil unit response to room temperature set point adjustment. Changes to be cooling set point to cooling set point minus 6 degrees C and return to cooling set point. _____

(2) Check blower fan air flow. _____ L/s

(3) Check cooling coil water flow. _____ L/s

(4) Verify proper operation of cooling water control valve.
_____

b. Cooling/heating fan-coils:

(1) Verify fan-coil unit response to room temperature set point adjustment. Changes to be cooling set point to heating set point and return to cooling set point. _____

(2) Check blower fan air flow. _____ L/s

(3) Check cooling coil water flow. _____ L/s

(4) Verify proper operation of cooling water control valve.
_____

(5) Check cooling mode inlet air temperature. _____ degrees C

(6) Check cooling mode outlet air temperature. _____ degrees C

(7) Check heating coil water flow. _____ L/s

(8) Verify proper operation of heating water control valve.
_____

(9) Check heating mode inlet air temperature. _____ degrees C

(10) Check heating mode outlet air temperature. _____ degrees C

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Unit Heaters

The Contracting Officer will select unit heaters to be spot-checked during the functional performance test. The number of terminals shall not exceed 10 percent.

1. Functional Performance Test: Contractor shall demonstrate operation of selected unit heaters as per specifications including the following:

a. Verify unit heater response to room temperature set point adjustment. Changes to be heating set point to heating set point minus 6 degrees C and return to heating set point. _____

b. Check blower fan speed. _____ rpm

c. Check heating mode inlet air temperature. _____ degrees C

d. Check heating mode outlet air temperature. _____ degrees C

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Steam/Hot Water Converter

For Converter: _____

1. Functional Performance Test: Contractor shall demonstrate operation of heating system as per specifications including the following: Start building heating equipment to provide load for converter.

a. Verify control system energizes. _____

b. Verify converter senses hot water temperature below set point and control system modulates steam valve. _____

c. Shut off building heating equipment to remove load on heating system. Verify converter steam valve closes after load is removed.

_____

2. Verify converter inlet/outlet pressure reading, compare to converter design conditions and manufacturer's performance data.

	DESIGN	ACTUAL
Converter inlet water temp (degrees C)	_____	_____
Converter outlet water temp (degrees C)	_____	_____
Converter inlet steam pressure (psig)	_____	_____
Determine water flow rate based on pressure drop through converter	_____	_____
Determine water flow rate with flow measuring device	_____	_____
Verify that temperature of water is in accordance with outdoor air reset schedule	_____	_____

3. Verify proper operation of converter safeties. _____

4. Check and report unusual vibration, noise, etc.

_____

5. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Computer Room Unit

For Computer Room Unit: _____

1. Functional Performance Test: Contractor shall verify operation of computer room unit as per specification including the following:

a. System safeties allow start if safety conditions are met. _____

b. Verify cooling and heating operation by varying thermostat set point from space set point to space set point plus 6 degrees C, space set point minus 6 degrees C, and returning to space set point. _____

c. Verify humidifier operation by varying humidistat set point from space set point to space set point plus 20 percent RH, and returning to space set point. _____

d. Verify that airflow is within +10/-0 percent of design airflow. _____

e. Verify unit shut down during fire event initiated by smoke/heat sensors. _____

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - HVAC Controls

For HVAC System: _____

The Contracting Officer will select HVAC control systems to undergo functional performance testing. The number of systems shall not exceed 10 percent.

1. Functional Performance Test: Contractor shall verify operation of HVAC controls by performing the following tests:

a. Verify that controller is maintaining the set point by manually measuring the controlled variable with a thermometer, sling psychrometer, inclined manometer, etc.

b. Verify sensor/controller combination by manually measuring the controlled medium. Take readings from control panel display and compare readings taken manually. Record all readings.

Sensor _____
Manual measurement _____
Panel reading value _____

c. Verify system stability by changing the controller set point as follows:

(1) Air temperature - 6 degrees C

(2) Water temperature - 6 degrees C

(3) Static pressure - 10 percent of set point

(4) Relative humidity - percent (RH) The control system shall be observed for 10 minutes after the change in set point. Instability or excessive hunting will be unacceptable.

d. Verify interlock with other HVAC controls.

e. Verify interlock with fire alarm control panel.

f. Verify interlock with EMCS.

g. Change controller set point 10 percent with EMCS (if installed) and verify correct response.

2. Verify that operation of control system conforms to that specified in the sequence of operation.

3. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

Functional Performance Test Checklist - Energy Recovery System

For Energy Recovery System: _____

1. Functional Performance Test: Contractor shall demonstrate operation of energy recovery system as per specifications including the following: Start equipment to provide energy source for recovery system.

a. Verify energy source is providing recoverable energy. _____

b. Verify recovery system senses available energy and activates. ___

c. Verify that recovery system deactivates when recoverable energy is no longer available. _____

2. Verify recovery system inlet/outlet readings, compare to design conditions and manufacturer's performance data.

	Design	Actual
Primary loop inlet temp (degrees C)	_____	_____
Primary loop outlet temp (degrees C)	_____	_____
Primary loop flow rate	_____	_____
Secondary loop inlet temp (degrees)	_____	_____
Secondary loop outlet temp (degrees C)	_____	_____
Energy recovered (kJ)	_____	_____

3. Check and report unusual vibration, noise, etc.

_____

_____

4. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

	Signature and Date
Contractor's Chief Quality Control Representative	_____/_/__
Contractor's Mechanical Representative	_____/_/__
Contractor's Electrical Representative	_____/_/__
Contractor's Testing, Adjusting and Balancing Representative	_____/_/__
Contractor's Controls Representative	_____/_/__
Contracting Officer's Representative	_____/_/__
Using Agency's Representative	_____/_/__

7.6 Attachments:

7.6.1 Attachment 1:

Technical Letter

No. 1110-3-489

3 April 1998

Engineering and Design

DOMESTIC WATER HEATERS FOR BARRACKS

1. Purpose. This letter provides basic design guidance for the sizing of domestic water heaters for barracks buildings.

2. Applicability. This letter applies to all HQUSACE elements and USACE Commands having military construction and design responsibility.

3. Reference. None

4. Distribution. Approved for public release; distribution is unlimited.

5. Background. There have been questions regarding the sizing for domestic water heaters for barracks. Designers have often used ASHRAE design criteria for motels or dormitories with some over sizing. However the peak demand for domestic hot water in barracks is significantly larger than motels or dormitories due to the concentrated shower pattern of the occupants. This ETL provides a uniform approach to determine domestic water heating requirements for barracks.

6. Guidance.

(a) General

(1) As with any domestic water heating system, storage tank temperature should be maintained at a minimum of 60°C (140°F) to reduce the potential for Legionella Pneumophila (Legionnaire’s Disease). Note that higher storage temperatures will result in a lower recovery rate to satisfy the peak demand. Include a cross connection with a mixing valve between the domestic water supply and hot water supply lines (leaving the storage tank) to limit the temperature of water distributed to plumbing fixtures to 43°C (110°F). Require a strainer upstream of the thermostatic mixing valve on both the hot and cold water connections to protect the small orifice in the mixing valve from debris that may be in either line.

(2) If a backflow preventer is installed in the domestic water main entering a building or in the line supplying the domestic hot water system, include provisions to accommodate thermal expansion. In barracks this can be critical as occupants often shower at the same time and after this peak usage event, the hot water loop will be at a relatively low temperature. During the subsequent recovery phase the water temperature will rise causing the water to expand. If little hot water is being used, this expansion will cause a pressure increase that may activate a relief valve or rupture the storage tank. The best method to alleviate this excess pressure is to install an expansion tank, sized in accordance with Chapter 12 of the 1996 ASHRAE Systems and Equipment handbook.

(3) Normally if a central energy plant is available it will be life cycle cost effective (an analysis must be performed) to generate domestic hot water using distributed media as the heat source. If there is no central plant or if the

plant does not operate during the non-heating season provide a separate domestic hot water source. If the site consists of several barracks buildings, evaluate the life cycle cost of these alternatives:

(a) A single boiler to provide low temperature hot water, 94°C (200°F) to heat exchangers in each barracks for domestic hot water generation.

(b) A single heating source for domestic hot water in each individual barracks separately. If the barracks building is not part of a building complex and there is no central plant or distribution system available then a single heating source must be provided.

b. Calculations: The following information applies to all types of domestic water

(1) Peak Demand: Design for the case where all occupants are taking showers at essentially the same time. Public law limits the maximum flow from of each shower head and lavatory faucet to 0.16 LPs (2.5 gpm). It is assumed during peak demand that the shower requires 7.5 minutes and the lavatory requires 2 minutes of full hot water flow. As a result, the peak domestic hot water demand can be found using equation (1) below:

$$\underline{Vp = h \times occ \times P \times (Td/Ts)} \qquad (1)$$

where:

Vp = volume of domestic hot water required at peak, L (gal).
h = number of shower heads, ea.
occ= number of occupants using each shower, ea.
Td = temperature of water delivered to shower valve = 43°C (110°F)
Ts = temperature of water in storage tank, degrees C (degrees F)
P = amount of water used per occupant during peak demand, 90 L/occupant (23.75 gal/occupant)

Note that there is no diversity in the number of occupants in the building. The peak volume of domestic hot water is calculated assuming 100% building occupancy. Also note that equation (1) does not take laundry or dining facilities into account. Add additional hot water requirements if laundry or dining facilities will be requiring hot water during the peak demand period.

(2) Tank Size: Once the peak demand is known, the tank capacity and corresponding recovery rate can be determined. Since space in the mechanical room is frequently limited, select the desired tank capacity first. An initial estimate of tank size can be determined by using 50 L per occupant (12.5 gal per occupant). Normally a selection of 50 L (12.5 gal) will provide acceptable operation at a reasonable cost but it should be noted that other factors including larger tank sizes and higher storage temperatures will reduce amount of recovery required. Larger tank sizes and increased storage temperatures will also result in greater heat loss from the storage tank. Compare selected tank size to standard tank capacities available commercially and with the space available in the mechanical room.

(3) Recovery Rate: Once the tank capacity is known, the recovery rate can be calculated. The recovery rate is the quantity of water to be heated from the inlet temperature to the desired storage temperature. The difference between the inlet water temperature and the water storage temperature is often assumed to be 55°C (100°F). However, this temperature difference should be coordinated with local conditions and revised as necessary. Equation (2) below is used to determine the required recovery rate:

$$R = (Vp-(M \times St))/d \qquad (2)$$

where:

R = recovery rate at the required temperature, LPs, (gph).
M = ratio of usable water to storage tank capacity (60 - 80%)
St = storage tank capacity, L (gal).
d = duration of the peak, (seconds) =
(9.5 min/occupant) × occ(60 sec/min) (SI)

d = duration of the peak, (hours) =
((9.5 min/occupant) × occ)/(60 min/hr) (IP)

The duration is calculated assuming that the peak usage period will be 9.5 minutes per occupant. Therefore, if two occupants share a bathroom the duration is 19 minutes, 3 occupants would be 28.5 minutes, etc.

Note that the recovery rate is an output condition. Insure that manufacturer's data, submitted for the hot water generation unit, indicates that sufficient input capacity to satisfy the recovery rate with actual inlet water and storage temperatures will be provided.

(4) Pipe Sizes: The next component to be sized in the system is the domestic hot water distribution piping. Appendix A of the 1997 National Standard Plumbing Code, Chapter 45 of the 1995 ASHRAE Applications Handbook and Chapter 33 of the 1997 ASHRAE Fundamentals Handbook provide an ample set of resources on this topic. Therefore, this letter will not discuss this process.

(5) Domestic Hot Water Circulation Pump: After the domestic hot water distribution piping has been sized, the domestic hot water circulation pump can be sized. This pump is used to circulate the domestic hot water through the distribution piping system. Size the pump using equation (3) below:

$$Qp = q/(c \times r \times Cp \times DT) \qquad (3)$$

where:

Qp = pump capacity, LPs (gpm)
q = heat loss in the piping system, kW (BTUH)
c = constant, 1((kW * sec)/KJ)×(60 min/hr))
r = density of water, 0.9971(kg/L) (8.33 lb/gal)
cp = specific heat of water, 4.18(kJ/(Kg * °C)) (1 BTU/(lb * °F)
DT = allowable temperature drop through the system, °C (°F)

Equation (3) can be simplified to:

$$Qp = q/(4.1679((kW * sec)/(L * °C))\times DT) \qquad (4\text{-SI})$$

$$Qp = q/(500 \times((BTUH)/(gpm * °F))\times DT) \qquad (4\text{-IP})$$

Heat loss in the piping system (q) can be calculated using Table 2 in Chapter 45 of the 1995 ASHRAE Applications Handbook. However, a common rule of thumb is 0.032 kW/m (30 BTUH/ft.). The allowable temperature drop through the piping system (DT) is usually 2 to 5°C (5 to 10°F). It is recommended to use 2°C (5°F) to assure that sufficient hot water is provided for all occupants under peak conditions. If the temperature drop through the piping system will result in a temperature less than 40°C (105°F) at the most remote fixture, require the supply water temperature leaving the mixing valve to be above 43°C (110°F) and revise the storage tank and recovery capacities accordingly.

c. Systems using a separate hot water generation unit and storage tank: The following information applies to systems using a separate storage tank and forced circulation type water heater, boiler or heat exchanger to generate and store domestic hot water. A forced circulation type water heater is similar to a boiler in that it is designed to heat domestic water as it passes through a series of coils rather than heating water in a storage tank but is designed for generating domestic hot water only.

(1) Locate the storage tank and hot water generation unit in the same mechanical room whenever possible. This keeps the head requirements at a minimum for the pump circulating water between the hot water generation unit and the storage tank.

(2) Require the domestic water supply be connected in the line supplying hot water to the storage tank. This allows the cold water to mix with the warmer water in the storage tank before entering the boiler, minimizing problems associated with condensation and thermal stress and improving overall system efficiency. Require a submittal from the manufacturer addressing whether a thermostatically controlled bypass line between the boiler supply and return lines or other means are needed to preclude the possibility of thermal shock to the boiler.

(3) If a forced circulation type water heater or boiler is used, equation (3) again can be used to size the circulation pump between the heater and the storage tank. In this case limit the temperature differential to no greater than 16K (30°F) to minimize problems with condensation and thermal stress and improve overall system efficiency. Also note that the sizing of the circulation pump must account for the heating of the domestic cold water being provided. Therefore, the value of q required to use equation (3) is found with equation (5):

$$q = q\text{-pipe} + (R \times c \times r \times Cp \times DTt) \qquad (5)$$

where:

q-pipe = heat loss in the piping between the boiler and the storage tank, kW (BTUH)

DTt = temperature difference between the tank water and the make-up water, °C (°F)

Determine actual storage tank and domestic water supply temperatures based on local requirements. If the water in the tank is assumed to be 60°C (140°F) and the make-up water is 4°C (40°F, equation (5) can be simplified to:

$$q = q\text{-pipe} + (R \times 233.402((kW * sec)/L)) \qquad (5\text{-SI})$$

$$q = q\text{-pipe} + (R \times 50{,}000(BTUH/gpm)) \qquad (5\text{-IP})$$

The new value of q can then be inserted into equation (3) to determine the required flow rate for the pump. Compare this flow rate with the minimum flow rates required for boiler or water heater operation and require the larger of the two values. Once the required flow rate is known, the pressure drop for the circulation pump can be determined. The resources listed in paragraph 6.b(4) (Pipe Sizes) give adequate information on calculating the pressure drop through the piping. However, several manufacturers should be contacted to determine the pressure drop through the water heater or boiler. This value will vary widely between different manufacturers. Therefore, the circulation pump should be sized to overcome the highest pressure drop. However, flow rates over or under those

required by the boiler or water heater manufacturer can reduce the efficiency of the unit. As a result, the drawings should indicate the pump characteristics used for the design. Then add a note indicating that the pump is to be sized by the boiler or water heater manufacturer with the horsepower requirements not to exceed those listed in the schedule.

(4) If a heat exchanger is used, size the circulation pump based on the flow required for the heat exchanger to meet the recovery calculated in equation (3) and the heat lost through the piping.

d. Sample Computations:

(1) Given:

h = 36 shower heads
occ= 2 occupants per shower
Td = 43°C (110°F)
Ts = 60°C (140°F)
M = 75% useable tank capacity
DT = 5K (9°F) Maximum temperature drop through distribution system.
DTt = 54K (97°F)
Piping system consists of:
9 meters of 50 mm pipe
6 meters of 25 mm pipe
15 meters of 20 mm pipe
A separate tank and hot water boiler will be used.
q-pipe = 0.10 kW = 341.18 BTUH

(2) Find:

(a) Peak domestic hot water demand, L (gal).
(b) Storage tank size, L (gal).
(c) Recovery rate required given the tank size selected, LPs (gph).
(d) Flow rate required for domestic hot water circulation pump.
(e) Flow rate required for boiler circulation pump.

(3) Solution:

(a) Peak Domestic Hot Water Demand:

$$\underline{Vp = h \times occ \times (90/occupant) \times (Td/Ts)}$$

$$\underline{Vp = (36\ heads) \times (2\ occupants/head) \times (90\ L/occupant) \times (43°C/60°C)}$$

$$\underline{Vp = 4{,}644\ L\ (1{,}227\ gal)}$$

(b) Storage Tank Size:

$$\underline{St = (36\ heads) \times (2\ occupants/head) \times (50\ L/occupant)}$$

$$\underline{St = 3{,}600\ L\ (951\ gal)}$$

Use 2 tanks of 1893 L (500 gal) each to fit into the available space.

(c) Recovery Rate:

d = (95 min/occupant)×(2 occupants)×(60 sec/min)=
1,140 sec (0.32 hours)

R = (4,644 -(75% × 2 each × 1,893 L))/1,140 sec =
1.58 LPs (1,505 gph)

(d) Flow rate for circulation pump (heat loss through piping is 0.629 kW):

Qp = 0.629 kW/(4.1679((kW * sec)/(L * °C))× 5°C) =
0.0302 LPS (0.48 gpm)

(e) Flow rate for boiler circulation pump:

q = q-pipe +(R × 233.402((kW * sec)/L))

q = 0.1 kW +(1.58 L/sec × 233.402((kW * sec)/L)) = 368.875 kW

Qp = 368.875 kW/(4.1679((kW * sec)/(L * °C))× 16°C)) =
5.53 LPS (87.6 gpm)

7. Action. The guidance included in this technical letter will be used for the planning, design and construction of new and renovated facilities.

8. Implementation. This letter will have routine application, as defined in paragraph 8c, ER 1110-345-100.

FOR THE COMMANDER:

KISUK CHEUNG, P.E.
Chief, Engineering and
Construction Division
Directorate of Military Programs

8. ELECTRICAL AND TELECOMMUNICATIONS DESIGN REQUIREMENTS

8.1 Design, Installation, and Testing Standards.

8.1.1 Design Standards: Design and installation of electrical systems for the facility shall comply with the applicable requirements of the following standards listed in the reference standards paragraphs of this proposal: NFPA 70 (National Electrical Code), ANSI C2 (National Electrical Safety Code), NFPA 101, NFPA 72, AFJMAN 32-1080, AFM 88-9 Chapter 2, MIL-HDBK-1008C, Illuminating Engineering Society Application and Reference Handbooks, Institute of Electrical and Electronic Engineers, Insulated Power Cable Engineers Association, National Electrical Manufacturer's Association, Underwriters' Laboratories Inc., American National Standards Institute, American Society for Testing and Materials, and Electronic Industries Association/Telecommunications Industries Association EIA/TIA 568-A, EIA/TIA 569, EIA/TIA 607, EIA TSB 67, Insulated Cable Engineers Association ICEA S-80-576, and ICEA S-83-596.

8.1.2 Installation Standards: The installation of electrical equipment shall comply with the latest edition of the National Electrical Code, Nevada Power Company, and the National Electrical Safety Code, ANSI C2.

8.1.3 Testing Standards: All service equipment shall be Underwriters Laboratories (UL) listed. Alternately, published proof from a recognized independent testing laboratory shall be provided.

8.1.4 PCB Standards: All new electrical equipment shall be supplied with no detectable PCB's. New fluorescent lighting fixture ballasts shall be clearly marked "No PCB's". Existing transformers and ballasts to be removed, unless clearly marked that they contain no PCB's, shall be treated as hazardous materials and appropriately packaged, stored, transported, and disposed in a State of Nevada approved incinerator. Certified PCB test from laboratory with serial number of unit on results shall be obtained by the Contractor.
Disposal of fluorescent lamps shall be similarly handled as hazardous waste.

8.2 Site Considerations.

8.2.1 Electrical and Communications Demolition: See Electrical Demolition Site Plan, sheet E1.0.

8.2.2 Exterior Duct Lines: Duct lines for primary electrical cables shall be 103 mm thin-wall concrete encased ducts (Type EB- encased burial). Duct lines for communications shall be 103 mm thin-wall concrete encased ducts under paved areas or 103 mm heavy-wall ducts (Type DB- direct burial) under other than paved areas. Concrete encasement shall be 76 mm minimum on all sides, with 50 mm spacing between adjacent ducts in the same run. Secondary electrical duct lines shall follow the same application criteria as the communications lines, except for duct sizes. Secondary service ducts shall be 103 mm diameter, while secondary ducts to loads such as exterior mechanical equipment or for parking lot lighting circuits shall be a minimum of 27 mm diameter. Minimum burial depth of direct buried ducts shall be 762 mm. Minimum burial depth of concrete encased duct banks shall be 610 mm to top of encasement. Any required crossing of existing streets shall be done with boring and jacking with conduit sleeves; no cutting of existing streets will be allowed.

8.2.3 Primary Electrical: The new Dormitory Facility shall be serviced with a new pad-mounted transformer fed from a new pad-mounted switch. See Electrical Site Plan, sheet E2.0. Primary voltage is 12,470 volts, three phase.

8.2.4 Communications Service: Provide new communications ducts to the first floor communications room of the new dormitory per Electrical Site Plan, sheet E2.0. Obtain digging permit before proceeding with construction. If any underground communications cable should be damaged, immediately notify 99th Communications Squadron at (702) 652-7882. Contractor's will be responsible for attaining his own telephone service.

8.2.5 Communications Handholes: New handholes shall be either pre-cast or poured in place. Handholes shall be provided with cable racks on each wall and shall have a 3050 mm ground rod with top 100 mm exposed Handholes shall have pulling-in irons installed on each wall. Provide the word "COMMUNICATIONS" on the cover. Before entering any existing communications manholes, first contact the 99th Communications Squadron at (702) 652-7882 to coordinate the work.

8.2.6 Transformer: Provide a deadfront, tamper-resistant pad-mounted compartmental transformer sized with a rated capacity of not less than 90 percent of the building demand load and 10% spare. Transformer shall be radial feed with surge protection, pressure relief, oil gauge, LBOR switch, fuses, and two 2-1/2 % taps above and below normal. Provide oil sample test for transformer. Transformer must be certified as PCB free by a certified testing laboratory and a copy of certification given to the government for record keeping. Install on reinforced concrete pad sized to fit transformer. Fuses in transformer and main circuit breaker on the main distribution panel must be coordinated with other protection devices down stream of it. Location of oil-filled transformer installation shall comply with the following: concrete or masonry buildings within 7.62 m of a transformer shall have: 1) no window openings in first story walls within 3.05 m horizontal of transformers, 2) windows beyond 3.05 m and up to 7.62 m horizontally from the transformers shall be protected, using either wired glass in steel sash or glass block, 3) window openings in second and third story walls directly above transformers shall be protected using either wired glass in steel sash or glass block, and 4) overhanging eaves, where they exist, shall be noncombustible. Buildings located 7.62 m or more from oil-insulated transformers do not require fire exposure protection. Provide one portable fire extinguisher to be stored near the transformer. In lieu of oil insulation, transformers may use less flammable liquid. Transformer shall be located in the mechanical equipment yard hidden by a screening wall and shall be painted Federal Paint Number 23617 (Greystone), or 30099 (Dakota Brown), from Federal Specification 595.

8.2.7 Sectionalizing Switch: Provide primary pad-mounted sectionalizing switch where indicated on Electrical Site Plan. New switch shall be 4-way, 4 compartments, air-insulated, load interrupter and shall conform to IEEE C37.63. Rated continuous current shall be 200 Amps. Provide fuses sized for conductors feeding existing transformer for Bldg. 745 and for new dormitory. Enclosure shall be of freestanding self-supporting construction provided with separate incoming and outgoing compartments for bottom cable entry. Enclosures shall be of deadfront construction with a hinged door for access to each compartment.

8.2.8 Corrosion Control: Provide cathodic protection for any buried/submerged metallic utility system (piping or tanks). The cathodic protection survey and design must be performed by a National Association of Corrosion Engineers (NACE) Accredited Corrosion Specialist, NACE Certified Cathodic Protection Specialist, or a Registered Professional Corrosion Engineer. This accreditation and/or registration must have been obtained in the field of cathodic protection. Cathodic protection system shall be in accordance with NACE RP-01-69 and NACE RP-01. Design anodes for a 20 year life minimum.

8.3 <u>Building Electrical</u>

8.3.1 Secondary Service: Provide 3 phase, 4 wire secondary service in underground 103 mm conduits from the transformer to the service equipment inside the main Elec Room. Use multiple conduit and conductor runs in parallel to avoid excessively large conductors and conduit. Ensure service equipment is properly configured to accept multiple conductors for each phase. Provide a main circuit breaker, solid state type, to function as a single disconnecting means for the entire facility. Use circuit breakers as disconnecting means in service equipment and all panelboards for ease of maintenance. Size equipment and feeder ampacities to be adequate for the estimated demand loads plus a reserve of approximately 10 percent for future growth. Provide a digital type watthour meter with pulse initiating capability compatible with the existing central station EMCS on base.

8.3.2 Secondary Distribution: Service to the building may be either 480/277 volts or 208/120 volts. Perform an economic comparison of the two systems considering mechanical equipment loads, dual transformation, etc. Demand load calculations shall be based on NEC for multi-family occupancy rather than hotel occupancy. In the room with the main service, serve motor loads from a motor control center if the number of motors will justify it. If a motor control center is not justified, the motors may be fed from the main distribution panelboard instead of the branch circuit panelboard at contractor's option. Provide 208/120 volt distribution panelboards in Elec Rooms of each floor to feed multiple branch circuit loadcenters located closest to the loads within the unit modules to reduce branch circuit length and corresponding voltage drop. Avoid locating branch circuit panelboards within the main portions of office areas, circulation spaces, or in locations that would detract from the aesthetic effect of the facility. Provide ventilation for equipment rooms to offset heat produced by dry-type transformers and other electrical devices to maintain ambient temperature at no more than 33 degrees C .

8.3.3 Loadcenter Panelboards: Provide one loadcenter type panelboard in each dormitory unit module (2 bedrooms, kitchen, and bathroom). Loadcenter type panelboards shall not be provided in any other areas. Loadcenters may be connected using the feeder tap rules covered by article 240-21(b) of the National Electrical Code, thereby reducing the number of feeder breakers in distribution panels which feed the loadcenters. Each loadcenter shall have a main circuit breaker. Location of loadcenters shall be in the common area of the unit module and coordinated so as to avoid conflicts with other room features.

8.3.4 Voltage Drop: Size wiring for service entrance conductors to have a voltage drop of 1% or less. Size wiring for feeders to have a voltage drop of 2% or less. Size wiring for branch circuits to have a voltage drop of 3% or less. Size overall wiring so that voltage drop from primary connection point to worst case individual utilization device is 5% or less. Include the required 5% to 10% spare capacity in the load levels used to determine these maximum voltage drop percentages.

8.3.5 Equipment Interrupting Capacity: Perform short circuit calculations to determine fault current available at service equipment, panelboards, loadcenters, motor control centers, safety switches, and enclosed circuit breakers. Provide equipment with sufficient short circuit interrupting capacity to withstand these calculated fault current levels. Circuit breakers shall be fully rated type.

8.3.6 Electrical Wiring and Conduit: Wiring shall generally consist of insulated conductors installed in electrical metallic tubing, intermediate metal conduit, or rigid galvanized conduit. Conductors shall be copper except that aluminum conductors may be used for No. 4 AWG and larger. Conductors for branch circuits of 120 volts more than 100 feet long and of 277 volts more than 230 feet long, from panel to connected load, shall be no smaller than No. 10 AWG. Class

1 remote control and signal circuit conductors shall be not less than No. 14 AWG. Class 2 remote control and signal circuit conductors shall be not less than No. 16 AWG. Class 3 low-energy, circuit conductors shall be not less than No. 22 AWG. Insulation type shall be suitable for the application according to the National Electrical Code. Pull ropes shall be installed in all empty conduits. Unless otherwise noted, all raceways shall be installed flush in the existing and new walls.

8.3.7 Wiring Temperature Rating: Where wiring is connected to devices rated at 100 amperes or less, the ampacity listed for 60 degrees C wire in the ampacity tables in the Code shall be used whether or not the wire is rated at a higher temperature. For wiring connected to devices rated at over 100 amperes, wiring rated at 75 degrees C or greater shall be used. The 75 degree ampacity for wire shall be used whether or not the wire is rated at a higher temperature. The derated ampacity of higher temperature rated wire may be used as long as the derated ampacity does not exceed the guidelines stated above. These requirements are to ensure higher temperature wire does not thermally overload terminals of equipment rated at a lower temperature.

8.3.8 Motors above 373 watts shall be three phase and rated at 208 volts or 460 volts where available. Motors 373 watts and smaller may be rated at 115 volts single phase. Provide high efficiency motors for all applications 746 w or greater and for those motors operating over 750 hours per year. Follow the guidelines in NEMA Standard MG-1. Motors larger than 7.5 kW shall be furnished with power factor correction.

8.3.9 Convenience Receptacles: All convenience receptacles shall be 20 amp specification grade duplex grounding type. Provide convenience receptacles at three meters on centers along perimeter walls in administrative and staff areas. Distance from edge of doors to first receptacle shall not exceed 1830 mm. Provide receptacles a maximum of ten meters on center in perimeter walls in corridors, lobby, and circulation areas for use of janitorial or other equipment. Provide two weatherproof GFCI receptacles on the exterior wall, one near outside mechanical equipment. Provide two quadruplex receptacles each on a dedicated 20 amp circuit at the telephone backboard in each Comm. Room. Provide five fourplex receptacles in each bedroom with one receptacle next to each CATV outlet. Receptacle at vanity shall be GFCI @ 1220 mm AFF, and on a dedicated branch circuit. Provide at least one receptacle in Elec Room and four other receptacles in Mech. Room. Provide ground-fault circuit-interrupter (GFCI) receptacles where receptacles are located within 1830 mm of sinks, toilet and other wet areas. Where counters are provided in any of the rooms, receptacles shall be located above counter back splashes. Provide no more than six convenience receptacles on each 20 amp circuit. In accordance with UBC 4304 outlets in the same stud space and on opposite sides of fire rated walls or partitions must be separated by a minimum of 610 mm horizontal distance. Device plates shall not be stainless steel.

8.3.10 Equipment Power: Provide hardwired connection or receptacle on dedicated circuits and two small appliance circuits with receptacles as required to serve the following equipment in the kitchen area: microwave, refrigerator, electric range/oven, coffee maker, dishwasher, and sink garbage disposal unit. Other equipments in administrative and common areas such as personal computers, copy machine, fax machine, laser printers, and alarm system shall be provided with dedicated branch circuits. In break rooms with counter tops, provide receptacles on two small appliance 20 amp dedicated circuits, and dedicated circuits for vending machines. Branch circuits shall also be provided for fan coil units, digital controls, and landscaping system irrigation controller. Provide receptacles @+ 1220 mm AFF in laundry of adequate rating and number for washing machines and clothes dryers. Verify if clothes dryer is gas or electric.

8.3.11 Grounding: Ground the electrical system, all separately derived electrical systems, and all electrical equipment and metallic enclosures of electrical conductors to comply with Article 250 of the NEC. In addition, install an insulated green equipment grounding conductor in all raceways regardless of the type of conduit. The earth electrode system shall be engineered to obtain a resistance to ground of 25 ohms or less. Telecommunications closets shall be grounded to the building electrical service grounding electrode system, in compliance with TIA/EIA 607.

8.4 Exterior Lighting.

8.4.1 Parking Lot Lighting: Parking lot and adjacent traffic lanes shall be illuminated to a maintained level of 5.4 lux. Provide one each 150 watt high pressure sodium vapor rectangular style aluminum fixtures (Type 401C2 in OCE Lighting Fixtures Standard Detail No. 40-06-04 or similar) mounted on 7.62 m high aluminum poles and located in parking islands out at ends and within the parking space area. New poles and fixtures shall have a medium bronze anodized finish. Poles and reinforced concrete base shall be rated for 161 km/hr wind load at the base of the pole and a wind gust factor of 1.3, and for the height and drag factor recommended by AASHTO LTS-2. The spacing of all these poles and fixtures shall be approximately 30 meters or less, which is within the recommended lateral spacing-to-mounting height criteria of four to one. See Civil drawings which indicate parking lot option bid items.

8.4.2 Perimeter Lighting: Lighting at the perimeter of the building shall be by high pressure sodium (HPS) vapor fixtures. Provide 50 watt wallmounted light fixtures around the building exterior and one located between each unit exterior door away from the window area to reduce light entering the sleeping room. Provide fluorescent wall mount fixture type impact resistant, with integral emergency lighting in ballast wireway, at all exterior stairways. Fixtures shall be of a low profile type so as to minimize protrusion from wall (no “jelly jars”). Fixtures shall have die-cast corrosion resistant housing for wet applications and shall have thermal shock-resistant lens with protective guards. Conduit and wiring to fixtures shall be concealed. Provide access to fixture ballasts to enable repair or replacement.

8.4.3 Walkway Lighting: Provide 50 watt HPS bollard type lighting fixtures along all walkways where indicated on the landscape plans. Coordinate locations with Landscape and Architectural elements to provide safe and aesthetic function and use of outdoor areas. Wire separately from parking lot lighting circuits.

8.4.4 Walkway Lighting Fixture Types: The bollard lighting fixtures shall be 1067 mm high and 200 mm in diameter with a cast aluminum base and an extruded aluminum housing each provided with manufacturer's standard corrosion resistant finish in medium bronze color. Optical element shall be a specular aluminum reflector with the lower portion of the reflector conically shaped and covering the lower portion of the lamp. Reflector shall be protected by a clear acrylic lens secured to the housing and gasketed. Reflector shall be optically engineered for low brightness distribution.

8.4.5 Provide weatherproof lighting fixtures for landscape features (i.e., covered patio areas, arbor structures, entrance sign, and mail box structure). Fixtures shall be photocell controlled with manual override switch. Provide a weatherproof GFCI receptacle at each covered shade structure.

8.4.6 Basketball Court Lighting: Not required.

8.4.7 Exterior Lighting Control: Provide a Lighting Control Cabinet (LCC) for

each building, to house lighting contactors, timeclocks, and manual override (ON-OFF-AUTO) devices. LCC shall be located in either electrical or mechanical rooms, with manual override selector switch located in cover. Provide separate lighting circuits for the perimeter lighting fixtures and for the parking lot, street and walkway lighting fixtures. Provide each circuit with photocell control ON and timeclock OFF control. Also, connect to base-wide EMCS system. One photocell unit shall be provided for each building, shall have an adjustable sensitivity range, and shall be mounted on the roof facing the northern sky.

8.4.8 Ballasts: All ballasts for exterior lighting fixtures shall be high power factor type with temperature rating of zero degrees F.

8.5 Interior Lighting.

8.5.1 Lamp and Ballast Types: Fluorescent lamps shall be four foot length (no U-lamps) and shall be 32 watt, T-8 energy saving type with compatible energy efficient electronic ballasts. Both compact fluorescent and T-8 lamps shall have a correlated color temperature of 3500 Kelvins and a minimum Color Rendering Index (CRI) of 82. Electronic ballasts shall have a ballast factor of at least 0.85, a power factor of at least 0.95, a maximum harmonic distortion limit of 10%, light output regulation of +/- 10%, and voltage input regulation of +/- 10%. Electronic ballasts shall not be required for compact fluorescent fixtures. All ballasts shall be high power factor type.

8.5.2 Lighting Illumination Levels: Design lux intensity levels and other lighting requirements shall be provided according to in AFM 88-9, Chapter 2 and MIL-HDBK 1190 as shown below:

Space	Lux	Fixture Type
Sleeping	323	Surface mounted domes with compact fluorescent lamps
Kitchen	538	Recessed Fluorescent Troffer with prismatic acrylic lens
Under Counter	538	Surface Commercial Fluorescent
Bath	215	Vaporproof Incandescent
Vanity	323	Incandescent (see below)
Walk-in Closet	161	Surface compact fluorescent
Game Room	538	Recessed Fluorescent Troffer & compact fluorescent Downlights
Elec/Mech	161	Industrial Fluorescent
Communications	538	Industrial Fluorescent
Janitor	161	Industrial Fluorescent
Bulk Storage	323	Industrial Fluorescent
Public Toilets	215	Commercial Fluorescent
Admin/Office	538	Recessed Fluorescent Troffer with parabolic louvers
Laundry	323	Commercial Fluorescent

8.5.3 Fixture Types in Offices and Game Room: Fixtures in offices and the Game Room shall be 610 mm x 1220 mm 2 or 3 lamp with 100 mm deep parabolic louvers. Larger rooms (rooms with a Room Cavity Ratio (RCR) of 4 or less shall be provided with 2 lamp fixtures in order to avoid exceeding the 538 lux design level while maintaining close enough spacing to achieve acceptable uniformity. Smaller rooms (rooms with an RCR of 5.5 or greater) shall be provided with 3 lamp fixtures. Rooms with an RCR between the values of 4 and 5.5 may be provided with either 2 or 3 lamp fixtures depending on the particular room configuration. Particular attention shall be given to the selection of fixtures and layout of downlights and switching/dimming control in the Game Room due to the aesthetic nature of the

space.

8.5.4 Fixture Spacings and Mountings: Provide the proper mounting for all fixtures based on the type of ceiling. If the ceiling is finished type, provide surface or recessed mounting as required. If ceiling is exposed and over three meters high provide pendant mount as required but fixture must not interfere with any other mechanical or electrical equipments. Provide proper mounting and spacing of fixture as required in the IES Lighting Handbook.

8.5.5 The glass block windows in the Bulk Storage rooms on the second and third floors shall be backlit in a decorative manner and shall have a photocell control for dusk-to-dawn operation separate from the standard overhead room lighting.

8.5.6 In each sleeping room provide a combination motorized paddle fan with lights attached to base. If clearance height below fan light unit is too low, then provide two 610 mm x 610 mm recessed fluorescent fixtures straddling the perimeter of the paddle fans. Mounting of unit shall be sufficient strength to support the fan/light while in motion at highest speed. Light shall be switched from a wall switch and fan shall be controlled by a switch next to the light switch with three speeds (high, medium, and low).

8.5.7 Vanity lighting fixture above mirror shall be the make-up (theatrical type) light strips with exposed incandescent globe lamps, 5 or 6 lamps to fit width of vanity, with polished chrome finish and oak trim.

8.5.8 Switching Requirements: Occupancy sensors shall be provided in Game Room, office, and laundry. Dimmers shall be provided in Game Room. In other areas provide multi-level switching of three lamp fixtures. Provide three way switching for rooms with two entrances such as corridors. Mount switches at 1220 mm above finished floor for handicap requirements.

8.5.9 Exit and Emergency Lighting: Provide exit and emergency lighting in accordance with the requirements of NFPA 101, Life Safety Code. Provide battery backup for exit and emergency lighting fixtures. Exit lighting fixtures shall use a light emitting diode light source and shall be red letters on white background. Provide integral emergency lighting capability in ballast wireway of four foot long fluorescent fixtures with emergency feature and provide emergency lighting frame-in kits mounted at fixture for compact fluorescent fixtures with emergency feature. "Bugeye" type emergency lights (floodlight heads mounted atop a battery unit, or mounted separately) shall not be used. Mount exit signs high up as possible and close to walls to minimize accidental breakage.

8.5.10 Support of Pendant Mounted Fixtures: Fixtures shall not be supported from the underside of the roof deck. Suspension of fixtures shall be from structural members where spacing of structural members coincides with required fixture spacings. Where fixture spacing do not coincide with structural supports, provide steel channels mounted between and connected to structural members for support of pendant mounted fixtures.

8.5.11 Lighting Circuiting Requirements: Do not load lighting circuits above 12 amps. Provide local switching for each room area.

8.6 <u>Fire Alarm System.</u>

8.6.1 Signal, Annunciator, and Control Panel Requirements: Provide non-coded and zoned automatic fire alarm and detection system. Provide completely supervised fire alarm control panel with sufficient number of zones so that each type of

device is separately zoned with further location breakdown of zoning for initiating devices on each floor of the dormitory. Each floor of the dormitory should also be logically divided into wings, with initiating devices in these wings zoned accordingly. Each initiating device zone shall transmit individual signals to the fire department. Provide radio transceiver compatible with the existing Monaco D-700 central station equipment along with antenna to transmit alarm signals to the Base Fire Station. Control panel and transceiver shall be provided with 24 volt D.C. battery backup system sized to meet system requirements in accordance with NFPA 72.

8.6.2 Initiating and Notification Circuits: All fire initiating and notifying circuits shall be by four wire, Class "A" supervised system with return loop in separate conduit. All bedrooms within the facility shall be covered by self-restoring smoke detectors with a local audible alarm. No alarm signal shall be transmitted to the Fire Alarm Control Panel from the bedroom smoke detectors. 120 VAC smoke detectors shall not be powered from a local unit module loadcenter but provide a 120 VAC dedicated circuit from the building main panel. Secondary power source for 120 VAC detectors shall be internal battery; alternatively, detectors may be connected to the Fire Alarm Control Panel for power source only. Provide heat detectors in any area not covered by fire sprinklers. Provide manual pull stations along paths of egress for manual alarm notification capability per NFPA 101, Life Safety Code. Provide duct smoke detectors in return air ducts and in supply air ducts with air flows above 2000 CFM. Duct detectors shall be powered from the Control Panel as separate zones and shall cause a general building alarm when activated. Resetting shall occur at the Control Panel with a key operated switch inside the panel that allows the panel to be reset before the smoke detector clears. Provide waterflow switch to alarm upon sprinkler system activation. Provide supervised tamper switches for Post Indicator Valves and OS&Y shut-off valves. HVAC interlocks shall be provided in fire alarm control panel to shutdown selected ventilation equipment upon alarm activation. Zone each of these functions separately. Provide alarm notification circuits with sufficient number of combination alarm horn/visual indicators throughout building to notify all occupants upon alarm. Provide visual only alarm devices in all public restrooms. In each living module kitchen area, provide a combination horn/strobe with sufficient sound power to attain 15 dB above ambient in all areas of the living module with doors closed. Strobes shall be ADA rated, one Hertz flash rate, minimum 75 candela. Conduit for all fire alarm system shall be minimum 21 mm. Temperature rating of fire alarm devices shall be within the ambient temperature ranges for Nellis AFB or suitable air-conditioning or heating shall be provided.

8.6.3 Qualifications: Design of fire alarm system shall be done by a registered Professional Engineer with at least 4 years of current and applicable experience.

8.6.4 Training: Provide minimum eight hours training on use and maintenance of system, including any software, special tools, and equipment required for future repairs.

8.7 <u>Building Communication Requirements.</u>

8.7.1 Telephone and Local Area Network system: System shall be prewired in accordance with EIA/TIA 568A. It will include dual modular 8-pin telephone/ data jacks (RJ45) except as noted below. The top position RJ45 jack shall be Category 3, and the bottom position RJ45 jack shall be Category 5. Each RJ45 jack shall be factory labeled “Voice” or “Data”. Provide each one 4 pair unshielded twisted pair (UTP) copper category 3 (voice) cable to the top position jack and one 4 pair UTP copper category 5 (data) cable to the bottom position jack. UTP cables shall be color coded for identification: pink jacket for data/LAN and grey jacket for voice. Provide two each wired telephone/data outlets in office and Game Room

spaced as indicated on plans, or one each per 9.3 square meters. Provide two wired telephone/data outlets in each bedroom, one on each side of the room. Wiring of the two telephone jacks shall be multiple (one 4-pair cable per bedroom); however, provide one dedicated 4-pair UTP Category 5 cable to each data jack in each bedroom. In bedrooms provide single gang outlet box, 67 mm deep, with 21 mm conduit up to pullbox above walk-in closet. UTP copper category 5 (data) cable length from the patch panel in the communications closet to each outlet jack shall not exceed 90 meters. In kitchens provide one wired telephone outlet with 21 mm conduit up to pullbox, and one 4 pair UTP to backboard. Kitchen outlet faceplate shall have dual lugs. Outlet boxes for areas other than bedrooms shall be minimum 100 mm square and 67 mm deep. Provide access hatches in gyp board ceilings as required to access comm pullboxes. Provide one 43 mm feeder conduit from each living module (2 bedroom unit) to comm room on each floor. All horizontal data cabling shall be without splices or bridge taps between outlets and terminal blocks or patch panels. Provide three 103 mm ducts between each floor at vertically stacked comm backboards. Provide prewiring to two pay telephone outlets and one Base telephone wall outlet in Entry/Lobby; provide one Base telephone wall outlet near the top of the second and third floor interior stairwell. Provide a Base telephone wall outlet in the mechanical room of emergency use. Minimum conduit size shall be 21 mm. Cables shall be plenum rated if they are exposed to air plenums during distribution, such as in the use of cable tray. Routing of raceways and cables shall be parallel or perpendicular to walls and ceilings and shall not be run diagonally across rooms. All cables shall be installed concealed. Cables shall be labeled at both ends of runs with jack number and cable pair numbers. Category 5 cables and jacks shall be rated as such per EIA/TIA-568 A, EIA/TIA TSB-36, and TIA/EIA TSB40. Cable twists shall be maintained within 13 mm of mechanical termination to maintain near-end crosstalk (NEXT) within Category 5 limits. Cable tests shall be performed with all cables terminated, in accordance with TIA/EIA TSB 67.

8.7.2 Riser Cable: Provide category 3 (voice) and category 5 (data) rated riser cables from first floor comm room to second floor comm room and from first floor comm room to third floor comm room and terminated on 110 type blocks. Riser cables shall be sized to support the maximum outlet requirement on each floor plus 50 percent spares. Cable shall be label-verified with cable jacket factory marked at regular intervals indicating verifying organization and performance level.

8.7.3 Copper Cable Tests: The contractor shall notify the Contracting Officer and the Communications Squadron 21 days before the acceptance tests are to be conducted. Cable tests shall be performed with all cables in terminated. The contractor shall supply and maintain the necessary test equipment to accomplish all Category 3 and Category 5 UTP tests. All test equipment shall meet or exceed the standards, specifications and parameters as stated in this document and TIA/EIA TSB 67. All unshielded cable pairs shall be tested for proper identification, correct pin configuration, and continuity. Testing shall be bi-directional and include, as a minimum, four test parameters which are Wire Map, Length, Attenuation, and NEXT (Near-end Crosstalk) Loss. A pass or fail on a parameter shall be determined by the allowable limits for that parameter, as described by TIA/EIA TSB 67. All opens, shorts, crosses, grounds, reversals, in addition to Fails in any of the four test parameters, shall be corrected as recommended by the TIA/EIA TSB 67 standard. Correct color coding and termination of each pair shall be verified in the communications closet and at the outlet. Horizontal wiring shall be tested from and including the termination device and all cross-connects in the comunications closet to and including the modular jack in each room outlet. All cross-connect patch cords and riser cables in the communications closet shall be tested to include the modular RJ-45 jacks. Backbone riser cables shall be tested end-to-end, including termination devices, from terminal block to terminal block, in the respective communications closets.

These tests shall be completed, with all cables and components terminated, and all errors corrected as required by the TIA/EIA TSB 67 standard. The Government will retest to verify Contractor's final test results. The Contractor’s tests shall be performed in the presence of and/or verified by Government Quality Assurance Personnel, the Contracting Officer, or by knowledgeable Base Communications Squadron personnel. A copy of all documentation, to include as-built shop drawings and floor plans with conduits, cable trays, cabling routes, installed equipment, shall be provided to the Contracting Officer and the Base Communications Squadron. All test results data shall be uploaded to a PC and printed out. An electronic file and a hard copy of all test results shall be provided to the Contracting Officer.

8.7.4 Category 5 Systems Tests: The category 5 data transmission system shall be tested to confirm that it transmits data at the industry standard rated capacity (100 Mbps for Cat.5 data transmission) and written test results shall be provided to the Base Communications Squadron. Contractor shall provide all necessary equipment required to properly test the data transmission systems. Testing shall be done using the TSB 67 basic link test and channel tests procedures for Level II testing. Testing equipment used shall meet the Level II accuracy requirements of TIA/EIA TSB 67. Cables which contain failed circuits shall be replaced and retested until they pass the specified tests. There shall not be any defective pairs in the final installation of the telecommunications cabling.

8.7.5 Qualifications: All communications wiring shall be installed by a telecommunications contractor who shall have a minimum of three years in the design, installation, and testing of these specified systems and equipment. General electrical trade staff (electricians) shall not be used for the installation of the premises distribution system.

8.7.6 Backboards: Provide 2440 mm high by 19 mm thick plywood backboards on all four walls of every communications room. Backboards shall be painted with two coats of white sealer. Provide ladder type cable tray horizontally above all backboards and vertically on backboards for ease of cable routing. Provide accessories at backboards such as hangers and spools for proper cable management. Provide Category 3 rated 110 terminal blocks on insulating mounting brackets at TTB's for terminating of horizontal voice and riser cables. Data station cables shall be terminated at TTB's on modular Category 5 RJ45 patch panels. Patch panels shall be sized for the number of data outlets served, color coded, labeled, with cable guides for proper wire management. Provide patch cords consisting of stranded (flexible) UTP category 5, label-verified, with 8-position modular plugs for RJ-45 jacks. Service entrance cable (provided for Government service) and station voice cables, and station data cables shall have separate designated areas on the backboards. Provide splice case and protector blocks for Government telephone cable; crossconnects will be installed by others. Reserve empty board space for additional 110 terminal blocks and other communications cables to be brought in by Sprint Comm. Cable TV shall have its own designated area, approximately 610 mm wide at each backboard. Provide one 4-plex 120 volt AC outlet near the base of the plywood backboard under the location of the telephone terminals in each communications room/closet.

8.7.7 Coordination: Exterior commercial service communications cables will be terminated on the first floor backboard by Sprint Comm during the last 30 days of this contract. Also, Sprint will be connecting and testing for dial tone at each outlet during this time. Contractor shall coordinate with the Base Communications Squadron, through the Contracting Officer, for this work.

8.7.8 Grounding: Provide Ground Bar, 100 mm H x 254 mm L x 6.35 mm T copper with 12 drilled and tapped attachment holes) at lower left corner of each TTB mounted

on standoff insulators. Provide #1/0 AWG copper ground wire in 21 mm PVC conduit to interconnect each Ground Bar to the Main Ground Bar at the first floor, and then to building grounding electrode system. Grounding shall be in accordance with TIA/EIA 607 and designed to obtain a resistance to ground of 10 ohms or less.

8.7.9 Cable Television (CATV) System: Provide cable television outlet with standard bulkhead F connector in each bedroom at two locations; both jacks wired from same cable drop. Each bedroom shall have a separate cable drop for private billing. Provide one TV outlet in the kitchen on the wall opposite the food preparation area on a separate cable drop; occupants shall determine billing for this shared outlet. Provide a minimum of 3 outlets in Game Room. Provide dedicated RG-6/U cables in conduit, 21 mm (3/4") minimum, from the backboard to each outlet. Cables shall be plenum rated and labeled at both ends of runs with cable number. Cables shall not be terminated to coaxial cable connectors at the backboards. Instead, coil and secure three meters of cable to the TTB.

8.7.10 Communication Room environmental: All comm rooms shall be environmentally controlled to 10 degrees C to 30 degrees C, with humidity below 85% RH. Avoid dust and static electricity by installing floor tile and treating walls and ceiling to minimize dust. Install the same (key) locks on all three comm closet doors. Locks should use the base standard (boiler room) key.

8.8 <u>Other Building Systems.</u>

8.8.1 Energy Monitoring and Control System: As stated above a pulse initiator shall be provided for the watthour demand meter to allow for connection to the basewide EMCS system. Provide capability for EMCS connection for all electronic utility meters. The EMCS system requires a pair of telephone lines to transmit to the central station. Provide one 120 volt dedicated circuit for future EMCS equipment in main Mech Room.

8.8.2 Year 2000 Compliant Equipment: Where applicable, all equipment specified shall be Year 2000 compliant and shall be able to accurately process date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, including leap year calculations, when used in accordance with the product documentation provided by the contractor, provided that all products (e.g. hardware, software, firmware) used in combination with other information technology, shall accurately process date/time data if the other information technology properly exchanges date/time data with it.

8.9 <u>Seismic Considerations.</u>

8.9.1 Nellis AFB is in seismic zone 2B. Provide seismic bracing or restraints for equipment (transformers, lighting fixtures, etc.) in accordance with the Mechanical Requirements of this RFP.

8.10 <u>Handicapped Accessibility</u>

8.10.1 The Dormitory Room Units are exempt from American Disabilities Act Requirements. All other aspects of the electrical installation in the Dormitories shall conform to handicapped accessibility requirements set forth in the American Disabilities Act. Minimum height of receptacles and communications outlets shall be 380 mm. Maximum height of lighting switches and fire alarm system manual pull stations shall be 1220 mm.

8.11 <u>Device Body and Coverplate Colors</u>

8.11.1 Device bodies and coverplates for wall switches, power and communications outlets shall be a color which harmonizes with the room in which they are located. All devices in the same room shall be the same color.

8.12 <u>Coordination of Electrical Device Locations</u>

8.12.1 Specific interior electrical device locations described in this section, "ELECTRICAL AND TELECOMMUNICATIONS DESIGN REQUIREMENTS", are based on room and furniture configurations proposed in this RFP. Device locations shall be coordinated with all disciplines as floorplans are modified for construction.

8.12.2 Mounting Heights: Outlets shall be mounted above countertops and sinks where it is appropriate to do so, such as in kitchens, bathrooms and break rooms. Power receptacles, telephone/data outlets, and Cable TV outlets shall be mounted at the same mounting heights on blank walls, 380 mm, and above 150 mm countertops, to provide a uniform horizontal outlet arrangement, unless noted otherwise.

TECHNICAL SPECIFICATIONS

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SECTION 01311

NETWORK ANALYSIS SYSTEM

(CONSTRUCTION PHASE)

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SECTION 01311

NETWORK ANALYSIS SYSTEM
(CONSTRUCTION PHASE)

PART 1 GENERAL

1.1 DFARS 252.236-7012 CONTRACTOR PROJECT MANAGEMENT SYSTEM:

(a) General:

(1) The Contractor's Project Management System is included to assure adequate planning and execution of the work, to assist the Contracting Officer in appraising the reasonableness of the schedule, to evaluate progress of the work, to make progress payments, and to make decisions relative to time and/or cost adjustments which may result from changes in the work.

(2) The management system is to be based on a computerized Network Analysis System (Critical Path Method) operated by on-site or off-site personnel. Input data shall be coordinated with the Contracting Officer prior to the monthly update report.

(3) The Contractor's Project Management system is to be staffed and prepared pursuant to Contract Clauses, "SCHEDULE FOR CONSTRUCTION CONTRACTS", and "SUPERINTENDENCE BY THE CONTRACTOR". In preparing this system the Contractor assumes responsibility for conformance with contract requirements, planning, sequencing of work, and determining the construction means and methods.

(b) Basic System Requirements:

(1) The computerized Network Analysis System (NAS) must be capable of providing the following minimum on-site services: network analysis by IJ or precedence notation, progress and cost reports, network comparisons, super and subnetworks, resource reporting, report writer allowing flexible formatting and summarization, and graphical output using a dot matrix or laser printer. In preparing the NAS, the Contractor shall insure that it represents an accurate and efficient plan for accomplishing the work.

(2) The Contractor's project management system must be capable of at least weekly update and production of physical update reports, percent complete reports, and cost reports for payment purposes. Management effort required will include capability to analyze factors delaying progress and altering logic and durations on an interactive basis to maintain an up-to-date active management schedule.

(3) The Contractor may use either a network analysis system functionally equivalent to that used by the Contracting Officer or any other IBM compatible Critical Path Method (CPM) network analysis system. The Contracting Officer uses OPEN Plan Scheduling software by WELCOM Software Technology, 1325 South Dairy Ashford Road, Suite 125, Houston, Texas 77077, telephone (713) 558-0514. Should the Contractor select to use an alternate scheduling system, the data shall be in a format directly readable by OPEN Plan or in the "Standard Data Exchange Format" as defined in APPENDIX B of ER 1-1-11 dated 15 MAR 90. Copies of APPENDIX B are available upon request. In addition to the specified number of paper copies of reports and network diagrams, the Contractor is required to provide to the Contracting Officer one set of IBM compatible data diskettes (1.2 MB 5.25" double density disks or

1.44 MB 3.5" diskettes) of all required network analysis submissions and updates.

(c) Detailed System Requirements:

(1) The system shall consist of diagrams and accompanying mathematical analysis. Flexibility of formatting and summarization of reports will be provided by selecting and prioritizing from the following menu of information: activity number (Precedence System) or numbers (I,J notation), duration in work days, activity description, code relating to the party responsible for performing the work, cost, manpower, estimate or labor hours, list of major items of construction equipment with anticipated usage, cost item or pay item the activity is associated with, milestones, identification of submittal when applicable, early start date, late start date, early finish date, late finish date, anticipated start date, float, a list of all activities that precede or follow each activity, and the definable feature of work each activity is associated with.

(2) Windowing (chronologically selected portions of the network) specified for reports or diagrams must be possible. A network and logic diagram, will be provided for the initially approved network as well as each update which incorporated a logic change.

(3) In addition to construction activities, the schedule shall include activities for submittal of materials, samples, shop drawings, operation and maintenance manuals, master equipment lists, spare parts lists, and other related documents. Also included shall be activities for the procurement of all major materials and equipment, including fabrication and delivery, installation and testing. Of particular interest shall be material and equipment procurement items that are expected to be critical to the progress of actual construction. Government activities, such as, review and approval of materials, equipment, testing, and other actions that affect construction progress shall be shown.

(4) The Contractor shall resource load all construction activities. As a minimum, resource loading shall identify equipment, management, skilled and unskilled labor requirements. The Contractor may at his option decide on greater detail for his own purposes, but if this option is elected, the system must be able to consolidate resources into the above defined categories for use by the Contracting Officer.

(5) The Contractor shall incorporate any and all milestone and contract required events which may be specified elsewhere within these specifications. Should milestone events not be specifically identified by the Government within these specifications, the Contractor shall identify at least five percent (5%) of the network activities and designate them as milestone activities.

(6) Logic Diagrams:

(a) Logic diagrams shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor.

(b) Detailed networks need not be time scaled, but drafted to have a continuous flow from left to right, showing how the start of a given activity is dependent on the completion of preceding activities, and how its completion restricts the start of following activities.

(c) A logic diagram of the complete project shall be submitted with the initial NAS, showing each activity number or numbers, duration, description, with the critical path easily identified. Update diagrams will be provided as required by logic changes (but not more frequently than the monthly update).

(7) Each activity, except Government activities and nonpaid activities, such as, the preparation of submittals and master equipment lists, shall be assigned a corresponding monetary value. The value shall be based upon a cost estimate made for each activity and shall represent all the elements of cost, i.e., labor, equipment, materials, overhead, and profit. The cost of each activity shall be identified to the appropriate contract bid item. Upon approval of the schedule, activity values shall be frozen and no changes in the value of any activity shall be permitted without formal approval from the Contracting Officer. The cost estimate for each activity shall be submitted to the Contracting Officer. These activity values shall equal the contract amount.

(8). In addition to the detailed schedule, a summary schedule shall be developed by the Contractor. The summary schedule shall consist of a minimum of thirty (30) activities and be updated monthly.

(d). Submission and approval of the system shall be as follows:

(1). The Contractor shall submit for review and approval a description of the type and capabilities of the computerized network system proposed to be used. Submission shall be within three (3) calendar days of the notice to proceed.

(2). A detailed network defining the Contractor's planned operations during the first sixty (60) calendar days of the contract shall be submitted within fifteen (15) days of the notice to proceed. The first sixty (60) days of the preliminary schedule is a fragmentary network (sub-network) of the total contract schedule and shall conform in all respects with the details and requirements for diagrams and mathematical analysis as specified. The Contractor's general approach for the remainder of the project shall be shown. At midmonth the Contractor shall submit an updated network of actual progress on this network for partial payment. This report shall contain costs of activities completed or partially completed with a tabulation of total earnings.

(3). The complete network system consisting of the detailed network mathematical analysis (including on-site manpower loading schedule and equipment schedule) and network diagrams shall be submitted for approval within (30) calendar days after receipt of the notice to proceed.

(4). The Contractor shall participate in a review and evaluation of the proposed network diagrams and mathematical analysis by the Contracting Officer. Any revisions necessary as a result of this review shall be resubmitted for approval of the Contracting Officer within three (3) calendar days after the conference. The approved schedule shall be used by the Contractor for planning, organizing, directing the work, reporting progress, and requesting payment for work accomplished.

(e). Network Modifications:

(1). In those cases where the contract performance is delayed due to causes beyond the control of the Contractor, and a time extension may be

allowed under one or more of the Contract Clauses entitled "CHANGES", "DIFFERING SITE CONDITIONS", "DEFAULT" (Fixed Price Construction), "SUSPENSION OF WORK", or other applicable clauses, as a condition precedent to granting a time extension, the Contractor shall submit a time proposal in the format of a subnet diagram showing the activities affected by the delay.

(2). Change order proposals shall include description or listing of all proposed changes to the network, by activity, and demonstrate the effect on the contract required completion date. A complete list of activities changed and a subnet of activities affected by the change shall be submitted.

(3). Float or slack is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the NAS schedule. Float or slack is not time for the exclusive use or benefit of either the Government or the Contractor. Extensions of time for performance may be granted to the extent that equitable time adjustment for the activities affected exceed the total float or where the impact on contract completion can be shown. The contract completion date is fixed, and will be amended only by modifications which include time and are signed by the Contracting Officer.

(4). RAPID resolution of change orders and the granting of other time extensions, where authorized by the Contracting Officer, is a critical part of the overall management system. Implementation of all justified activity and logic changes shall be made and reflected in the next monthly update after approval of the Contracting Officer.

(5). If, in the opinion of the Contracting Officer, the current schedule no longer accurately reflects the Contractor's real plan for accomplishing the work, or no longer reflects a viable way of finishing work on schedule, the Contractor shall be directed to revise the schedule and submit it for approval within seven (7) Calendar days of direction.

(f). Reports:

(1). Monthly update reports will be submitted at midmonth showing current status and actual start and finish dates of project activities, and will be capable of comparing the current status with the approved base schedule. Each monthly update report shall be stored on the Contractor's computer until the final pay estimate is processed. The content of the monthly update shall be flexible to show items listed in the menu. The midmonth report shall be used for partial payments.

(2). A meeting shall be held three (3) workdays before the delivery of the midmonth report to discuss all input data. If the Contractor desires to make changes in his method of operation and scheduling, he shall clearly present the proposed changes.

(3). A narrative report shall be submitted with the midmonth report indicating current and anticipated problems, delaying factors, and conditions, that are impacting the Contractor's work effort. An analysis showing the reasons for the delay/gain and their impact upon the current schedule shall be included. When it is apparent that scheduled milestone and completion dates will not be met, the Contractor shall propose specific methods he intends to implement to bring the project back on schedule at no cost to the Government. Such measures may include but are not limited to:

(a). Increasing construction manpower in such quantities and crafts as will substantially eliminate the backlog of work effort.

(b). Increasing the number of working hours per shift; shifts per workday; workdays per week; the amount of construction equipment; or any combination thereof.

(c). Rescheduling of activities to achieve maximum practical concurrency of work efforts.

(4). The Contractor shall implement such procedures as may be necessary for the active participation by his subcontractors in preparing and updating the schedule. Subcontractors shall be provided with schedules which identify the interfaces of their work with the work of others. As a minimum, the Contractor shall provide bar graphs to each major subcontractor showing activity times with plots on an Early Start basis. Copies of these schedules shall also be provided to the Contracting Officer. The relationship between subcontractor and interdependency of work shall be managed by the Contractor. When these interdependencies are violated or impaired, the Contractor shall identify the problem, resolve it, and provide the information to the Contracting Officer as part of the monthly report.

(g). Payment Requests:

(1). The monthly update report shall be used as a basis for the monthly partial pay estimate. The report will state the cost, actual percent complete, and current value of partially completed or completed work. Subtotals from subnets representing separate areas of construction will be given, along with a grand total of dollar value of work completed for the project.

(2). The first payment shall not be made until the preliminary schedule has been approved by the Contracting Officer and the second payment shall not be made until the full schedule has been approved by the Contracting Officer. If, in the judgement of the Contracting Officer, the Contractor fails or refuses to provide an approved schedule and other progress data specified, the Contractor shall be deemed not to have provided the required information upon which payments may be made.

(3). Activities submitted for payment shall be based on the approved network activities and monetary amount. No payment shall be made for activities that have not been performed in accordance with the approved logic.

(4). Payment for activities conducted when previously dependent activities have not been completed or accepted due to quality defects may be withheld at the discretion of the Contracting Officer.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

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SECTION 01330

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SECTION 01300

SUBMITTAL PROCEDURES
(CONSTRUCTION PHASE)

PART 1 GENERAL

1.1 SUBMITTAL CLASSIFICATION

Submittals are identified with submittal description (SD) numbers and are classified as follows:

1.1.1 Government Approved

Governmental 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. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.1.2 Information Only

All submittals not requiring 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.

1.2 SUBMITTAL REVIEW AND APPROVAL

Before submission, Contractor shall review all submittals prepared by subcontractors, suppliers, and himself, for completeness, accuracy, and compliance with plans and specifications. Contractor shall not use red markings on submittals. Red markings are reserved for use by the Contracting Officer. Approval by Contractor shall be indicated on each drawing by an "Approved" stamp with Contractor's name, signature, and date. The Contractor shall have independent agents not associated with his organization to do the review. The review shall be done by a licensed architect or registered engineers in the appropriate disciplines of architectural, civil, structural, mechanical and electrical, as appropriate. The reviews shall be thorough and complete and authenticated by registered engineer's or architect's stamp. This administration of submittal review must be integrated into the Contractor's Quality Control Plan. The plan must delineate in precise detail how the Contractor intends to satisfy this requirement. This should include names of organizations, qualifications and names of individuals who will be doing the work with their qualifications/resumes. Supplier's or subcontractors certifications are not acceptable as meeting this requirement of independent review. Submittals not conforming to the requirements of this section will be returned to the Contractor for correction and resubmittal.

1.3 GOVERNMENT APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the CQC requirements of this contract, is responsible for the dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After

submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be given consideration unless accompanied by an explanation of why a substitution is necessary.

1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.5 PAYMENT FOR ITEMS FOR WHICH A SUBMITTAL AND APPROVAL IS REQUIRED

In accordance with FAR 52.232-5, "Payments Under Fixed-Price Construction Contracts", the Government shall make progress payments to the Contractor monthly based on estimates of work accomplished which meets the standards of quality established under the contract. On items for which submittals must be approved by the Contracting Officer, payment cannot be made for the item until the Government establishes that the item "meets the standards of quality" required by the contract. The Contractor shall not invoice for, nor shall the Government make payment for any item, for which submittal and approval is required, until the item has been submitted and approved as described herein.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall make submittals as required by the specifications. 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 shall be the same used in the contract drawings. Submittals shall be made in the respective number of copies and to the respective addresses set forth below. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) representative and each respective transmittal form (ENG Form 4025) shall be stamped, signed, and dated by the CQC representative certifying that the accompanying submittal complies with the contract requirements. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include 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 shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturers Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

Submittals of all architectural finishes shall all be submitted at the same time so that they may be evaluated as a whole in comparison with the specified

coordinated finishes. See Section 01300 (paragraph COLOR BOARDS) for additional requirements of submittals.

3.2 SUBMITTAL REGISTER (ENG Form 4288)

At the end of this section is one set of ENG Forms 4288 listing each item of equipment and material for which submittals are required by the specifications. Columns "d" thru "p" have been completed by the Government. The Contractor shall complete columns "a," through "c," and "r" thru "t" and return two (2) completed copies to the Contracting Officer for approval within thirty (30) calendar days after Notice to Proceed. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated. The Contractor will insure that any errors in draft ENG Form 4288 and any omissions are added prior to submission for approval.

The Contractor shall complete (FOR CONSTRUCTION) columns "a," "b," and "q" thru "s" and return two (2) completed copies to the Contracting Officer for approval within thirty (30) calendar days after Construction Notice to Proceed. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated. The Contractor will insure that any errors in draft ENG Form 4288 and any omissions are added prior to submission for approval.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 10 calendar days exclusive of mailing time) shall be allowed on the register for review and approval. No delays damages or time extensions will be allowed for time lost in late submittals.

3.4 TRANSMITTAL FORM (ENG Form 4025)

The Contractor shall complete ENG Form 4025, "Transmittal of Shop Drawings, Equipment Data, Material Samples, or Manufacturer's Certificates of Compliance" and forward two (2) copies of same with each set of shop drawings, certificates of compliance, materials, fixtures and equipment lists submitted for approval. Two (2) copies of the ENG Form 4025 shall be submitted for information only data. No translucent or coated reproduced copies will be accepted. Each item submitted shall be listed separately on the ENG Form 4025. For new submittals or resubmittals mark the appropriate box; or resubmittals also insert previous transmittal number. Blank ENG Forms 4025 will be furnished by the Contracting Officer on request. Shop drawings shall be either blue line or black line prints on a white background. Blueprints are not acceptable. Each submittal shall be identified with the Contractor's name, Contract Number, Transmittal Number, and Item Number to correspond with

Item Number listed on ENG Form 4288. The following identification shall be marked on submittals as applicable:

Contract Number
Project Title and Location
Subcontractor's Name
Supplier's Name or Manufacturer's Name
Specification Section and Paragraph Number
Contract Drawing File Number

3.5 SUBMITTAL PROCEDURE

Submittals shall be made as follows:

3.5.1 Procedures

Submittals required by the CONTRACT CLAUSES and other non-technical parts of the contract are not included in this section. The Contractor shall submit to the Contracting Officer: four (4) copies for approval, and three (3) copies for information only, of all shop drawings, certificates of compliance, materials, fixtures and equipment lists called for under the various headings of these specifications. These drawings, certificates and lists shall be complete and detailed and, prior to submission, must be reviewed and certified correct by the Contractor as required by the Quality Control System paragraph of the Construction Quality Control Section. If approved by the Contracting Officer, three (3) sets of all submittals will be retained by the Contracting Officer and one (1) set will be returned to the Contractor. Submittals for information only usually will not be returned. The Contractor is encouraged to submit paper documents that are printed/copied double-sided on recycled paper that has at least 20% postconsumer material.

(a) Resubmittals:

(1) If a submittal is returned for correction or is not satisfactory and is disapproved by the Contracting Officer, the Contractor shall resubmit the corrected material in the same quantity, including reproducibles as specified for the original submittal for approval within 14 days after receipt by him of the disapproved material.

3.5.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall 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.

3.6 MECHANICAL ROOM LAYOUT DRAWINGS:

The Contractor shall submit a layout drawing, including appropriate elevations and sections as required, for each Mechanical Room showing the room arrangement he proposes for all pieces of equipment and appurtenances thereto (viz., air-conditioning equipment, boilers, compressors, hot water tanks,

pumps, electrical control panels, ducts, piping, etc.), that are to be located in the room. The Mechanical Room floor slab will not be placed until the complete Mechanical Room layout drawing has been submitted and approved. No payment will be made to the Contractor for any of the equipment for the room or its installation until these drawings have been approved. Mechanical Room Layout Drawings shall be identified and submitted in the manner specified for "Shop Drawings". Equipment rooms shown on the drawings are of adequate size to accommodate equipment of required capacities, as available from several manufacturers, with sufficient space left for access, servicing, removal, etc. The use of equipment items with dimensions such as to crowd the space will not be permitted.

3.7 SPARE PARTS LIST AND MAINTENANCE OPERATIONS MANUALS:

Within 30 calendar days after approval of shop drawings and equipment lists, the Contractor shall submit, to the Contracting Officer, 3 copies of spare parts lists and operating and maintenance manuals as required under the various headings of these specifications. One reproducible, unfolded copy shall be provided of all operating instructions, control diagrams, etc., that are larger than 8-1/2-inches by 11-inches; this does not apply to standard manufacturer's data.

(A) Spare parts lists shall contain the following listed information:

(1) Quantity of parts required for 120 days and one year of operation.

(2) Description of each spare part.

(3) Drawing number and shop drawing reference.

(4) Part equipment code number.

(5) Unit price of each item.

(6) Total price of all items.

(7) Procurement lead time with particular attention to long lead times.

(8) Name and address of nearest supplier.

(9) Such remarks and data as the manufacturer may consider pertinent.

(10) Complete parts list of all replaceable items.

(B) Operation, Maintenance, and Repair Manuals and Instructions:

(1) The requirements for furnishing operating, maintenance, and repair data/manuals and field instructions under this contract are specified in the Technical Specifications. The Contractor shall submit to the Contracting Officer, not later than 60 calendar days after the Notice to Proceed, an outline showing the proposed submittal date(s) of operation and maintenance manuals to be furnished the Government and the scheduled date(s) of all required field instructions to be provided by Contractor furnished personnel or manufacturer's representatives. All operation and maintenance manuals must be furnished to the Contracting Officer not later than 60 calendar days prior to turnover of the facility to the Government.

(2) Failure on the part of the Contractor to comply with requirements of this clause will result in no further payment until all required O&M data/manuals are submitted and accepted.

(3) All O&M data/manuals submittal data shall be entered in a separate section of the master submittal register.

3.8 COLOR BOARDS:

FOR COLOR BOARD REQUIREMENTS SEE SECTION 00800 and Attachment No. 09..

3.9 TYPICAL ROOM MOCK-UP (Quality Control)

(A) Contractor shall submit color and finish samples to Contracting officer for approval.

(B) Following receipt of approval for all color and finish selections from the Contracting Officer, the Contractor shall completely mock-up one typical room unit to include; living/sleeping area, closet, bath and kitchen with approved finish materials. These finish materials shall include all wall covering, paint, floor coverings, trim, doors, hardware, woodwork, casework, countertops, glass, electrical, mechanical, and plumbing fixtures and appliances as called for in the contract. If mock-up is not approved by the Contracting Officer, the Contracting Officer shall indicate acceptance of the quality of the finishes prior to permitting the Contractor to complete the remainder of the units. The Contractor shall maintain the level of quality approved for the typical room unit throughout the project.

3.9 AS-BUILT DRAWINGS:

(A) General: The Contractor shall send to Contracting Officer one (1) full set of reproducible construction record drawings (30" x 42" cronoflex or 3 mil double matte sheets) and two (2) copies of drawings on 3-1/2" floppy diskettes, in format compatible with AutoCad, Release 12. The as-built prints 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 a record of all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, all additional work not appearing on the contract drawings, and all changes which are made after final inspection of the contract work.

In event the Contractor accomplishes additional work which changes the as-built conditions of the facility after submission of the as-built drawings, the Contractor shall furnish revised and/or additional drawings as required to

depict as-built conditions. The requirements for these additional drawings will be the same as for the as-built drawings included in the original submission.

(B) Preliminary As-built Prints: The Contractor shall maintain one set of paper prints to show the as-built conditions. These as-built marked prints shall be kept current and available on the jobsite at all times. All changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. The as-built marked prints will be jointly inspected for accuracy and completeness by the Contracting Officer's representative and a responsible representative of the construction Contractor prior to submission of each monthly pay estimate. The prints shall show the following information, but not be limited thereto:

(1) 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.

(2) The location and dimensions of any changes within the building or structure.

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

(4) Correct elevations if changes were made in site grading.

(5) 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.

(6) The topography and grades of all drainage installed or affected as a part of the project construction.

(7) All changes or modifications which result from the final inspection.

(8) Options: Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the as-built drawings.

3.10 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.11 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Four (4) copies of the submittal will be retained by the Contracting Officer and two (2) copies of the submittal will be returned to the Contractor.

3.12 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. These submittals will be used for information purposes. 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 and will not prevent the Contracting Office from requiring removal and replacement of nonconforming material incorporated in the work. This does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or check testing by the Government in those instances where the technical specifications so prescribe.

3.13 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall 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:  _________________________________________________________ |
|                                                                    |
|____________________________________________________________________|
```

-- End of Section --

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION

CONTRACTOR

SPECIFICATION SECTION

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.

ENG FORM 4288-R, JAN 97 EDITION OF MAR 95 IS OBSOLETE.

(Proponent: CEMP-CE)

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS	**I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.** _____ NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288-R for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A	--	Approved as submitted.	E	--	Disapproved (See attached).
B	--	Approved, except as noted on drawings.	F	--	Receipt acknowledged.
C	--	Approved, except as noted on drawings. Refer to attached sheet resubmission required.	FX	--	Receipt acknowledged, does not comply as noted with contract requirements.
D	--	Will be returned by separate correspondence.	G	--	Other *(Specify)*

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

(Reverse of ENG Form 4025-R)

INDEX

SECTION 01410

ENVIRONMENTAL PROTECTION

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SECTION 01410

ENVIRONMENTAL PROTECTION

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.

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 261	Identification and listing of Hazardous Waste

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 DEFINITIONS

Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural or historic perspective. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive materials; and other pollutants.

1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-08 Statements

Retention Pond Removal Plan; GA.

Submit plan detailing Contractor's procedures for testing retention pond sediment and for removal of the sediment.

1.4 SUBCONTRACTORS:

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

1.5 ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractor and subcontractors shall comply with all applicable Federal, State, and local laws and regulations. The Contractor shall provide environmental protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during construction.

A. Protection of Features

This section supplements the Contract Clauses PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS; OPERATIONS AND STORAGE AREAS; and CLEANING UP, Section 00700. The Contractor shall prepare a list of features requiring protection under the provisions of the contract clause which are not specially identified on the drawings as environmental features requiring protection. The Contractor shall protect those environmental features, indicated specially on the drawings, in spite of interference which their preservation may cause to the Contractor's work under the contract.

B. Permits

All permits must be obtained from the proper agency and paid for by the Contractor, see Contract Clause, PERMITS AND RESPONSIBILITIES.

1.6 ENVIRONMENTAL PROTECTION PLAN

Within 15 calendar days of Notice of Award, the Contractor shall submit an Environmental Protection Plan for review and acceptance by the Contracting Officer. Acceptance is conditional and is predicated upon satisfactory performance during construction. The Government reserves the right to require the Contractor to make changes in the Environmental Protection Plan or operations if the Contracting Officer determines that environmental protection requirements are not being met. The plan shall detail the actions which the Contractor shall take to comply with all applicable Federal, State, and local laws and regulations concerning environmental protection and pollution control and abatement, as well as the additional specific requirements of this contract. No physical work at the site shall begin prior to acceptance of the Contractor's plan or an interim plan covering the work to be performed. The environmental protection plan shall include, but not be limited to, the following:

A. List of State and Local Laws and Regulations

The Contractor shall provide as part of the Environmental Protection Plan a list of all State and local environmental laws and regulations which apply to the construction operations under the Contract.

B. Spill Control Plan

The Contractor shall include as part of the environmental protection plan, a Spill Control Plan. The plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by the Emergency Response and Community Right-to-Know Act or regulated under State or local laws or regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

(1) The name of the individual who will be responsible for implementing and supervising the containment and cleanup.

(2) Training requirements for Contractor's personnel and methods of accomplishing the training.

(3) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

(4) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

(5) The methods and procedures to be used for expeditious contaminant cleanup.

(6) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity spill occurs. The plan shall contain a list of the required reporting channels and telephone numbers.

C. Recycling and Waste Minimization Plan

The Contractor shall submit a Recycling and Waste Minimization Plan as a part of the Environmental Protection Plan. The plan shall detail the Contractor's actions to comply with the following recycling and waste minimization requirements:

(1) The Contractor shall participate in State and local government sponsored recycling programs to reduce the volume of solid waste materials at the source.

D. Contaminant Prevention Plan

As a part of the Environmental Protection Plan, the Contractor shall prepare a contaminant prevention statement identifying potentially hazardous substances to be used on the job site and intended actions to prevent accidental or intentional introduction of such materials into the air, water, or ground. The Contractor shall detail provisions to be taken to meet Federal, State, and local laws and regulations regarding the storage and handling of these materials.

E. Environmental Monitoring

The Contractor shall include in the plan the details of environmental monitoring requirements under the laws and regulations and a description of how this monitoring will be accomplished.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 SPECIAL ENVIRONMENTAL PROTECTION REQUIREMENTS

A. Tree Protection

No ropes, cables, or guys shall be fastened to or attached to any tree(s) for anchorage unless specifically authorized by the Contracting Officer. Where such special use is permitted, the Contractor shall provide effective protection to prevent damage to the tree and other land and vegetative resources. Unless specifically authorized by the Contracting Officer, no construction equipment or materials shall be placed or used within the dripline of trees shown on the drawings to be saved. No excavation or fill shall be permitted within the dripline of trees to be saved except as shown on the drawings.

B. U.S. Department of Agriculture (USDA) Quarantined Considerations

The Contractor shall thoroughly clean all construction equipment at the prior job site in a manner that ensures all residual soil is removed and that egg deposits from plant pests are not present. The Contractor shall consult with the USDA Plant Protection and Quarantine (USDA - PPQ) jurisdictional office for additional cleaning requirements that may be necessary.

C. Soil Disposal Areas on Government Property

Material shall be disposed only in those areas designated on the contract drawings. Hazardous, toxic, and radiological wastes (HTRW) shall be removed from the work area and be disposed in compliance with Federal, State, and local requirements. Disposal operations shall be managed and controlled to prevent erosion of soil or sediment from entering nearby waters or wetlands. Disposal operations shall be developed and managed in accordance with the grading plan shown on the drawings or as approved by the Contracting Officer.

D. Disposal of Solid Wastes

Solid waste is rubbish, debris, waste materials, garbage, and other discarded solid materials (excluding clearing debris and hazardous waste as defined in following paragraphs). Solid waste shall be placed in containers and disposed on a regular schedule. All handling and disposal shall be conducted in such a way as to prevent spillage and contamination. The Contractor shall transport all solid waste off the Government property and dispose in compliance with Federal, State, and local requirements.

E. Clearing Debris

Clearing debris is trees, tree stumps, tree trimmings, and shrubs, and leaves, vegetative matter, excavated natural materials (e.g., dirt, sand, and rock), and demolition products (e.g., brick, concrete, glass, and metals).

(1) The Contractor shall collect trees, tree stumps, tree trimmings, shrubs, leaves, and other vegetative matter; and shall transport from the project site for proper disposal in compliance with Federal, State, and local requirements. The Contractor shall segregate the matter where appropriate for proper disposal. Untreated and unpainted scrap lumber may be disposed of with this debris where appropriate.

(2) Excavated natural materials shall be placed in the designated area on the drawings.

(3) Demolition products shall be transported from the project site for proper disposal in compliance with Federal, State, and local requirements.

F. Disposal of Contractor Generated Hazardous Wastes

Hazardous wastes are hazardous substances as defined in 40 CFR 261, or as defined by applicable State and local regulations. Hazardous waste generated by construction activities shall be removed from the work area and be disposed in compliance with Federal, State, and local requirements. The Contractor shall segregate hazardous waste from other materials and wastes, and shall protect it from the weather by placing it in a safe covered location; precautionary measures against accidental spillage such as berming or other appropriate measures shall be taken. Hazardous waste shall be removed from the project site within 60 days. Hazardous waste shall not be dumped onto the ground, into storm sewers or open water courses, or into the sanitary sewer system.

G. Fuels and Lubricants

Fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spills and evaporation. Lubricants and waste oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with Federal, State, and local laws and regulations.

3.2 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

A. Known Historic, Archaeological, and Cultural Resources

Known historic, archaeological, and cultural resources within the Contractor's work area are marked on the contract drawings. The Contractor shall install protection for these resources as shown on the drawings and shall be responsible for their preservation during the contract.

B. Discovered Historic, Archaeological, and Cultural Resources

If during construction activities, items are observed that may have historic or archaeological value (e.g., Native American human remains or associated objects are discovered), such observations shall be reported immediately to the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall prevent his employees from trespassing on, removing, or otherwise disturbing such resources.

3.3 PROTECTION OF FISH AND WILDLIFE RESOURCES

(A) Wild Life Encounters During Construction:

It is not anticipated that there will be an abundance of wild life encounters at the project site. However, should the Contractor discover animals living within the construction boundaries, operation shall be suspended at the site of discovery and continued in other areas. The Contractor shall notify the Contracting Officer and Biological Monitor immediately of the finding. Included with the notification shall be a brief statement to the Contracting Officer and Biological Monitor of the location and the findings. How to identify sensitive animals that may be discovered will be provided at the Preconstruction Conference.

(B) Desert Tortoise:

Contractor employees shall not touch, harm, harass, or kill desert tortoises. The Biological Monitor shall be notified immediately of all desert tortoise sightings. The Biological Monitor will be responsible for removing desert tortoises out of immediate dangers. Should construction activities threaten the survival of any desert tortoises, those activities will immediately cease until the Biological Monitor safely removes the tortoise(s). The Biological Monitor shall perform clearance surveys in all areas of planned disturbance. The Biological Monitor will be available to accompany construction crews during period of tortoise activity to provide protection of these animals and their burrows.

(1) The Contractor shall implement an employees environmental awareness program which will be provided to construction and operation employees with information to encourage awareness and preservation of the desert ecosystem and the resources found in the **Western Mojave Desert**. This information shall be distributed to and discussed with all employees during employee orientation sessions. This information shall also be provided to all visitors and subcontractors that will be on-site. The Contractor shall have all persons participating in the environmental awareness program sign and affidavit declaring that the individual understands and will adhere to the guidelines set
forth in the program material.

(2) The Contractor shall develop a strict trash and litter control program. A litter control program shall consist of supplying an adequate number of covered trash and litter receptacles in all appropriate locations.

3.4 PROTECTION OF ENDANGERED TREES:

(A) Endangered Trees within Project Site:

Due to the limited vegetation in the area, removal or relocation of plants shall be minimized. The Contractor shall obtain approval from the Contracting Officer before removing or relocating any endangered plants within the construction boundaries. One such plant is the Joshua Tree which is an endangered species. How to identify this tree and procedures for relocating those within the project site, are described as follows:

(B) Joshua Trees:

Only trees under 5 feet tall shall be moved using hand tools. Mark North side of the tree and plant in same orientation. Using shovel, dig down to get main root mass (generally within 2 feet of surface). Try to get tap root and a fibrous water storage structure that it leads to. Take some of the soil to put in new hole. Roots should be dusted with sulfur to prevent rot. A small amount of manure can be mixed in with soil when replanting. Soil should be tamped down and a small berm placed around plant 5-foot diameter. Water with several gallons. Stake in 2 directions to prevent wind from knocking down. If not transplanted right away, "heel in" the plant (lay them on their side and cover roots with soil). Very large Joshua Trees (10-20 feet tall) shall not be moved but be detoured around by the utilities. If plants need relocation areas, they can be used in landscaping around the base.

3.5 PROTECTION OF AIR RESOURCES

Special management techniques as set out below shall be implemented to control air pollution by the construction activities. These techniques supplement the requirements of Federal, State, and local laws and regulations; and the safety requirements under this Contract. If any of the following techniques conflict with the requirements of Federal, State, or local laws or regulations, or safety requirements under this contract, then those requirements shall be followed in lieu of the following.

A. Particulates

Airborne particulates, including dust particles, from construction activities and processing and preparation of materials shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, disposal sites, borrow areas, and all other work areas free from airborne dust which would cause a hazard or nuisance.

B. Dust Control:

Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment or similar methods will be permitted to control dust. Sprinkling, to be approved, must be repeated at such internals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

C. Burning Rubbish and Debris:

Open burning of rubbish, debris and other combustibles will not be permitted on the **Base**.

3.6 INSPECTION

If the Contracting Officer notifies the Contractor in writing of any observed noncompliance with contract requirements or Federal, State, or local laws, regulations, or permits, the Contractor shall inform the Contracting Officer of proposed corrective action and take such action to correct the noncompliance. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action is taken. No time extensions will be granted or costs or damages allowed to the Contractor for any such suspension, unless it was determined that the Contractor was in compliance in accordance with FAR 52.212-12, see Section 00700.

3.7 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed pollution control facilities and portable pollution control devices for the duration of the Contract or for the length of time construction activities create the particular pollutant.

3.8 TRAINING OF CONTRACTOR PERSONNEL

Contractor personnel shall be trained in environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel monthly. The training and meeting agenda shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, installation and care of facilities (vegetative covers, etc.), and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control. Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants, shall also be discussed. Other items to be discussed shall include recognition and protection of archaeologic sites and artifacts.

-- End of Section --

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CONTRACTOR QUALITY CONTROL

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SECTION 01451

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 in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1994a) 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	(1993b) 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 Pricing Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "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 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 quality requirements specified in the contract. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 15 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of Section 00800, Paragraph,

"Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. Construction will be permitted to begin only after acceptance of the CQC Plan unless specific written authority is granted by the Contracting Officer. Work outside of the features of work included in an accepted plan will not be permitted to begin until acceptance of a CQC Plan or an interim plan containing the additional features of work to be started.

3.2.2 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, 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 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 will also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01300 SUBMITTAL PROCEDURES.

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 will be approved by the Contracting Officer.)

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 will 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 and has separate control requirements. It could be identified by different trades or disciplines, or it could 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 feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.3 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.

3.2.4 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 Preconstruction 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 14 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 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within his organization at the site of the work 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 5 years in related work. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager will be identified in the plan to serve

in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC System Manager.

3.4.3 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors". This course is offered quarterly by the Los Angeles District, contact the Contracting Officer for more information.

3.4.5 Organizational Changes

The Contractor shall maintain his 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

Submittals shall be made as specified in Section 01300 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

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 work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work and shall include:

a. A review of each paragraph of applicable specifications.

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 48 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 48 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 or 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, will 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 will 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 will 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 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 On-Site 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 will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b., at the following address:

For delivery by mail:

Director
South Pacific Division Laboratory
U.S. Army Corps of Engineers
25 Liberty Ship Drive
Sausalito, California 94965-1768

For other deliveries:

Director
South Pacific Division Laboratory
U.S. Army Corps of Engineers
Bridgeway, Foot of Spring St.
(Building directly east of 2000 Bridgeway)
Sausalito, California 94965

Coordination for each specific test, exact delivery location and dates will be made through the Area Office. The Contractor shall only submit those samples which are specifically designated to be sent to the SPD Lab. Notify the resident Contracting Officer Representative at least 14 days prior to delivery of samples.

3.8 COMPLETION INSPECTION

3.8.1 Pre-Final Inspection

At the completion of all work or any increment thereof established by a completion time stated in Section 00800, Paragraph "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a "punch

list" of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. Once this is accomplished the Contractor shall notify the Government that the facility is complete and is ready for the Government's "Prefinal" inspection. The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Prefinal Punch List" will 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 and so notify the Government so that a "Final" inspection with the customer can be scheduled. Any items noted on the "Final" inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.8.2 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, his superintendent or other primary management person and the Contracting Officer's Representative will be in attendance at this 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 notice from the Contractor. This notice will be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being acceptable, 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 Section 00800, Paragraph, "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 should be identified (Preparatory, Initial, Follow-up). List 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 reviewed, with contract reference, by whom, and action taken.

g. Off-site 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(s) 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 seven 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 IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM FOR CONTRACTOR QUALITY CONTROL OF CONTRACT

The Contractor shall utilize a Government furnished CQC Programming Module (A computerized executable file which is DOS based and operates on a minimum of 80386 IBM compatible computers). The Module includes a Daily CQC Reporting System 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 Daily CQC Report Form. The Contractor will also be required to complete Government-Furnished Module elements which includes, but is not limited to, Prime Contractor staffing; letter 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 User Schooling 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, and all Bid Items, Options and Additives shall be separately identified, in accordance with the "Pricing Schedule". Bid Items may include multiple Activities, but Activities may only be assigned to one such Bid Item. This Module 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.

(1) 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 will acknowledge receipt of these comments by specific number reference on his Daily CQC Report, and will also reflect on his Daily CQC Report when these items are specifically completed or corrected to permit Government verification.

(2) The Contractor's schedule system shall include, as specific and separate activities, all Preparatory Phase Meetings (inspections); all O&M Manuals; and all Test Plans of Electrical and Mechanical Equipment or Systems that require validation testing or instructions to Government representatives.

3.12 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 worksite, 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 in accordance with FAR 52.242-14.

3.13 CONSTRUCTION CONTROL MANUAL

In addition to the requirements specified in the various Technical Specifications hereinafter, test procedures and minimum number of tests will be performed in accordance with SPK PAM 415-1-2, "Construction Control Manual". Neither the specified minimum number of tests nor the lack of them shall in any way limit or relieve the Contractor of his responsibility to perform adequate tests to assure compliance with the quality requirements of these specifications. The referenced standards listed in this Construction Control Manual shall be of the latest issue unless otherwise specified.

Corps of Engineers	U.S. Army Engineer District, Los Angeles
Los Angeles District	Nellis Resident Office
Construction Management Section	Range Road, Building 1114
911 Wilshire Blvd.	P.O. Box 9744
Los Angeles, California	Nellis Air Force Base, Nevada 89191-0744

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SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS:

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

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1983) Construction and Industrial Plywood
DOC PS 20	(1970) American Softwood Lumber Standard.

FEDERAL SPECIFICATIONS (FS)

FS TT-P-001984	(Basic) Primer Coating, Latex Base, Exterior, (Undercoat for Wood), White and Tints

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z535.1	(1991) Safety Color Code

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 547	(1977; R 1990) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

U.S. ARMY CORPS OF ENGINEERS

EM 385-1-1	Safety and Health Requirements Manual (1 October 1992).

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 16	(1970; Rev 1983) Standard Grading and Dressing Rules for Douglas Fir, Western Hemlock, Western Red Cedar, White Fir, Sitka Spruce Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA-01	(1991; Supple No. 1) Western Lumber Grading Rules 91

1.2 GENERAL REQUIREMENTS

1.2.1 Site Plan

The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.2.2 Identification of Employees

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.

1.2.3 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

1.3 AVAILABILITY AND USE OF UTILITY SERVICES

1.3.1 Payment for Utility Services

The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The Contractor shall carefully conserve any utilities furnished without charge. The Contractor's attention is directed to Section 00800, Paragraph **AVAILABILITY OF UTILITIES SERVICES**.

1.3.2 Sanitation

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.3.3 Telephone

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

1.4 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.4.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 915 by 1220 mm (36 by 48 inches) in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to

all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

1.4.2 Project and Safety Signs

(A) General:

The Contractor shall construct and erect one project sign, one safety sign and a minimum of **4** hard hat signs at locations designated by the Contracting Officer. The signs shall conform to the requirements of the drawings attached at the end of this section. The signs shall be erected as soon as possible and within 15 days after date of commencement of work under this contract. The data required by the safety sign shall be corrected daily.

(B) Materials:

(1) Lumber shall conform to DOC PS 20 and grading rules of applicable grading agencies, WCLIB or WWPA. Grade shall be "Standard" or better Douglas Fir, S4S and shall be stamped S-Dry.

(2) Plywood: Plywood shall conform to DOC PS 1, Grade AC, Group 1, Exterior.

(3) Bolts, Nuts and Nails: Bolts and nuts shall be galvanized, and type, and size best suited for intended for use. Nails shall conform to ASTM F 547.

(4) Paint: Type of paint for primer, finish coats, lettering, and color of signs and lettering shall be as directed by the Contracting Officer. Safety signs shall be painted in the same colors as the project sign. Hard hat signs shall be painted as indicated on the attached drawing.

(5) Decals: Corps of Engineers castle decal and the hard hat decal called for on the signs will be furnished by the Government.

(C) Construction:

(1) Signs shall be constructed as detailed on attached drawings.

(2) Painting: All exposed surfaces and edges of plywood shall be given one coat of linseed oil and be wiped prior to applying primer. All exposed surfaces of signs and supports shall be given one coat of primer and one finish coat of paint colors as directed. All lettering shall be sized as indicated. Width of letter stroke shall be 1/6 of the letter height, except as noted.

(D) Maintenance and Disposal:

The Contractor shall maintain the signs in good condition throughout the life of the project. Signs shall remain the property of the Contractor and upon completion of the project they shall be removed from the site.

1.5 SCRAP MATERIAL:

Materials specified to be removed and become the property of the Contractor are designated as scrap, and the Contractor, by signing this contract, hereby acknowledges that he has made due allowance for value, if any, of such scrap in the contract price.

1.6 WRITTEN GUARANTEES AND GUARANTOR'S LOCAL REPRESENTATIVE:

Prior to completion of the contract, the Contractor shall obtain and furnish to the Contracting Officer's representative written guarantees for all the equipment and/or appliances furnished under the contract. The Contractor shall furnish with each guarantee: The name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and/or appliances are installed, who, upon request of the Using Service's representative, will honor the guarantee during the guaranty period and will provide the services prescribed by the terms of the guarantee.

1.7 PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY:

The Contractor shall promptly furnish and shall cause any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property. This information shall be listed on RMS CQC Module furnished by the Government. See example forms at the end of this section.

1.8 TEMPORARY ELECTRIC WIRING:

(A) Temporary Power and Lighting:

The Contractor shall provide construction power facilities in accordance with the safety requirements of the National Electrical Code NFPA No. 70 and the SAFETY AND HEALTH REQUIREMENTS MANUAL EM 385-1-1. The Contractor, or his delegated subcontractor, shall enforce all the safety requirements of electrical extensions for the work of all subcontractors. All work shall be accomplished by skilled electrical tradesmen in a workmanlike manner, as approved by the Contracting Officer.

(B) Construction Equipment:

In addition to the requirements of EM 385-1-1, SAFETY AND HEALTH REQUIREMENTS MANUAL, all temporary wiring conductors installed for operation of construction tools and equipment shall be either Type TW or THW contained in metal raceways, or may be multiconductor cord. Temporary wiring shall be secured above the ground or floor in a workmanlike manner and shall not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in strict accordance with the provisions of the National Electrical Code.

(C) Circuit Protection:

In addition to the present requirements in EM 385-1-1 and the National Electrical Code, all 15 and 20-ampere receptacle outlets used for obtaining power during construction shall have ground fault circuit interrupters (GFCI) for personnel protection. Block and brick saws shall also be equipped with GFCI. The Contracting Officer may allow an exception to this requirement for circuits for concrete vibrators or circuits operating at other than 60 Hertz

normal (in both cases an assured grounding program as described in the National Electrical Code, except utilizing the daily inspection frequency of the grounding means of such equipment, may be permitted). The assured grounding program will not be permitted as a substitute for usage of GFCI'S except as described above. All generator-powered 15- and 20-ampere, 60 Hertz receptacle outlets shall have GFCI'S, and shall be properly grounded. A testing means shall be provided which will impose a measured fault of 5 milliamperes, plus or minus 1 milliamperes, and result in tripping the GFCI unit.

1.9 UTILITIES NOT SHOWN:

If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as to the date of this contract and such utilities will interfere with construction operations, he shall immediately notify the Contracting Officer in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are removed or relocated as directed by the Contracting Officer, the Contractor shall be entitled to equitable adjustment for any additional pertinent work or delay.

1.10 GENERAL SAFETY REQUIREMENTS:

(A) General:

The Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, (see Contract Clauses, Section 00700, ACCIDENT PREVENTION) and the Occupational Safety and Health Act (OSHA) Standards for Construction (Title 29, Code of Federal Regulations Part 1926 as revised from time to time); General Industry Standards (Title 29, Code of Federal Regulations Part 1910 as revised from time to time); and the National Fire Protection Association Codes are applicable to this contract. In case of conflict the most stringent requirement of the standards is applicable.

(B) The Prime Contractor's superintendent

The Prime Contractor's superintendent shall take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis (see below), tool box meetings, walk-through inspections, correction of violations, etc., and including that of the subcontractor's work.

(C) Job Hazard Analysis:

Based on the construction schedule, the Contractor shall submit a job hazard analysis of each major phase of work prior to entering that phase of activity. The analysis shall include major or high risk hazards, as well as commonly recurring deficiencies that might possibly be encountered for that operation, and shall identify proposed methods and techniques of accomplishing each phase in a safe manner. The Prime Contractor's superintendent shall take active participation in the Job Hazard Analysis, including the subcontractors' work. Prior to start of actual work a meeting shall be held with Prime Contractor, Government, and affected subcontractor to review the Job Hazard Analysis. In addition, job site meetings shall be held to indoctrinate foreman and workers on details of this analysis.

(D) Violations:

If recurring violations and/or gross violation indicate that the safety performance is unsatisfactory, corrective action shall be taken as directed, and

at the discretion of the Contracting Officer the retention or some part thereof will be withheld from the progress payment until corrective action has been completed.

(E) Elevated Work Areas:

Workers in elevated work areas in excess of 6 feet above an adjoining surface require special safety attention. In addition to the provisions of EM 385-1-1, the following safety measures are required to be submitted to the Contracting Officer's Representative. Prior to commencement of work in elevated work areas, the Contractor shall submit drawings depicting all provisions of his positive protection system including, but not limited to, all details of guard rails.

(1) Positive protection for workmen engaged in the installation of structural steel and steel joists shall be provided by safety nets, tie-off's, hydraulic man lifts, scaffolds, or other required means. Decking crews must be tied-off or work over nets or platforms not over 6 feet below the work area. Walking on beams and/or girders and the climbing of columns is prohibited without positive protection.

(2) Perimeter guard rails shall be installed at floor, roof, or wall openings more than 6 feet above an adjoining surface and on roof perimeters. Rails shall be designed to protect all phases of elevated work including, but not limited to, roofing operations and installation of gutters and flashing. Rails around roofs may not be removed until all work on the roof is complete and all traffic on or across the roof ceases. Rails shall be designed by a licensed engineer to provide adequate stability under any anticipated impact loading. As a minimum, the rails shall consist of a top rail at a height of 42 inches, a mid rail and a toe board. Use of tie-offs, hydraulic man lifts, scaffolds, or other means of roof edge protection methods may be utilized on small structures such as family housing, prefabricated metal buildings, etc.

(F) Fire Prevention:

Twenty-four hours notice shall be given to the Contracting Officer for coordination with the Facility Fire Department prior to conducting any fire hazardous operation. Cutting or welding will be permitted only in areas that are or have been made fire safe. Where possible, all combustibles shall be located at least 35 feet horizontally from the work site. Where such location is impracticable, combustibles shall be protected with fire blankets and/or protective welding screens to prevent slag from running out of the work area. Edges of covers at the floor shall be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. The Contractor shall not allow any welding/cutting or open flame operations in facilities that are protected by a wet pipe fire sprinkler or an automatic detection system, if the system is out of service. First priority of work will be to return the suppression/detection system to operational condition. Return the fire detection and/or suppression system back to an operational status (if possible) during periods that the facility is unoccupied, and at the end of the work day. The Contractor shall post a fire guard for a 24 hour period (or certify to the Fire Department that the facility is safe) after welding, cutting, and open flame operations in a facility when: (a) fire detection and suppression system can not be returned to service; (b) fire detection or suppression systems do not exist. Other fire prevention precautions shall be in accordance with the latest National Fire Codes.

(G) Recordkeeping/Reporting Requirements:

On all contract operations, the Prime Contractor shall be responsible for recording and reporting all accident exposure and experience incident work. (This includes exposure and experience of the prime contractor and his/her sub-contractor(s)). As a minimum these records shall include exposure work-hours and a log of occupational injuries and illnesses. (OSHA Form 200 or state equivalent as prescribed by 29 CFR 1904.5) Reference EM 385-1-1, 02.A.02.

(H) Accident Reporting:

In addition to the requirements for reporting accidents in accordance with EM 385-1-1, Section 1, the Prime Contractor will submit at the 50% point and 100% of project completion, a written summary of worker's compensation claims filed by workers on the project. The report will include all subcontractors. The main report covering the Prime Contractor claims will be certified as "correct and true" by the Contractor's compensation insurance carrier. The same certification will be required for subcontractor reports.

1.11 PLANNED UTILITY OUTAGES AND STREET CLOSURES:

All utility outages and street closures shall be of as short a duration as possible and shall be scheduled as far in advance as possible with the Contracting Officer, in no case less than **14** days before the outage or closure. The Contractor shall obtain in writing from the Contracting Officer a statement or schedule giving the permissible times of outages or closures for particular installations and the maximum time allowed for each. The Contractor shall strictly observe such schedules and will be held responsible for any violations.

(A) Street Closure:

The Contractor shall obtain approval in writing from the Contracting Officer before he can close any street or parking lot access. The request for closure shall be submitted in writing to the Contracting Officer 7 working days prior to planned closing and shall include the section to be closed and length of time of closure.

1.12 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 State and local 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 public 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.

1.12.1 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.12.2 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such 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.

1.13 PERMITS:

(A) Excavation Permit:

The Contractor will be required to obtain an excavation permit on AF Form 103 from the Base Civil Engineer prior to performing any required excavation under this contract. The form shall be accompanied by a sketch showing size, depth, location, and extent of all excavation and trenching included in the contract. The completed form shall be submitted to the Base Civil Engineer with a copy to the Resident Engineer at least 10 working days prior to intended date of excavation. During the 10-day period the Base Civil Engineer and Base Communications Officer will make known to the Contractor by drawings, staking, or both, the location of all known buried utilities and communication lines. In these identified areas, only hand excavation will be permitted.

(A) Welding Permit:

Where welding of any nature is to be performed on Nellis Air Force Base, the Contractor shall apply for a welding permit by calling the Fire Department, extension 652-9630. A permit will be issued within two working days with instructions for welding, fire prevention.

1.14 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER:

(A) This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE, Section 00700, entitled "DEFAULT (FIXED-PRICE CONSTRUCTION)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

(B) The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(05)	(03)	(03)	(01)	(01)	(00)	(01)	(02)	(01)	(01)	(02)	(05)

(C) Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day.
(ER 415-1-15, 31 OCT 89)

1.15 CONTRACTOR'S TEMPORARY FACILITIES

1.15.1 Administrative Field Offices

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

1.15.2 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 **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 such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site **but within the military boundaries.** Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. At the end of each work day mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area.

1.15.3 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

1.15.4 Appearance of Trailers

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 which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on **the military property.**

1.15.5 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse with construction equipment or other vehicles grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.15.6 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 equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.16 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. The devices shall be made available for use by Government personnel.

1.17 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 1.07 meters (42 inches) high, supported and tightly secured to steel posts located on maximum 3 meters (10 foot) centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the

life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.18 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.19 HOUSEKEEPING AND CLEANUP:

Pursuant to the requirements of paragraph, CLEANING UP and paragraph, ACCIDENT PREVENTION, of the CONTRACT CLAUSES, Section 00700, the Contractor shall assign sufficient personnel to insure strict compliance. The Contractor shall submit a detailed written plan for implementation of this requirement. The plan will be presented as part of the preconstruction safety plan and will provide for keeping the total construction site, structures and accessways free of debris and obstructions at all times. Work will not be allowed in those areas that, in the opinion of the Contracting Officer's representative, have unsatisfactory cleanup and housekeeping at the end of the preceding day's normal work shift. At least once each day all areas shall be checked by the Quality Control person of the Prime Contractor and the findings recorded on the Quality Control Daily Report. In addition, the Quality Control person will take immediate action to insure compliance with this requirement. Housekeeping and cleanup shall be assigned by the Contractor to specific personnel. The name(s) of the personnel shall be available at the project site; each person will be supplied with a distinctively marked hard hat, to be worn from the beginning to the end of the project.

1.20 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of 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 grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

1.21 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

(A) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a Contractor or subcontractor at any tier shall be based on actual cost data when the Government can determine both ownership and operating costs for each piece of equipment or equipment groups of similar serial and series from the Contractor's accounting records. When both ownership and operating costs cannot be determined from the Contractor's accounting records, equipment costs shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule", Region VII. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the Contracting Officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For

retrospective pricing, the schedule in effect at the time the work was performed shall apply.

(B) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36 substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated leasees are allowable. Costs for major repairs or overhaul are unallowable.

(C) When actual equipment costs are proposed and the total amount of the pricing action is over $25,000, cost or pricing data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet". By submitting cost or pricing data, the Contractor grants to the Contracting Officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement, the Contractor shall certify that the equipment costs or pricing data submitted are accurate, complete and current.

1.22 SPECIAL CONSTRUCTION PROCEDURES:

(A) Haul Route Cleanup:

The Contractor shall clean, sweep, or pick up, as necessary, mud, rocks, trash, or any other type of debris spilled along haul routes, immediately after passage. Cleanup shall be performed to the satisfaction of the Contracting Officer.

(B) Tree Relocation:

Trees, plants, shrubs, etc., designated for salvage shall be carefully removed and replanted at locations on Nellis AFB as shown on the drawings. Excavation shall be accomplished so as to avoid unnecessary damage to roots, limbs and foliage, and the plant shall be maintained in good condition until replanted in its new location.

(C) Pavement Excavation:

The Contractor shall notify the Contracting Officer of the starting date, location, and scope of any cutting and removal of pavement. The Contractor shall also report the length of time necessary to complete the work, replace the pavement and make the parking lot or street fully operational. When pavement excavation will be continuous for more than 5 days, the schedule of work for each day shall be submitted. The daily schedule shall be updated as necessary by each Monday if total duration is greater than 5 working days. The notification will be in writing and submitted to the Contracting Officer for approval at least 7 work days prior to the start of work.

1.23 SOIL DENSITY TEST (USING METERS CONTAINING RADIOACTIVE MATERIALS):

Nuclear methods are not acceptable for soil and soil-aggregate density tests required by this contract except as stated in DIVISION 2. Testing for official results shall be conducted as specified in DIVISION 2 of this contract. If the Contractor proposes to use meters containing radioactive materials to

obtain unofficial results for his own convenience, the Contractor shall adhere to the following requirements:

(A) A USAF Radioactive Material Permit shall be obtained prior to work being performed.

(B) The Contractor shall contact the installation Radiation Protection Officer (RPO) at least 45 days prior to intended use so adequate time is provided for processing the paperwork and obtaining the USAF Radioactive Material Permit.

(C) The Contractor shall notify the RPO before bringing the radioactive material onto the installation and must notify the RPO when radioactive material is removed. The Contractor shall ensure that the RPO, installation fire department, and safety office know the locations where the material will be stored and used.

(D) The Contractor shall comply with the requirements of his/her NRC or Agreement State license and the USAF Radioactive Material Permit.

(E) The Installation RPO will periodically check the use of the radioactive material to ensure proper radiological health precautions are being followed. If the RPO discovers improper radiological procedures, the RPO will immediately notify the contract monitor to initiate corrective actions.

(F) Applications for USAF Radioactive Material Permits are submitted as follows:

(1) All applications for permits shall be submitted to host base RPO for review and approval of qualified users to work on Air Force installations.

(2) Requests will be submitted in duplicate to RPO and will include:

a. Evidence of a valid Nuclear Regulatory Commission (NRC) or Agreement State Radioactive Material License.

b. A copy of an NRC Form 241, or a similar document (such as a letter), listing the specific licensable items the Contractor wishes to use on the base (in the case of an Agreement State licensee, the original must be forwarded by the Contractor to the appropriate NRC region).

c. Proof of a valid Air Force contract.

(3) Non-Air Force organizations which possess Agreement State licenses must forward an NRC Form 241 directly to the applicable NRC regional office as well as to the committee (Reference Title 10, Code of Federal Regulations, Part 150.20). Agreement State licenses are valid for only 180 calendar days per calendar year. If the non-Air Force organization that possesses the Agreement State license wishes to conduct operations on the Air Force installation for more than 180 days per year, it must apply for and be issued an NRC license before a permit may be issued.

(G) Renewal or termination of a USAF Radioactive Material Permit is processed as follows:

(1) Non-Air Force organizations must formally apply for either a renewal or termination of their permit upon its expiration. Permits do not automatically terminate upon reaching their expiration date but remain active pending final disposition of the radioactive material.

(2) If the original contract is renewed or continued, then an application for renewal must contain the same information as the initial request.

(3) If work under the contract has been completed, the non-Air Force organization shall submit a formal application to terminate the permit. This application shall include appropriate disposal documents and radiation survey data to confirm that the radioactive materials have been removed from the installation. (AFR 161-16)

1.24 CONTRACTOR SAFETY PERSONNEL REQUIREMENTS: (1985 JAN HQ USACE)

(A) Full-time, on-site, safety coverage by contractors shall be required for the life of the contract.

(B) The following conditions shall be met:

(1) The Contractor shall employ, to cover all hours of work at the project site(s), at least one safety and health person to manage the Contractor's safety program; duties which are not germane to the safety program shall not be assigned to this person(s). The principal safety and health person shall report to and work directly for the Contractor's top on-site manager, corporate safety office, or other high-level official of equivalent position. The safety and health person(s) shall have the authority to take immediate steps to correct unsafe or unhealthful conditions. The employment of a safety and health person(s) shall not abrogate the safety and health responsibilities of other personnel.

(2) Qualifications for Safety and Health Person(s).

(a) Safety and Health Person(s) shall have a degree in engineering or safety in at least a four year program from an accredited school and shall have been engaged in safety and occupational health for at least one (1) year of experience (no time being credited to this one (1) year unless at least fifty (50) percent of the time was devoted to safety and occupational health) and shall have at least one (1) year experience in construction, or--

(b) Safety and Health Person(s) shall have legal registration as a Professional Engineer or a Certified Safety Professional and shall have been engaged in safety and occupational health for at least one (1) year of experience (no time being credited to this one (1) year unless at least fifty (50) percent of the time was devoted to safety and occupational health) and shall have at least one (1) year experience in construction, or--

(c) Safety and Health Person(s) shall have a degree other than that specified in paragraph, Qualifications for Safety and Health Person(s) above, and shall have been engaged in safety and occupational health for at least three (3) years of experience (no time being credited to these three (3) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health) and shall have at least two (2) years experience in construction, or--

(d) In lieu of a degree, Safety and Health person(s) shall have been engaged in safety and occupational health for at least five (5) years of experience (no time being credited to these five (5) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health) and shall have at least two (2) years experience in construction.

(e) First aid work is not a creditable experience.

(3) The name and qualifications of the nominated safety and health person(s) shall be furnished to the Contracting Officer for acceptability and a functional description of duties shall be provided prior to the pre-work conference.

NOTE: The Contractor shall have one or more Safety and Health Persons, each of whom meets the qualifications of (B)(2) Qualifications for Safety and Health Person(s), physically present on the actual site of the work whenever work of any sort is being performed by a Contractor, subcontractor, or supplier personnel on the work site. The foregoing clause language shall not be interpreted to contravene this note.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

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SECTION 01505

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SECTION 01505

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SCRAP MATERIAL:

Materials specified to be removed and become the property of the Contractor are designated as scrap, and the Contractor, by signing this contract, hereby acknowledges that he has made due allowance for value, if any, of such scrap in the contract price.

1.2 WRITTEN GUARANTEES AND GUARANTOR'S LOCAL REPRESENTATIVE:

Prior to completion of the contract, the Contractor shall obtain and furnish to the Contracting Officer's representative written guarantees for all the equipment and/or appliances furnished under the contract. The Contractor shall furnish with each guarantee: The name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and/or appliances are installed, who, upon request of the Using Service's representative, will honor the guarantee during the guaranty period and will provide the services prescribed by the terms of the guarantee.

1.3 PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY:

The Contractor shall promptly furnish and shall cause any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property. This information shall be listed on RMS CQC Module furnished by the Government. See example forms at the end of this section.

1.4 TEMPORARY ELECTRIC WIRING:

(A) Temporary Power and Lighting:

The Contractor shall provide construction power facilities in accordance with the safety requirements of the National Electrical Code NFPA No. 70 and the SAFETY AND HEALTH REQUIREMENTS MANUAL EM 385-1-1. The Contractor, or his delegated subcontractor, shall enforce all the safety requirements of electrical extensions for the work of all subcontractors. All work shall be accomplished by skilled electrical tradesmen in a workmanlike manner, as approved by the Contracting Officer.

(B) Construction Equipment:

In addition to the requirements of EM 385-1-1, SAFETY AND HEALTH REQUIREMENTS MANUAL, all temporary wiring conductors installed for operation of construction tools and equipment shall be either Type TW or THW contained in metal raceways, or may be multiconductor cord. Temporary wiring shall be secured above the ground or floor in a workmanlike manner and shall not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in strict accordance with the provisions of the National Electrical Code.

(C) Circuit Protection:

In addition to the present requirements in EM 385-1-1 and the National Electrical Code, all 15 and 20-ampere receptacle outlets used for obtaining power during construction shall have ground fault circuit interrupters (GFCI) for personnel protection. Block and brick saws shall also be equipped with GFCI. The Contracting Officer may allow an exception to this requirement for circuits for concrete vibrators or circuits operating at other than 60 Hertz normal (in both cases an assured grounding program as described in the National Electrical Code, except utilizing the daily inspection frequency of the grounding means of such equipment, may be permitted). The assured grounding program will not be permitted as a substitute for usage of GFCI'S except as described above. All generator-powered 15- and 20-ampere, 60 Hertz receptacle outlets shall have GFCI'S, and shall be properly grounded. A testing means shall be provided which will impose a measured fault of 5 milliamperes, plus or minus 1 milliamperes, and result in tripping the GFCI unit.

1.5 UTILITIES NOT SHOWN:

If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as to the date of this contract and such utilities will interfere with construction operations, he shall immediately notify the Contracting Officer in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are removed or relocated as directed by the Contracting Officer, the Contractor shall be entitled to equitable adjustment for any additional pertinent work or delay.

1.6 GENERAL SAFETY REQUIREMENTS:

(A) General:

The Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, (see Contract Clauses, Section 00700, ACCIDENT PREVENTION) and the Occupational Safety and Health Act (OSHA) Standards for Construction (Title 29, Code of Federal Regulations Part 1926 as revised from time to time); General Industry Standards (Title 29, Code of Federal Regulations Part 1910 as revised from time to time); and the National Fire Protection Association Codes are applicable to this contract. In case of conflict the most stringent requirement of the standards is applicable.

(B) The Prime Contractor's superintendent

The Prime Contractor's superintendent shall take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis (see below), tool box meetings, walk-through inspections, correction of violations, etc., and including that of the subcontractor's work.

(C) Violations:

If recurring violations and/or gross violation indicate that the safety performance is unsatisfactory, corrective action shall be taken as directed, and at the discretion of the Contracting Officer the retention or some part thereof will be withheld from the progress payment until corrective action has been completed.

(D) Elevated Work Areas:

Workers in elevated work areas in excess of 6 feet above an adjoining surface require special safety attention. In addition to the provisions of EM 385-1-1, the following safety measures are required to be submitted to the Contracting Officer's Representative. Prior to commencement of work in elevated work areas, the Contractor shall submit drawings depicting all provisions of his positive protection system including, but not limited to, all details of guard rails.

(1) Positive protection for workmen engaged in the installation of structural steel and steel joists shall be provided by safety nets, tie-off's, hydraulic man lifts, scaffolds, or other required means. Decking crews must be tied-off or work over nets or platforms not over 6 feet below the work area. Walking on beams and/or girders and the climbing of columns is prohibited without positive protection.

(2) Perimeter guard rails shall be installed at floor, roof, or wall openings more than 6 feet above an adjoining surface and on roof perimeters. Rails shall be designed to protect all phases of elevated work including, but not limited to, roofing operations and installation of gutters and flashing. Rails around roofs may not be removed until all work on the roof is complete and all traffic on or across the roof ceases. Rails shall be designed by a licensed engineer to provide adequate stability under any anticipated impact loading. As a minimum, the rails shall consist of a top rail at a height of 42 inches, a mid rail and a toe board. Use of tie-offs, hydraulic man lifts, scaffolds, or other means of roof edge protection methods may be utilized on small structures such as family housing, prefabricated metal buildings, etc.

(E) Fire Prevention:

Twenty-four hours notice shall be given to the Contracting Officer for coordination with the Facility Fire Department prior to conducting any fire hazardous operation. Cutting or welding will be permitted only in areas that are or have been made fire safe. ***Except in established shops, any open flame, brazing, welding and/or metal grinding will not be used until DA form 5383-R, Hot Work Permit and SIAD Form 1011 (1 Dec 96) have been completed. These can be obtained from your POC.*** Where possible, all combustibles shall be located at least 35 feet horizontally from the work site. Where such location is impracticable, combustibles shall be protected with fire blankets and/or protective welding screens to prevent slag from running out of the work area. Edges of covers at the floor shall be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. The Contractor shall not allow any welding/cutting or open flame operations in facilities that are protected by a wet pipe fire sprinkler or an automatic detection system, if the system is out of service. First priority of work will be to return the suppression/detection system to operational condition. Return the fire

detection and/or suppression system back to an operational status (if possible) during periods that the facility is unoccupied, and at the end of the work day. The Contractor shall post a fire guard for a 24 hour period (or certify to the Fire Department that the facility is safe) after welding, cutting, and open flame operations in a facility when: (a) fire detection and suppression system can not be returned to service; (b) fire detection or suppression systems do not exist. Other fire prevention precautions shall be in accordance with the latest National Fire Codes.

(F) Recordkeeping/Reporting Requirements:

On all contract operations, the Prime Contractor shall be responsible for recording and reporting all accident exposure and experience incident work. (This includes exposure and experience of the prime contractor and his/her sub-contractor(s)). As a minimum these records shall include exposure work-hours and a log of occupational injuries and illnesses. (OSHA Form 200 or state equivalent as prescribed by 29 CFR 1904.5) Reference EM 385-1-1, 02.A.02.

(G) Accident Reporting:

In addition to the requirements for reporting accidents in accordance with EM 385-1-1, Section 1, the Prime Contractor will submit at the 50% point and 100% of project completion, a written summary of worker's compensation claims filed by workers on the project. The report will include all subcontractors. The main report covering the Prime Contractor claims will be certified as "correct and true" by the Contractor's compensation insurance carrier. The same certification will be required for subcontractor reports.

1.7 PLANNED UTILITY OUTAGES AND STREET CLOSURES:

All utility outages and street closures shall be of as short a duration as possible and shall be scheduled as far in advance as possible with the Contracting Officer, in no case less than **14** days before the outage or closure. The Contractor shall obtain in writing from the Contracting Officer a statement or schedule giving the permissible times of outages or closures for particular installations and the maximum time allowed for each. The Contractor shall strictly observe such schedules and will be held responsible for any violations.

(A) Street Closure:

The Contractor shall obtain approval in writing from the Contracting Officer before he can close any street or parking lot access. The request for closure shall be submitted in writing to the Contracting Officer 7 working days prior to planned closing and shall include the section to be closed and length of time of closure.

1.8 PERMITS:

(A) Excavation Permit:

The Contractor will be required to obtain an excavation permit on AF Form 103 from the Base Civil Engineer prior to performing any required excavation under this contract. The form shall be accompanied by a sketch showing size, depth, location, and extent of all excavation and trenching included in the contract. The completed form shall be submitted to the Base Civil Engineer with a copy to the Resident Engineer at least 10 working days

prior to intended date of excavation. During the 10-day period the Base Civil Engineer and Base Communications Officer will make known to the Contractor by drawings, staking, or both, the location of all known buried utilities and communication lines. In these identified areas, only hand excavation will be permitted.

(A) Welding Permit:

Where welding of any nature is to be performed on Nellis Air Force Base, the Contractor shall apply for a welding permit by calling the Fire Department, extension 652-9630. A permit will be issued within two working days with instructions for welding, fire prevention.

1.9 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER:

(A) This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE, Section 00700, entitled "DEFAULT (FIXED-PRICE CONSTRUCTION)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

(B) The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

NELLIS AFB/BOULDER CITY

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(05)	(03)	(03)	(01)	(01)	(00)	(01)	(02)	(01)	(01)	(02)	(05)

(C) Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. (ER 415-1-15, 31 OCT 89)

1.10 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

(A) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a Contractor or subcontractor at any tier shall be based on actual cost data when the Government can determine both ownership and operating costs for each piece of

equipment or equipment groups of similar serial and series from the Contractor's accounting records. When both ownership and operating costs cannot be determined from the Contractor's accounting records, equipment costs shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule", Region VII. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the Contracting Officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retrospective pricing, the schedule in effect at the time the work was performed shall apply.

(B) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36 substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated leasees are allowable. Costs for major repairs or overhaul are unallowable.

(C) When actual equipment costs are proposed and the total amount of the pricing action is over $25,000, cost or pricing data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet". By submitting cost or pricing data, the Contractor grants to the Contracting Officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement, the Contractor shall certify that the equipment costs or pricing data submitted are accurate, complete and current.

1.11 SPECIAL CONSTRUCTION PROCEDURES:

(A) Haul Route Cleanup:

The Contractor shall clean, sweep, or pick up, as necessary, mud, rocks, trash, or any other type of debris spilled along haul routes, immediately after passage. Cleanup shall be performed to the satisfaction of the Contracting Officer.

(B) Tree Relocation:

Trees, plants, shrubs, etc., designated for salvage shall be carefully removed and replanted at locations on Nellis AFB as shown on the drawings. Excavation shall be accomplished so as to avoid unnecessary damage to roots, limbs and foliage, and the plant shall be maintained in good condition until replanted in its new location.

(C) Pavement Excavation:

The Contractor shall notify the Contracting Officer of the starting date, location, and scope of any cutting and removal of pavement. The Contractor shall also report the length of time necessary to complete the work, replace the pavement and make the parking lot or street fully operational. When pavement excavation will be continuous for more than 5 days, the schedule of work for each day shall be submitted. The daily schedule shall be updated as necessary by each Monday if total duration is

greater than 5 working days. The notification will be in writing and submitted to the Contracting Officer for approval at least 7 work days prior to the start of work.

For additional information regarding trenching for utilities SEE; Statement of Work, Paragraph 2.

(D) Dust Control Permit

Contractor shall be responsible for obtaining the Dust Control Permit for this project.

1.12 CONTRACTOR SAFETY PERSONNEL REQUIREMENTS: (1985 JAN HQ USACE)

(A) Full-time, on-site, safety coverage by contractors shall be required for the life of the contract.

(B) The following conditions shall be met:

(1) The Contractor shall employ, to cover all hours of work at the project site(s), at least one safety and health person to manage the Contractor's safety program; duties which are not germane to the safety program shall not be assigned to this person(s). The principal safety and health person shall report to and work directly for the Contractor's top on-site manager, corporate safety office, or other high-level official of equivalent position. The safety and health person(s) shall have the authority to take immediate steps to correct unsafe or unhealthful conditions. The employment of a safety and health person(s) shall not abrogate the safety and health responsibilities of other personnel.

(2) Qualifications for Safety and Health Person(s).

(a) Safety and Health Person(s) shall have a degree in engineering or safety in at least a four year program from an accredited school and shall have been engaged in safety and occupational health for at least one (1) year of experience (no time being credited to this one (1) year unless at least fifty (50) percent of the time was devoted to safety and occupational health) and shall have at least one (1) year experience in construction, or--

(b) Safety and Health Person(s) shall have legal registration as a Professional Engineer or a Certified Safety Professional and shall have been engaged in safety and occupational health for at least one (1) year of experience (no time being credited to this one (1) year unless at least fifty (50) percent of the time was devoted to safety and occupational health) and shall have at least one (1) year experience in construction, or--

(c) Safety and Health Person(s) shall have a degree other than that specified in paragraph, Qualifications for Safety and Health Person(s) above, and shall have been engaged in safety and occupational health for at least three (3) years of experience (no time being credited to these three (3) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health) and shall have at least two (2) years experience in construction, or--

(d) In lieu of a degree, Safety and Health person(s) shall have been engaged in safety and occupational health for at least five (5)

years of experience (no time being credited to these five (5) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health) and shall have at least two (2) years experience in construction.

(e) First aid work is not a creditable experience.

(3) The name and qualifications of the nominated safety and health person(s) shall be furnished to the Contracting Officer for acceptability and a functional description of duties shall be provided prior to the pre-work conference.

NOTE: The Contractor shall have one or more Safety and Health Persons, each of whom meets the qualifications of (B)(2) Qualifications for Safety and Health Person(s), physically present on the actual site of the work whenever work of any sort is being performed by a Contractor, subcontractor, or supplier personnel on the work site. The foregoing clause language shall not be interpreted to contravene this note.

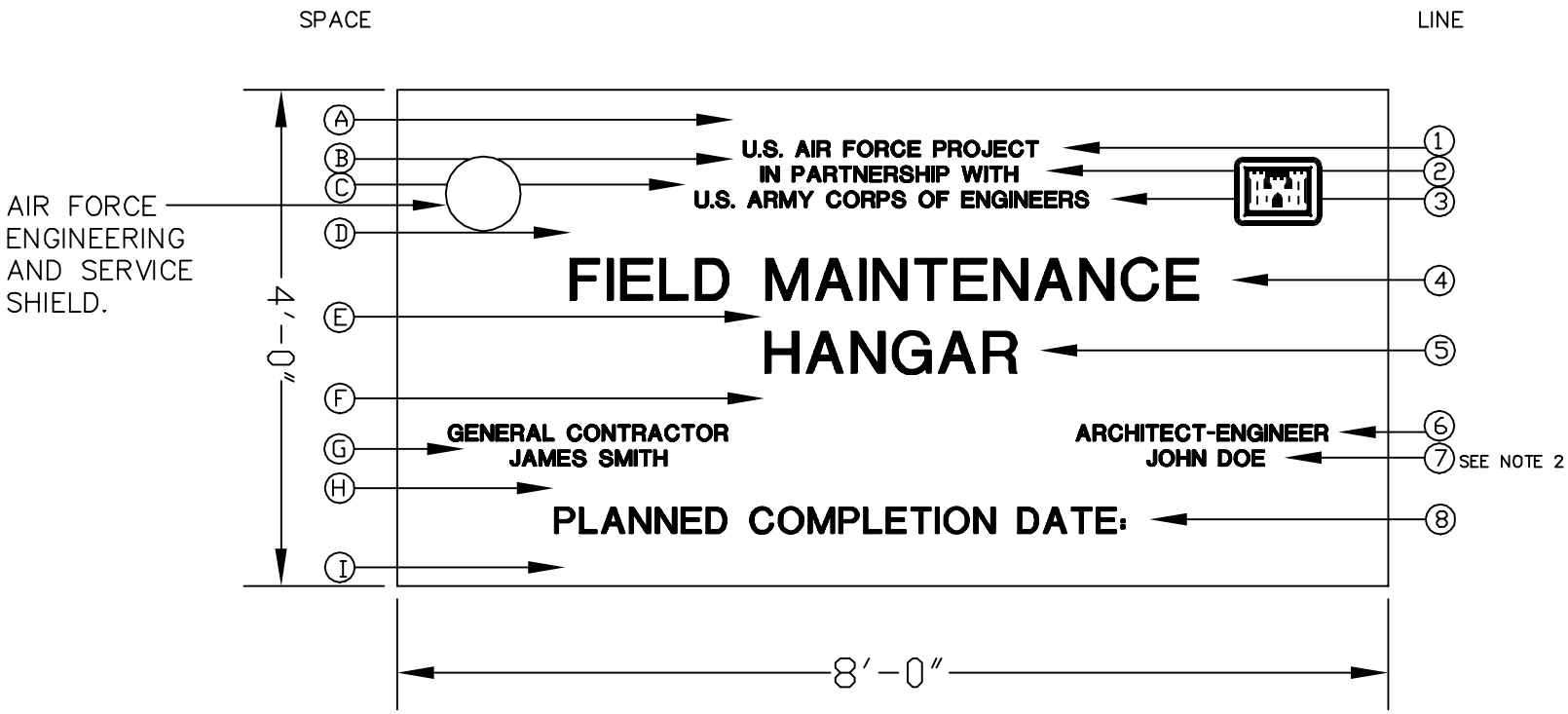
1.13 COLOR SCHEME FOR CONTRACTOR FACILITIES:

(A) All Contractor storage and operational facilities including temporary structures, signs and fencing, that remain at the site shall be compatible with the color scheme used on the project signs as directed by the Contracting Officer.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --



SAMPLE CONSTRUCTION SIGN

NOTES:

1. BACKGROUND AND LETTER COLORS SHELL BE AS SPECIFIED IN SECTION 01500.
2. "CORPS OF ENGINEERS" (FOR SACRAMENTO DISTRICT IN-HOUSE DESIGN PROJECTS ONLY).

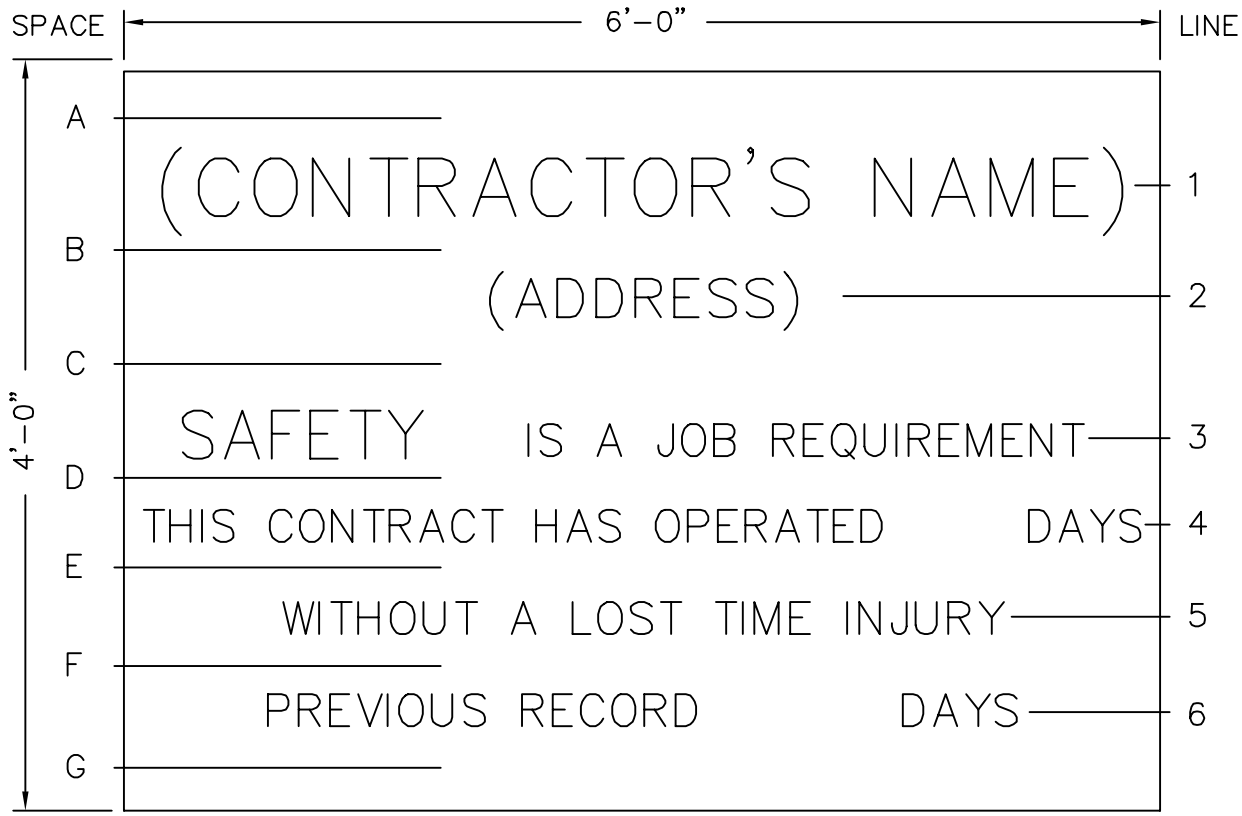
SCHEDULE

SPACE	HEIGHT	LINE	DESCRIPTION	LETTER HEIGHT	STROKE
A	5"	1	U.S AIR FORCE PROJECT	1.5"	3/16"
B	1"	2	IN PARTNERSHIP WITH	1.5"	3/16"
C	1"	3	U.S. ARMY CORPS OF ENGINEERS	1.5"	3/16"
D	5"	4	PROJECT NAME	4"	1/2"
E	3"	5	PROJECT NAME (IF REQUIRED)	4"	1/2"
F	5"	6	GENERAL CONTRACTOR/A-E	1.5"	3/16"
G	1"	7	GENERAL CONTRACTOR/A-E	1.5"	3/16"
H	4"	8	PLANNED COMPLETION DATE	2.5"	1/4"
I	5"				

STANDARD DETAIL
PROJECT SIGN
U.S. AIR FORCE
U.S. ARMY ENGINEER DISTRICT
SACRAMENTO

Drawn T. Tufts — Not to Scale
Checked R. Simmons — AUGUST 1994
File. No. 150-25-1162

ACAD DRAWING: SIGN1162 DWG. 9, AUG. 94



SCHEDULE

SPACE	HEIGHT	LINE	DESCRIPTION	LETTER HEIGHT
A	5"			
		1	CONTRACTOR'S NAME	5"
B	3"			
		2	ADDRESS	3"
C	6"			
		3	SAFETY IS A JOB REQUIREMENT	4 1/2" & 3"
D	3"			
		4	ALL LETTERING	3"
E	3"			
		5	ALL LETTERING	3"
F	3"			
		6	ALL LETTERING	3"
G	5"			

NOTE:

LETTERING SHALL BE BLACK No. 27038, FEDERAL STANDARD 595A.
SIGN SHALL BE INSTALLED IN THE SAME MANNER
AS THE PROJECT SIGN.

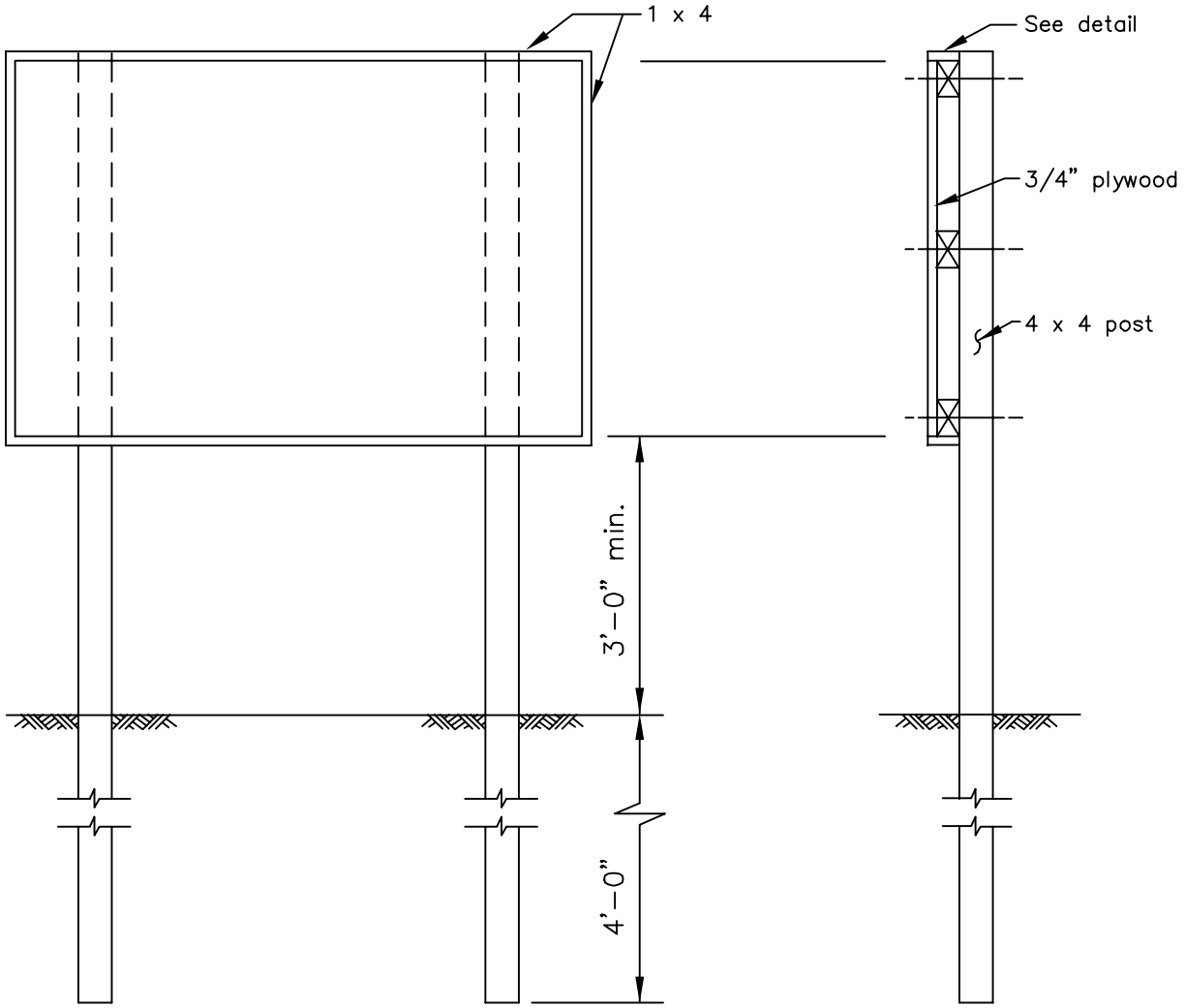
STANDARD DETAIL

SAFETY SIGN

U S ARMY ENGINEER DISTRICT
SACRAMENTO

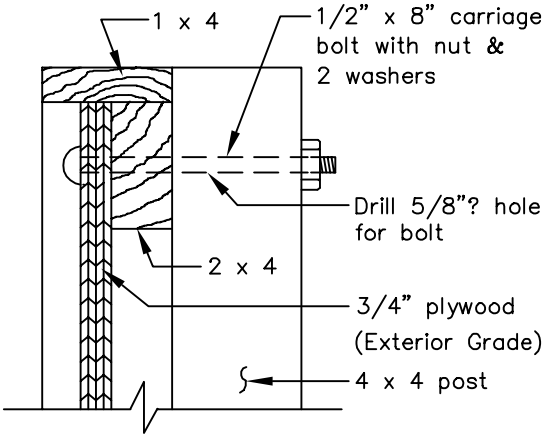
Drawn T. Tufts Not to Scale
Checked R. Simmons AUG. 1988
File number 80-25-707

ACAD DRAWING: SIGN 707 DWG. 9, DEC. 88



ELEVATION

SECTION



DETAIL

GENERAL NOTES:

1. Lumber to be cut & formed accurately.
2. Secure 1 x 4 and plywood with 6d finish nails at not less than 12" O.C.
3. All exposed nails to be set & holes filled with putty.
4. Sign to be set in good solid ground & backfill carefully tamped into place.
5. Where necessary posts shall be braced to provide a solid installation.
6. Paint primer (Fed. Spec. TT-P-25)
   Paint primer (Fed. Spec. TT-E-529)

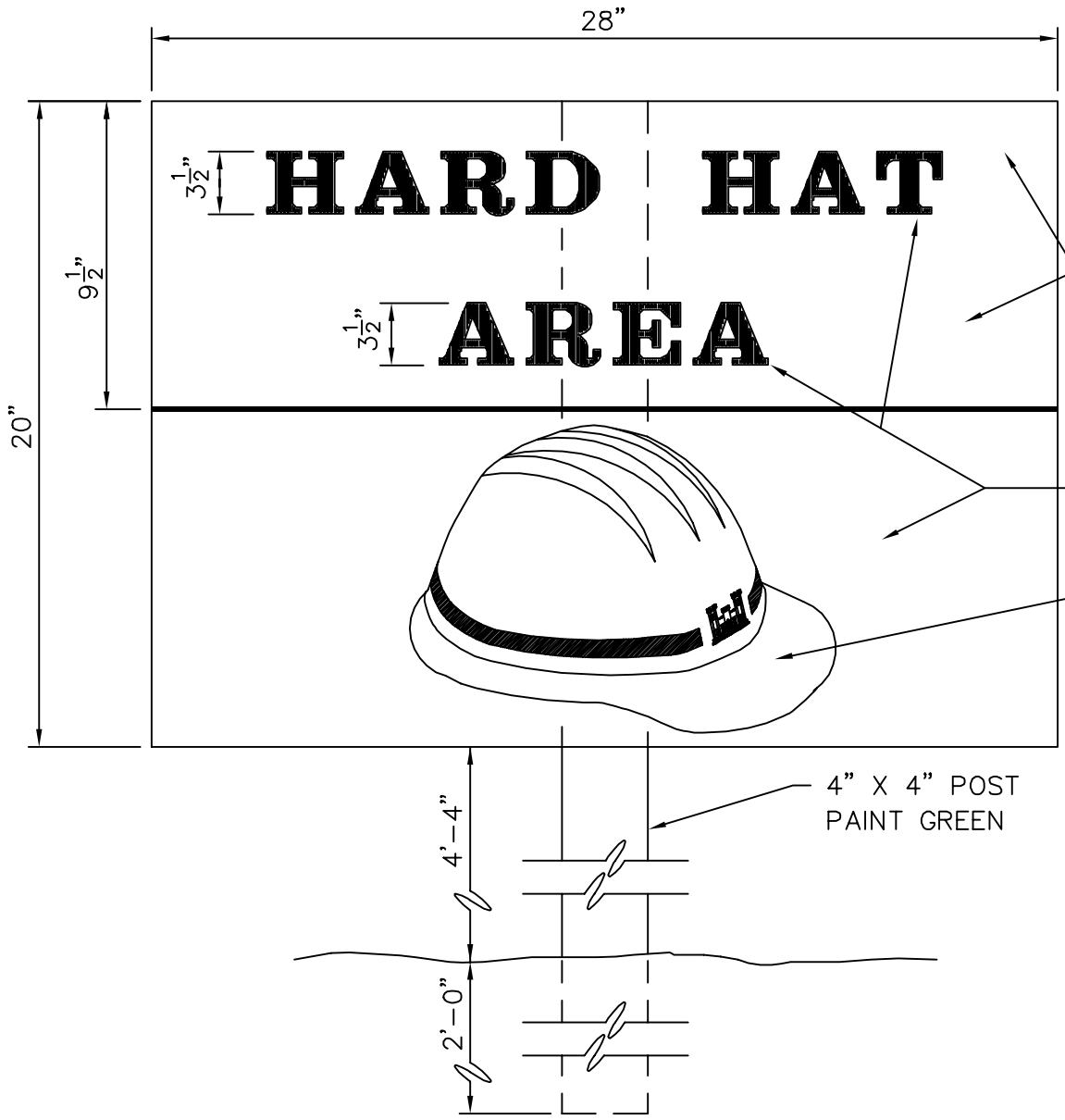
STANDARD DETAIL

SIGN DETAILS

U.S. ARMY ENGINEER DISTRICT
SACRAMENTO

Drawn M.Koenig — Not to Scale
Checked R. Simmons — 1987
File No. 150-25-1232

ACAD Drawing SIGN1232.DWG 198



GENERAL NOTES:

1. Green & White Paint shall be opaque glossy as specified in ANSI Z535.1

2. Bolt Sign to post w/$2\frac{1}{2}$" dia. Carriage Bolts.

STANDARD DETAIL

HARD HAT SIGN

U.S. ARMY ENGINEER DISTRICT
SACRAMENTO

Drawn T. Tufts — Not to Scale
Checked R. Simmons — JAN. 1996
File No. 80-25-774

ACAD DRAWING: SIGN774 DWG. 31, JAN. 96

SECTION 02080
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ASBESTOS ABATEMENT

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.

1.1.1 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z87.1	(1989) Occupational and Educational Eye and Face Protection
ANSI Z88.2	(1992) Practices for Respiratory Protection

1.1.2 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 1368	(1990) Visual Inspection of Asbestos Abatement Projects

1.1.3 CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926	Section .1101, Asbestos
40 CFR Part 61 (Asbestos)	National Emissions Standards for Hazardous Air Pollutants, Subpart M
40 CFR 763	Asbestos-Containing Materials in Schools, Subpart E

1.1.4 ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos Containing Materials in Buildings
EPA 340/1-90-018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 340/1-90-019	(1990) Asbestos/NESHAP Adequately Wet Guidance
EPA 20T-2003	(1990) Managing Asbestos In Place
EPA 340/1-92-013	(1992) A Guide to Normal Demolition Practices Under the Asbestos NESHAP

1.1.5 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(1994) Portable Fire Extinguishers
NFPA 70	(1996) National Electrical Code

1.1.6 NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH-01	(1994) Manual of Analytical Methods

1.1.7 NATIONAL INSTITUTE FOR HEALTH (NIH)

Pub No. 89-1647	(1989) Smoking Cessation (self help)

1.1.8 UNDERWRITERS LABORATORIES (UL)

UL 586 (Oct 18, 1990; Rev Apr 1995) High-Efficiency, Particulate, Air Filter Units

1.1.9 UNITED STATES ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (Sep 1996) Safety and Health Requirements Manual

1.2 DEFINITIONS

1.2.1 **Adequately Wet**: A term defined in 40 CFR 61, Subpart M, and EPA 340/1-90-019 that means to sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.

1.2.2 **Aggressive Method**: Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).

1.2.3 **Amended Water**: Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter when tested in accordance with ASTM D 1331.

1.2.4 **Asbestos**: Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophylite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

1.2.5 **Asbestos-Containing Material (ACM)**: Any materials containing more than one percent asbestos.

1.2.6 **Authorized Person**: Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

1.2.7 **Asbestos Fiber**: A particulate form of asbestos, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.

12.8 **Building Inspector**: Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) “Building Inspector” training accreditation required by 40 CFR 763 Subpart E, Appendix C.

1.2.9 **Certified Industrial Hygienist (CIH)**: An Industrial Hygienist certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

1.2.10 **Class I Asbestos Work**: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

1.2.11 **Class II Asbestos Work**: Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glove bag may be classified as a Class III job.

1.2.12 **Class III Asbestos Work**: Activities defined by OSHA that involve repair and maintenance operations,

where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

1.2.13 **Class IV Asbestos Work**: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists and cleaning up loose ACM debris from TSI or surfacing ACM following construction.

1.2.14 **Clean room**: An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

1.2.15 **Competent Person**: In addition to the definition in 29 CFR 1926.32(f), a person who is capable of identifying existing asbestos hazards as defined per 29 CFR 1926.1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/ Supervisor" training accreditation required by 40 CFR 763 Subpart E, Appendix C.

1.2.16 **Contractor/Supervisor**: Individual who supervises asbestos abatement work and has EPA Model Accreditation Plan "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C.

1.2.17 **Critical Barrier**: One or more layers of plastic sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

1.2.18 **Decontamination Area**: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

1.2.19 **Demolition**: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

1.2.20 **Disposal Bag**: 6 mil thick leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

1.2.21 **Disturbance**: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM so disturbed exceed that which can be contained in one glove bag or waste disposal bag which shall not exceed 60 inches in length and width.

1.2.22 **Equipment Room or Area**: An area adjacent to the regulated area used for the decontamination of employees and their equipment.

1.2.23 **Employee Exposure**: That exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

1.2.24 **Fiber**: A fibrous particulate, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.

1.2.25 **Friable ACM**: A term as defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 that means any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent as determined by a method other than point counting by PLM, verify the asbestos content by point counting using PLM.

1.2.26 **Glove bag**: Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

1.2.27 **High-Efficiency Particulate Air (HEPA) Filter**: A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

1.2.28 **Homogeneous Area**: An area of surfacing material or thermal system insulation that is uniform in color and texture.

1.2.29 **Industrial Hygienist**: A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

1.2.30 **Intact**: ACM which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.

1.2.31 **Model Accreditation Plan (MAP)**: USEPA training accreditation requirements for persons who work with asbestos specified at 40 CFR 763, Subpart E, Appendix C.

1.2.32 **Modification**: A changed or altered procedures, material or component of a control system, which replaces a procedure, material or component of a required system.

1.2.33 **Negative Exposure Assessment**: A demonstration by the Contractor that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).

1.2.34 **NESHAP**: National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61 Subpart M.

1.2.35 **NIOSH**: National Institute of Occupational Safety and Health.

1.2.36 **Nonfriable ACM**: A NESHAP term as defined in 40 CFR 61 Subpart M and EPA 340/1-90-018 that means any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

1.2.37 **Nonfriable ACM (Category I)**: A NESHAP term as defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 that means asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.2.38 **Nonfriable ACM (Category II)**: A NESHAP term as defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 that means any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light

Microscopy, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

1.2.39 **Permissible Exposure Limits (PELs)**:

a. **PEL-Time weighted average(TWA)**: Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an eight (8) hour time weighted average (TWA), as determined by the method prescribed in 29 CFR 1926.1101, Appendix A, or the current version of NIOSH analytical method 7400.

b. **PEL-Excursion limit**: An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of thirty (30) minutes as determined by the method prescribed in 29 CFR 1926.1101, Appendix A, or the current version of NIOSH analytical method 7400.

1.2.40 **Presumed Asbestos Containing Material (PACM)**: An OSHA term defined in 29 CFR 1926.1101 as thermal system insulation and surfacing material found in buildings constructed no later than 1980. The material is "presumed" to contain asbestos unless it is demonstrated not to contain asbestos through bulk sampling in accordance with 40 CFR 763.86. PACM includes flooring material and associated mastic and backing and TSI.

1.2.41 **Regulated Area**: An OSHA term as defined in 29 CFR 1926.1101 that means a regulated area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos exceed or there is a reasonable possibility they may exceed the permissible exposure limit. This area may be contained and controlled either by an enclosed containment (full containment area, single or double bulkhead containment area, mini-containment area), modified containment, glove bag or outdoor techniques, where asbestos containing materials (ACM) operations are performed and isolated by physical boundaries to prevent the spread of ACM and control access to authorized persons. A full containment, single or double bulkhead containment area, mini-containment area, modified containment, and glove bag work area is isolated within a containment enclosure in which ACM operations are performed. An outdoor regulated work area is not isolated within a containment enclosure, but is otherwise secured by means of physical barriers, boundary warning tape, and signage, etc., to control access by unauthorized persons.

1.2.42 **Regulated Asbestos-Containing Material (RACM)**: An EPA NESHAP term defined as Friable ACM, Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or Category II nonfriable ACM that has a high probability of becoming or has been crumbled, pulverized, or reduced to powder by the forces expected to act it in the course of demolition or renovation operations.

1.2.43 **Removal**: All operations where ACM is taken out or stripped from structures or substrates, and includes demolition operations.

1.2.44 **Repair**: Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM attached to structures or substrates. (If the amount of asbestos so "disturbed" cannot be contained in one standard glove bag (60 inch x 60 inch) or waste bag, Class I precautions are required)

1.2.45 **Spills/Emergency Cleanups**: Cleanup of sizable amounts of asbestos waste and debris which has occurred, for example, when water damage occurs in a building, and sizable amounts of ACM are dislodged. A Competent Person evaluates the site and ACM to be handled, and based on the type, condition and extent of the dislodged material, classifies the cleanup as Class I, II, or III. Only if the material was intact and the cleanup involves mere contact of ACM, rather than disturbance, could there be a Class IV classification.

1.2.46 **Surfacing ACM**: Asbestos-containing material which contains more than 1% asbestos and is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials

on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

1.2.47 **Thermal system insulation (TSI) ACM**: ACM which contains more than 1% asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain or water condensation.

1.2.48 **Thermal system insulation ACM**: Thermal system insulation which contains more than 1% asbestos.

1.2.49 **Transite:** A generic name for asbestos cement wallboard and pipe.

1.2.50 **Worker**: Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101 to include EPA Model Accreditation Plan (MAP) "Worker" training accreditation required by 40 CFR 763, Subpart E, Appendix C, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

1.3 DESCRIPTION OF WORK

1.3.1 General: The work covered by this section includes the handling of asbestos-containing materials (ACM) which are encountered during demolition of Building 765 at Nellis AFB, NV, and any spill/emergency cleanup or housekeeping activities associated with this project and describes procedures and equipment required to protect workers and occupants of the work area from contact with airborne asbestos fibers and ACM dust and debris. Activities include the removal of roofing materials which are OSHA Class II work operations. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Accident Prevention Plan and its subcomponents, the Asbestos Hazard Abatement Plan (AHAP) and Activity Hazard Analyses (AHAs) required in paragraph SAFETY AND HEALTH PROGRAM.

1.3.2 Unexpected Discovery of Asbestos: For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer(CO).

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

1.4.1 SD-01 Data

1.4.1.1 Materials and Equipment; FIO. Manufacturer's catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information.

1.4.2 SD-04 Drawings

Site Layout; GA. Descriptions, detail project drawings, site layout to include worksite containment area techniques as prescribed on applicable SET-UP DETAIL SHEETS and boundaries of each asbestos regulated work area.

1.4.3 SD-08 Statements

1.4.3.1 Qualification; GA. A written report providing evidence of qualification for personnel, facilities and

equipment assigned to the work as required by paragraph QUALIFICATIONS.

1.4.3.2 Training Material; FIO. A copy of the written project site-specific training material as indicated in 29 CFR 1926.1101 that will be used to train all on-site employees. This training document shall be signed by the Contractor's Designated IH and Competent Person.

1.4.3.3 Certification of Medical Requirements; FIO. Physician written result as required in paragraph MEDICAL REQUIREMENTS

1.4.4 SD-09 Reports

1.4.4.1 Exposure Assessments, Air Monitoring Results and Documentation; GA. Initial exposure assessments, Negative exposure assessments, air-monitoring results and documentation required by paragraph EXPOSURE ASSESSMENT AND AIR MONITORING.
1.4.4.2 Licenses, Permits and Notifications; GA. Licenses, permits and notifications required by paragraph LICENSES, PERMITS AND NOTIFICATIONS.

1.4.5 SD-18 Records

1.4.5.1 Respirator Program; GA. Records of the respirator program as required by paragraph RESPIRATORY PROTECTION.

1.4.5.2 Asbestos Waste Shipment; GA. Waste Shipment Records as required by paragraph, CLEAN-UP AND DISPOSAL.

1.5 QUALIFICATIONS

1.5.1 Written Qualifications and Organization Report: The Contractor shall submit a written qualifications and organization report providing evidence of qualifications of the Contractor, Contractor's on-site project manager, designated Competent Person, supervisors and workers; designated independent IH (person assigned to project and firm name); independent testing laboratory (include name of firm, principal and analyst(s) who will perform analyses); all subcontractors to be used to include disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. The report shall include an organization chart showing the Contractor's staff organization for this project by name and title, chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor’s on-site project manager, designated Competent Person, designated independent IH, designated testing laboratory and the principals of all subcontractors to be used. The Contractor shall include the following statement in the report: “By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926.1101, 40 CFR 61, Subpart M, and the Federal, state and local requirements specified in paragraph SAFETY AND HEALTH COMPLIANCE for those asbestos abatement activities that they will be involved in.

1.5.1.1 Qualifications: The Contractor shall be licensed for asbestos abatement by the State of California and shall designate in writing, personnel meeting the following qualification to perform asbestos abatement activities and shall include the information requested in the Qualifications and Organization Report:

a. Designated Competent Person: The name, address, telephone number, and resume of the Contractor’s designated Competent Person. Evidence that the full-time designated Competent Person is qualified in accordance with 29 CFR 1926.32 and .1101, has EPA Model Accreditation Plan (MAP) “Contractor/Supervisor” training accreditation required by 40 CFR 763, Subpart E,

Appendix C, and is experienced in the administration and supervision of asbestos abatement projects, including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, set up and inspection of asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees on-site, etc. The duties of the Competent Person shall include the following: controlling entry to and exit from the regulated area; supervising any employee exposure monitoring required by 29 CFR 1926.1101; ensuring that all employees working within a regulated area wear the appropriate personal protective equipment (PPE), are trained in the use of appropriate methods of exposure control, and use the hygiene facilities and decontamination procedures specified; and ensuring that engineering controls in use are in proper operating conditions and are functioning properly. This Designated Competent Person shall be responsible for compliance with applicable Federal, state and local requirements, the Contractor's APP and Asbestos Hazard Abatement Plan. The designated on-site Competent Person shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that this person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The designated competent person shall be on-site at all times during the conduct of this project.

b. Designated Project and Other Supervisors: The name, address, telephone number, and resume of the designated on-site Project Supervisor and other supervisors, who have responsibility to implement the Accident Prevention Plan including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses, the authority to direct work performed under this contract and verify compliance and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C. The designated on-site Project Supervisor and other supervisors shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgement" required by this paragraph. The Contractor shall submit evidence that the designated Project Supervisor has a minimum of 2 years of on- the job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a minimum of 1 year on-the job asbestos abatement experience commensurate with the responsibilities they will have on this project.

c. Designated Industrial Hygienist: The name, address, telephone number, resume and other information specified below for the Industrial Hygienist (IH) selected to prepare the Contractor's Asbestos Hazard Abatement Plan, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who is board certified in the practice of industrial hygiene as determined and documented by the American Board of Industrial Hygiene (ABIH), has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C and has a minimum of 2 years of comprehensive experience in planning and overseeing asbestos abatement activities. The designated IH shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgement" required by this paragraph.. The designated IH shall be completely independent from the Contractor and shall not be an employee of the Contractor or be an employee or principal of a firm recognized by Federal, state, or local regulations that would constitute a business relationship that would not be considered independent. A copy of the designated IH's current

valid ABIH Certification shall be included. The designated IH shall visit the site during asbestos activities and be available for emergencies. In addition, the designated IH shall prepare and the Contractor shall submit the name, address, telephone numbers and resumes of additional IH's and industrial hygiene technicians (IHT) who will be assisting the designated IH in performing on-site tasks. IHs and IHTs supporting the Designated IH shall have a minimum of 2 full years of practical on-site asbestos abatement experience. The formal reporting relationship between the designated IH and the support IHs and IHTs, the designated Competent Person, and the Contractor shall be indicated. The resume of each support IH and IHT shall be signed by the designated IH and Contractor. The resume of each designated IH, support IH and IHT staff shall be signed by the individual for whom the resume was prepared.

d. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926.1101, 40 CFR 61, Subpart M and other applicable Federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment" in this paragraph.

e. Worker Training and Certification of Worker Acknowledgment: Training documentation is required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form entitled "Certificate of Workers Acknowledgment" to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. All training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

f. Physician: The name, medical qualifications, address, telephone number and resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician must be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconioses and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926.1101 and paragraph MEDICAL REQUIREMENTS. The physician shall be familiar with the site's hazards and the scope of this project. The medical consultant's name, qualifications, and knowledge of the site's conditions and proposed activities shall be included in the Accident Prevention Plan (APP).

g. First Aid and CPR Trained Persons: The names of at least two persons who are currently trained in first aid and CPR by the American Red Cross or other approved agency shall be designated and shall be on-site at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910.1030 and shall be included in the Contractor's Bloodborne Pathogen Program. These persons may perform other duties but shall be immediately available to render first aid when needed. Provide a copy of each designated persons current valid First Aid and CPR certificate.

h. Independent Testing Laboratory: The name, address and telephone number of the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by Federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor shall be submitted:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting phase contrast microscopy (PCM) of airborne samples using the methods specified by 29 CFR 1926.1101, OSHA method ID-160, the most current version of NIOSH-01, Method 7400, and NIOSH Method 7402, transmission electron microscopy (TEM); the laboratory is currently certified and judged proficient in counting airborne asbestos samples by PCM by successful participation within the past year in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT)

Program; the name of each selected microscopist who will analyze airborne samples by PCM with verified documentation of their proficiency to conduct PCM analyses by being judged proficient in counting samples as a current participating analyst in the AIHA PAT Program, and having successfully completed the Asbestos Sampling and Analysis course (NIOSH 582 or equivalent with a copy of course completion certificate provided; when the PCM analysis is to be conducted on-site, documentation shall be provided certifying that the on-site analyst meets the same requirements.

(2) PCM/TEM: The laboratory is fully equipped and each analyst (provide name) possesses demonstrated proficiency in conducting phase contrast microscopy and transmission electron microscopy analysis of airborne samples using NIOSH-01 Method 7400 PCM and NIOSH-01 Method 7402 (TEM confirmation of asbestos content of PCM results) from the same filter.

i. Disposal Facility, Transporter: Provide written evidence that the landfill to be used is approved for asbestos disposal by the USEPA and state regulatory agencies. Copies of signed agreements between the Contractor, and each subcontractor to include transporters and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste generated during the performance of this contract will be provided. Qualification shall be provided for each subcontractor or transporter to be used, indicating previous experience in transport and disposal of asbestos waste to include all required state and local waste hauler requirements for asbestos. The contractor and transporters shall meet the DOT requirements of 49 CFR 171, 172, and 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61.154 or .155 as required in 40 CFR 61.150(b) and other applicable state or local requirements.

1.5.2 Federal, State or Local Citations on Previous Projects: The Contractor and all subcontractor's shall submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities (include projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (include projects, dates, and reasons for terminations). If there are none, there will be a negative declaration signed by an officer of the company.

1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable Federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. This includes, but is not limited to, Occupational Safety and Health Administration (OSHA) standards, 29 CFR 1926.1101, 40 CFR 61, Subpart M and 40 CFR 763. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.7 SAFETY AND HEALTH PROGRAM AND PLANS

The Contractor's Designated IH shall develop and submit a written comprehensive site-specific Accident Prevention Plan (APP) at least 30 days prior to the preconstruction conference. The APP shall address all requirements of EM 385-1-1, Appendix A covering on-site work to be performed by the Contractor and all subcontractor's. The APP shall incorporate an Asbestos Hazard Abatement Plan (AHAP), and Activity Hazard Analyses (AHAs) as separate appendices into one site specific APP document. Any portions of the Contractor's overall Safety and Health Program (SHP) that are referenced in the APP, e.g., respirator program, hazard

communication program, confined space entry program, etc., shall be included as appendices to the APP. The plan shall take into consideration all the individual asbestos abatement work tasks identified in Table 1. The plan shall be prepared by, signed and dated by the Contractor's Designated IH, Competent Person, and Project Supervisor.

1.7.1 The AHAP Appendix: The AHAP appendix to the APP shall include, but not be limited to:

a. The personal protective equipment to be used;
b. The location and description of asbestos regulated work areas
c. Initial exposure assessment in accordance with 29 CFR 1926.1101;
d. Level of supervision;
e. Method of notification of other employers at the worksite;
f. Abatement method to include containment and control procedures;
g. Storage and disposal procedures and plan;
h. Air monitoring methods (personal, environmental);
i. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations;
j. Fire and medical emergency response procedures; and

1.7.2 The AHA Appendix: AHAs, for each major phase of work, shall be submitted and updated during the project. The AHA format shall be in accordance with EM 385-1-1 (Figure 1-1). The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the AHA has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the government on-site representatives. The AHA shall be continuously reviewed and when appropriate modified to address changing site conditions or operations.

1.8 PRECONSTRUCTION CONFERENCE AND ON-SITE SAFETY

The Contractor and the Contractor’s Designated Competent Person, Project Supervisor, and Designated IH shall meet with the Contracting Officer prior to beginning work at a safety preconstruction conference to discuss the details of the Contractor's submitted Accident Prevention Plan (APP) to include the Asbestos Hazard Abatement Plan (AHAP) and Activity Hazard Analyses (AHAs) appendices. Deficiencies in the APP will be discussed and the APP shall be revised to correct the deficiencies and resubmitted for acceptance. Any changes required in the specification as a result of the APP shall be identified specifically in the plan to allow for free discussion and acceptance by the Contracting Officer prior to the start of work. On-site work shall not begin until the APP has been accepted. A copy of the written APP shall be maintained on-site. Changes and modifications to the accepted APP shall be made with the knowledge and concurrence of the Designated IH, the Project Supervisor, Designated Competent Person, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Designated IH shall bring such hazard to the attention of the Project Supervisor, Designated Competent Person, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to re-establish and maintain safe working conditions in order to safeguard on-site personnel, visitors, the public, and the environment. Once accepted by the Contracting Officer, the APP, including the AHAP and AHAs will be enforced as if an addition to the specification. Disregard for the provisions of this specification or the accepted APP shall be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

1.9 SECURITY

A locked security area shall be provided for each asbestos regulated work area. A log book shall be kept documenting entry into and out of the asbestos regulated work area. Entry into asbestos regulated work areas shall

only be by personnel authorized by the Contractor and Contracting Officer. Personnel authorized to enter asbestos regulated work areas shall be trained, medically evaluated and wear the personal protective equipment, as required by this specification, for the specific asbestos regulated work area to be entered.

1.10 MEDICAL REQUIREMENTS

Medical requirements shall conform to 29 CFR 1926.1101.

1.10.1 Medical Examinations

Before being exposed to airborne asbestos fibers, workers shall be provided with a medical examination as required by 29 CFR 1926.1101 and other pertinent state or local requirements. This requirement must have been satisfied within the last 12 months. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. X-ray films of asbestos workers shall be identified to the consulting radiologist and medical record jackets shall be marked with the word "asbestos."

1.10.1.1 Information Provided to the Physician: The Contractor shall provide the following information in writing to the examining physician:

a. A copy of 29 CFR 1926.1101 and Appendices D, E, G, and I;
b. A description of the affected employee's duties as they relate to the employee's exposure;
c. The employee's representative exposure level or anticipated exposure level;
d. A description of any personal protective and respiratory equipment used or to be used; and
e. Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

1.10.1.2 Written Medical Opinion: For each worker, a written medical opinion prepared and signed by a licensed physician indicating the following:

a. Summary of the results of the examination.
b. The potential for an existing physiological condition that would place the employee at an increased risk of health impairment from exposure to asbestos.
c. The ability of the individual to wear personal protective equipment including respirators while performing strenuous work tasks under cold stress and/or heat stress conditions.
d. A statement that the employee has been informed of the results of the examination, been provided a copy of the results, informed of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure, and formed of any medical condition that may result from asbestos exposure.

1.10.3 Medical and Exposure Records

Complete and accurate records shall be maintained of each employee's medical examinations, medical records and exposure data as required by 29 CFR 1910.20 and 29 CFR 1926.1101 for a period of 50 years after termination of employment. Records of the required medical examinations and exposure data shall be made available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA) or authorized representatives of the employee and an employee's physician upon request of the employee or former employee. Maintain on file at the worksite for review as requested by the Contracting Officer or the representative, a copy of the required medical certification for each employee.

1.11 TRAINING PROGRAM

The Contractor shall establish a training program as specified by United States Environmental Protection Agency (EPA) Model Accreditation Plan (MAP) training requirements at 40 CFR 763, Subpart E, Appendix C, applicable state requirements, and OSHA requirements at 29 CFR 1926.1101(k)(9) and this specification.

Prior to the commencement of work, each worker shall be instructed by the Contractor's Designated IH and Competent Person in the following project specific training:

a. The hazards and health effects of the specific types of ACM to be abated;
b. The content and requirements of the Contractor's APP to include the AHAP and AHAs and site-specific safety and health precautions;
c. Hazard Communication Program;
d. Hands-on training for each asbestos abatement technique to be employed;
e. Heat and/or cold stress monitoring specific to this project;
f. Air monitoring program and procedures;
g. Medical surveillance to include medical and exposure record keeping procedures;
h. The association of cigarette smoke and asbestos-related disease;
i. Security procedures;
j. Specific work practice controls and engineering controls required for each Class of work as required at 29 CFR 1926.1101.

1.11.1 Class II Operations Involving Single Component or Roofing Material Abatement:

Within 1 year prior to assignment and commencement of work on this asbestos abatement project, each worker directly involved in Class II activities involving roofing materials, handling ACM, ACM generated wastes to include packaging and transporting such wastes for disposal, shall complete at least 8 hours of training on the elements of paragraph TRAINING PROGRAM. In addition, the training shall include specific work practices and engineering controls at 29 CFR 1926.1101(g) which specifically relates to Transite panels and shall include "hands-on" training.

1.12 RESPIRATORY PROTECTION PROGRAM

1.12.1 Written Respiratory Protection Program: The Contractor's Designated IH shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926.1101, 29 CFR 1910.134, ANSI Z88.2, CGA G-7, CGA G-7.1 and DETAIL SHEET 12. The Contractor's Designated IH shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations encountered during the performance of the asbestos abatement work. The Contractor's respiratory protection program shall include, but not be limited to, the following elements:

a. The company policy, used for the assignment of individual responsibility, accountability, and implementation of the respiratory protection program.
b. The standard operating procedures covering the selection and use of respirators. Respiratory selection shall be determined by the hazard to which the worker is exposed.
c. Medical evaluation of each user to verify that the worker may be assigned to an activity where respiratory protection is required.
d. Training in the proper use and limitations of respirators.
e. Respirator fit-testing, i.e., quantitative, qualitative and individual functional fit checks.
f. Regular cleaning and disinfection of respirators.
g. Routine inspection of respirators during cleaning and after each use when designated for emergency use.
h. Storage of respirators in convenient, clean, and sanitary locations.
i. Surveillance of work area conditions and degree of employee exposure (e.g., through air monitoring).

j. Regular evaluation of the continued effectiveness of the respiratory protection program.
k. Recognition and procedures for the resolution of special problems as they affect respirator use (e.g., no facial hair that comes between the respirator face piece and face or interferes with valve function; prescription eye wear usage; contact lens usage; etc.).
l. Proper training in putting on and removing respirators.

1.12.2 Respiratory Fit Testing: A qualitative or quantitative fit test conforming to 29 CFR 1926.1101, Appendix C shall be conducted by the Contractor's Designated IH for each Contractor worker required to wear a respirator, and for the Contracting Officer and authorized visitors who enter an asbestos regulated work area where respirators are required to be worn. A respirator fit test shall be performed for each worker wearing a negative-pressure respirator prior to initially wearing a respirator on this project and every 6 months thereafter. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, or of full- facepiece air purifying respirators where they are worn at levels at which half-facepiece air purifying respirators are permitted. If physical changes in a worker develop that will affect the fit, a new fit test shall be performed. Functional fit checks shall be performed by employees each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.12.3 Respirator Selection and Use Requirements: The Contractor shall provide respirators, and ensure that they are used as required by 29 CFR 1926.1101 and used in accordance with manufacturers recommendations. Respirators shall be approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (MSHA/NIOSH), under the provisions of 30 CFR 11 or 42 CFR 84, for use in environments containing airborne asbestos fibers. Personnel who handle ACM, enter asbestos regulated work areas that require the wearing of a respirator, or who are otherwise carrying out abatement activities that require the wearing of a respirator, shall be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne asbestos concentration level to be encountered. For air-purifying respirators, the particulate filter portion of the cartridges or canister approved for use in airborne asbestos environments shall be high-efficiency particulate air (HEPA). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered. All recommendations made by the Contractor's Designated IH to downgrade respirator type shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person in consultation with the Designated IH, has the authority to take immediate action to upgrade or downgrade respiratory type when there is an immediate danger to the health and safety of the wearer. Respirators shall be used in the following circumstances:

a. During all Class I asbestos jobs.
b. During all Class II work where the ACM is not removed in a substantially intact state.
c. During all Class II and III work which is not performed using wet methods. Respirators need not be worn during removal of ACM from sloped roofs when a negative exposure assessment has been made and ACM is removed in an intact state.
d. During all Class II and III asbestos jobs where the Contractor does not produce a "negative exposure assessment".
e. During all Class III jobs where TSI or surfacing ACM is being disturbed.
f. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.
g. During all work where employees are exposed above the PEL-TWA or PEL-Excursion Limit.
h. In emergencies

1.12.4 Class I Work: The Contractor shall provide a tight-fitting powered air purifying respirator equipped with high efficiency filters or a full facepiece supplied air respirator operated in the pressure demand mode equipped with HEPA egress cartridges or an auxiliary positive pressure self-contained breathing apparatus for all employees

within the regulated area where Class I work is being performed for which a negative exposure assessment has not been produced and the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full facepiece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

1.12.5 Class II and III Work: The Contractor shall provide a half-mask air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment; and Class III jobs where TSI or surfacing ACM is being disturbed.

1.12.6 Sanitation: Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

1.13 HAZARD COMMUNICATION PROGRAM

A hazard communication program shall be established and implemented in accordance with 29 CFR 1926.59.

1.14 DESIGNATED INDUSTRIAL HYGIENIST (IH)

Personal, area/environmental and clearance air sampling and training shall be conducted under the direction of an IH experienced in asbestos abatement. For the purpose of this contract, the Contractor shall retain the services of an independent IH to perform all contract required air monitoring.

1.15 LICENSES, PERMITS AND NOTIFICATIONS

Necessary licenses, permits and notifications shall be obtained in conjunction with the project asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by Federal, state, regional, and local authorities and as otherwise specified herein. The Contractor shall notify the Regional Office of the USEPA, state's environmental protection agency responsible for asbestos air emissions, local air pollution control district/agency, state OSHA program and the Contracting Officer in writing at least 10 days prior to the commencement of work in accordance with 40 CFR 61, Subpart M, state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notification shall be by Certified Mail - Return Receipt Requested. The Contractor shall furnish copies of the receipts to the Contracting Officer in writing prior to the commencement of work. The local fire department shall be notified 3 days before fire-proofing material is removed from a building and the notice shall specify when the material contains asbestos. A copy of the written notification shall be provided to any rental company concerning the intended use of rental equipment and the possibility of asbestos contamination, the decontamination procedures that will be used prior to the return of the equipment. A copy of the rental company's written acknowledgment and agreement shall be included in the submittal. For licenses, permits and notifications that the Contractor is responsible for obtaining, the Contractor will pay any associated fees or other costs incurred.

1.15.1 Litigation and Notification: The Contractor shall notify the CO if any of the following occur:

a. If the Contractor or any of its subcontractor’s are served with notice of violation of any law, regulation, permit or license which relates to this Contract;
b. Proceedings are commenced which could lead to revocation of related permits or licenses; permits, licenses or other government authorizations relating to this Contract are revoked;
c. Litigation is commenced which would affect this Contract; and
d. If the Contractor or any of its subcontractor’s become aware that its equipment or facilities are not in compliance or may fail to comply in the future with applicable laws or regulations.

1.16 PERSONAL PROTECTIVE EQUIPMENT

1.16.1 General: Three complete sets of personal protective equipment shall be made available to the Contracting Officer and authorized visitors for entry to the asbestos regulated work area at all times for inspection of the asbestos regulated work area. Contractor workers shall be provided with personal protective clothing and equipment as specified herein and the Contractor shall ensure that it is worn properly. The Contractor's Designated IH and Designated Competent Person supervisor shall select and approve all the required personal protective clothing and equipment to be used.

1.17 HYGIENE FACILITIES AND PRACTICES

1.17.1 General: The Contractor shall establish a decontamination area for the decontamination of employees. The Contractor shall ensure that employees enter and exit the regulated area through the decontamination area.

1.17.2 Shower Facilities: Shower facilities shall be provided which comply with 29 CFR 1910.141(d)(3). The

1.17.3 Decontamination Area Entry Procedures: The Contractor shall ensure that employees:

a. Enter the decontamination area through the clean room.
b. Remove and deposit street clothing within a locker provided for their use.
c. Put on protective clothing and respiratory protection before leaving the clean room.
d. Employees shall pass through the equipment room to enter the regulated area.

1.17.4 Decontamination Area Exit Procedures: The Contractor shall ensure that:

a. Before leaving the regulated area, respirators shall be worn while employees remove all gross contamination and debris from their work clothing using a HEPA vacuum.
b. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers (see Detail Sheets 9 and 14) for disposal.
c. Employees shall not remove their respirators in the equipment room.
d. Employees shall shower prior to entering the clean room.
e. After showering, employees shall enter the clean room before changing into street clothes.

1.18 REGULATED AREAS

All Class I, II, and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated in a manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area. The Contractor may permit smoking in designated areas. The Contractor shall control access to regulated area, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.19 WARNING SIGNS AND TAPE

Bilingual warning signs and tape printed in English and Spanish shall be provided at the regulated boundaries and entrances to asbestos regulated work areas. The Contractor shall ensure that employees working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Warning

signs as shown and described in DETAIL SHEET 11 appended herein shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926.1101, minimum, 20 by 14 inches and displaying the following legend in the lower panel:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

Spacing between lines shall be at least equal to the height of the upper of any two lines. Warning tape shall be provided as shown and described on DETAIL SHEET 11, appended herein. Decontamination unit signage shall be as shown and described on DETAIL SHEET 15, appended herein.

1.20 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements specified herein are acceptable. Warning labels shall be as described in DETAIL SHEET 14 appended herein, shall conform to 29 CFR 1926 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1.21 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, be of sufficient capacity and provide the necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system or has otherwise been approved for use by the Contracting Officer. All residual asbestos shall be removed from reusable tools prior to storage and reuse. Reusable tools shall be thoroughly decontaminated prior to being removed from asbestos regulated work areas.

1.22 RENTAL EQUIPMENT

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment. A written acceptance of the terms of the Contractor's notification shall be obtained from the rental agency.

1.23 AIR MONITORING EQUIPMENT

The Contractor's Designated IH shall select and approve the air monitoring equipment to be provided and used by the Contractor for evaluation of airborne asbestos fiber concentrations. The equipment shall include, but not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute when equipped with a sampling train of tubing and filter cassette.
b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow even as filter resistance increases due to accumulation of fiber and debris on the filter surface.
c. Single use standard 25 millimeter diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 millimeter electrically conductive extension cowl, and shrink bands, to be used with low flow pumps in accordance with \-29 CFR 1926-\ Section .1101 for personal air sampling.
d. Single use standard 25 millimeter diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 millimeter electrically conductive cowl, and shrink bands, to be used with high flow pumps when conducting environmental area sampling using NIOSH-01 Methods 7400 and 7402, OSHA Method ID-160 and the transmission electric microscopy method specified at \-40 CFR 763-\.
e. Appropriate plastic tubing to connect the air sampling pump to the selected filter cassette.
f. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 degrees Fahrenheit to plus 140 degrees Fahrenheit and traceable to a National Institute for Standards and Technology (NIST) primary standard.

1.24 MATERIAL SAFETY DATA SHEETS

Material safety data sheets (MSDSs) shall be provided for all hazardous materials brought onto the worksite. One copy shall be provided to the Contracting Officers on-site Representative and one copy shall be included in the Contractor's Hazard Communication Program.

1.25 OTHER ITEMS

A sufficient quantity of other items shall be provided that may include, but not be limited to: scrapers, brushes, brooms, staple guns, tarpaulins, shovels, rubber squeegees, dust pans, other tools, scaffolding, staging, enclosed chutes, wooden ladders, lumber necessary for the construction of asbestos regulated containment work areas, UL approved temporary electrical equipment, material and chords, ground fault circuit interrupters, water hoses of sufficient length, fire extinguishers, first aid kits, portable toilets, logbooks, log forms, markers with indelible ink, spray paint in bright color to mark areas, project boundary fencing, etc.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall use the engineering controls and work practices required in 29 CFR 1926.1101(g) in all operations covered by this section, regardless of the levels of exposure. Asbestos abatement work tasks shall be performed as shown on the detailed plans and drawings as summarized in paragraph DESCRIPTION OF WORK to include Table 1. Personnel shall wear and utilize protective clothing and equipment as specified. Eating, smoking, drinking, or applying cosmetics shall not be permitted in the asbestos regulated work area. All hot work

(burning, cutting, welding, etc.) shall be conducted under strictly controlled conditions in conformance with 29 CFR 1926. Personnel of other trades not engaged in asbestos abatement activities shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions as required herein are complied with. Electrical service shall include ground fault circuit interrupters and shall be disconnected where necessary for wet removal. Temporary electrical service shall be provided where needed. If an asbestos spill occurs outside of the asbestos regulated work area, work shall be stopped and the Contracting Officer shall be notified. The condition shall be corrected to the satisfaction of the Contracting Officer including air sampling, prior to resumption of work. The Contractor shall stop abatement work in the asbestos regulated work area immediately when the airborne total fiber concentrations exeed 0.01 f/cc outside the asbestos regulated work area, or equals or exceeds 1.0 f/cc inside the asbestos regulated work area. The Contractor shall correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work resumption will only be allowed upon notification by the Contracting Officer. Corrective actions shall be documented.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement work shall be performed without damage or contamination of adjacent work or area. Where such work or area is damaged or contaminated as verified by the Contracting Officer using visual inspection and/or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and/or sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the Contracting Officer, work may proceed.

3.3 ASBESTOS CONTROL AREA REQUIREMENTS

Regulated containment areas shall be established and maintained for each abatement work task as specified in 29 CFR 1926.1101 and the selected SET-UP DETAIL SHEETS.

3.4 CLEAN UP

The Contractor shall maintain a clean work area by performing on a daily basis the following housekeeping functions at the end of each shift:

a. Loose ACM shall be prepared for disposal by packaging the waste and removing it from the work area to the load-out area.
b. Work area shall be HEPA vacuumed.

3.5 METHODS OF COMPLIANCE

3.5.1 Mandated Practices: The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M and the specification requirements herein. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including but not limited to details of construction materials, equipment, and handling procedures. The Contractor shall use the appended drawings which detail the required work practices and engineering controls. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters to collect all debris and dust containing ACM.
b. Wet methods or wetting agents to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup, except where it can be demonstrated that the use of wet methods is infeasible due to, for example, the creation of electrical hazards, equipment

malfunction, and in roofing.

c. Prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers.

3.5.2 Unacceptable Practices: The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
c. Dry sweeping, shoveling, or other dry clean-up of dust and debris containing ACM.
d. Employee rotation as a means of reducing employee exposure to asbestos.

3.5.3 Specific Control Methods for Class II Work: In addition to requirements of paragraph, Class II Work, Class II asbestos work shall be performed using the following methods:

Roofing Material: The Contractor shall use the following work practices when removing roofing materials which contain ACM as shown in RESPONSE ACTION DETAIL SHEET 74. Roofing material shall be removed in an intact state. Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards. When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operations shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. Asbestos-containing roofing material shall not be dropped or thrown to the ground. It shall be lowered to the ground via covered, dust-tight chute, crane or hoist. Any ACM that is not intact shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting. Intact ACM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. Unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust. Critical barriers shall be placed over roof level heating and ventilation air intakes.

3.5.4 Class II Asbestos Work Response Action Detail Sheets: The following Class II Asbestos Work Response Action Detail Sheet are specified on Table 1 for each individual work task to be performed.

Removal of Built-up Roof: See Action Detail Sheet 74

3.6 FINAL CLEANING AND VISUAL INSPECTION

The abated asbestos regulated work area shall be cleaned by collecting, packing, and storing all gross contamination; see SET-UP DETAIL SHEETS 9 and 14. A final cleaning shall use HEPA vacuum and wet cleaning of all exposed surfaces and equipment in the asbestos regulated work area. Upon completion of the cleaning, the Contractor shall conduct a visual pre-inspection of the cleaned area in preparation for a final inspection before final air clearance monitoring and reclean, as necessary. Upon completion of the final cleaning, the Contractor and the Contracting Officer shall conduct a final visual inspection of the cleaned work area in accordance with ASTM E 1368 and document the results on the Final Cleaning and Visual Inspection as specified on the SET-UP DETAIL SHEET 19. If the Contracting Officer rejects the abatement area as not meeting final cleaning requirements, the Contractor shall reclean as necessary and have a follow-on inspection conducted with

the Contracting Officer. Recleaning and follow-up reinspection shall be at the Contractor"s expense.

3.7 EXPOSURE ASSESSMENT AND MONITORING

3.7.1 Requirements: Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101, the Contractor's air monitoring plan, and as specified. Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be performed by the Contractor's designated IH. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section. The Contractor shall provide an on-site independent testing laboratory with qualified analysts and appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926.1101 to include NIOSH-01 Method 7400. Preabatement and during abatement area environmental air monitoring shall be performed by the Contractor's designated IH. Results of breathing zone samples shall be posted at the job site and made available to the Contracting Officer as specified. The Contractor shall maintain a fiber concentration inside a regulated work area equal to or less than 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with the Contracting Officer to determine the cause. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as average over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by the Contracting Officer.

3.7.2 Initial Exposure Assessment: The Contractor's designated IH shall conduct an exposure assessment immediately before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation. The assessment must be completed in time to comply with the requirements which are triggered by exposure data or the lack of a "negative exposure assessment," and to provide information necessary to assure that all control systems planned are appropriate for that operation. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the Contractor which indicate the levels of airborne asbestos likely to be encountered on the job.

3.7.3 Negative Exposure Assessment: The Contractor shall provide a negative exposure assessment for the specific asbestos job which will be performed. The negative exposure assessment shall be provided within 5 days of the initiation of the project and conform to the following criteria:

a. Objective Data: Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the PEL-TWA and PEL-excursion limit under those work conditions having the greatest potential for releasing asbestos;

b. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-excursion limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; and the data were obtained during work operations conducted under workplace conditions "closely resembling" the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations, the operations were conducted by employees whose training and experience are no more extensive that of employees performing the current job, and these data show that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that employee exposures will not

exceed the PEL-TWA and PEL-excursion limit; or

c. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job made from breathing zone air samples that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee covering operations which are most likely during the performance of the entire asbestos job to results in exposures over the PELs.

3.7.4 Air-Monitoring Results and Documentation: Air sample fiber counting shall be completed and results provided within 24 hours (personal, environmental/clearance monitoring samples) after completion of a sampling period. The Contracting Officer shall be notified immediately of any airborne levels of asbestos fibers in excess of established requirements. Written sampling results shall be provided within 5 working days of the date of collection. The written results shall be signed by testing laboratory analyst, testing laboratory principal and the Contractor's Designated IH. The air sampling results shall be documented on a Contractor's daily air monitoring log. The daily air monitoring log shall be submitted to the COR if requested, and shall contain the following information for each sample:

a. Sampling and analytical method used;
b. Date sample collected;
c. Sample number;
d. Sample type (P = Personal, A = Area, C = Abatement Clearance, IRWA = Inside regulated work area, ORWA = Outside regulated work area, DU = Decontamination Unit, LOU = Load-out unit, AT = Access Tunnel);
e. Sample period (start time, stop time), elapsed time (minutes), TWA calculation;
f. Sampling pump manufacturer - model and serial number, average flow rate (liters per minute (L/min));
g. Total air volume sampled (liters (l));
h. Sample results (fibers per cubic centimeter (f/cc)) and structures per square millimeter (s/mm square) if EPA methods are required for final clearance;
i. Location/activity/name where sample collected.
j. Calibration: Date, time, method, location, name of calibrator, signature.
k. Sample analysis: Lab name, location, analytical method, analyst, confidence level. In addition, print the name and provide a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log verifying the accuracy of the information.

3.8 SITE INSPECTION

While performing asbestos removal work, the Contractor shall be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by quality assurance, safety and industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative may issue a stop work order to be in effect immediately until the violation is resolved. Standby time required to resolve the violation shall be at the Contractor's expense.

3.9 CLEAN UP AND DISPOSAL

3.9.1 Housekeeping: Surfaces of regulated work areas shall be kept free of accumulation of asbestos-containing debris. Meticulous attention shall be given to restricting the spread of dust and debris. HEPA filtered vacuum cleaners shall be used. Regulated work areas shall not be blown down with compressed air. When asbestos abatement is complete and all ACM waste is removed from the regulated areas, and final clean-up is completed, the Contracting Officer will certify the areas as safe before the warning signs and boundary warning tape can be removed.

3.9.2 Title to Materials: Material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable Federal state and local, regulations.

3.9.3 Collection and Disposal of Asbestos: All ACM waste including contaminated waste water and waste water filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in leak-tight, containers. An OSHA warning and Department of Transportation (DOT) label shall be affixed or preprinted on each bag - see DETAIL SHEET 14. Asbestos containing waste shall be disposed of at an EPA, state and local approved asbestos landfill off Government property. For temporary storage, sealed impermeable containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e.; dumpster, roll-off waste boxes, etc.) in a manner as accepted by and in an area as assigned by the Contracting Officer. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards.

TABLE 1
INDIVIDUAL WORK TASK DATA ELEMENTS

There is a separate data sheet for each individual work task. Sheet_1_ of _1

1. WORK TASK DESIGNATION NUMBER: A
2. LOCATION OF WORK TASK: Roof
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Built-up roofing material
   Type of Asbestos: Chrysotile
   % asbestos content: 5%
4. ABATEMENT TECHNIQUE TO BE USED: REM
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK: II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK:
   Friable____ Non-friable Category I __X___ Non-friable Category II__
7. FORM: EA CONDITION OF ACM: G
8. QUANTITY: LINEAR FT.
   SQUARE FT._____6500_____
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK: 74
10. SET-UP DETAIL SHEET NUMBERS FOR WORK TASK
    9A, 9B, 9C, 12, 13, 14, 19

NOTES:

(1) Numeric sequence of individual work tasks (1, 2, 3, 4, etc.) for each asbestos regulated work area. Each category of EPA friability / OSHA class has a separate task.
(2) Specific location of work (building, floor, area, ex. Bldg 1421, 2nd Floor, Rm 201)
(3) A description of material to be abated, (example: horizontal pipe, cement wall panels, tile, stucco, etc.) and the Type of asbestos (chrysotile, amosite, crocidolite, etc.) and %content.
(4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = CAS; Enclosure = ENCL; Repair = REP.
(5) Class designation: Class I, II, III, or IV (OSHA designation).
(6) Friability of materials: Friable = FR; Non-friable = NF-1 or NF-2; (number indicates friable category) NESHAP designation).
(7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME. Condition: Good = G; Fair = F; Poor = P.
(8) Quantity of ACM in Linear Feet (ft); Square Feet (sf)
(9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
(10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet)

TABLE 2

FORMULA FOR CALCULATION OF THE 95 PERCENT CONFIDENCE LEVEL
(Reference: NIOSH 7400)

Fibers/cc (01.95 percent CL) = X + [(X) * (1.645) * (CV)]

Where: X = ((E) (AC)) / ((V) (1000))

E = ((F/Nf) - (B/Nb)) / Af

CV = The precision value; 0.45 shall be used unless the analytical laboratory provides the Contracting Officer with documentation (Round Robin Program participation and results) that the laboratory's precision is better.

AC = Effective collection area of the filter in square millimeters

V = Air volume sampled in liters

E = Fiber density on the filter in fibers per square millimeter

F/Nf = Total fiber count per graticule field

B/Nb = Mean field blank count per graticule field

Af = Graticule field area in square millimeters

TWA = C1/T1 + C2/T2 = Cn/Tn

Where: C = Concentration of contaminant.

T = Time sampled.

TABLE 3

NI0SH METHOD 7400
PCM ENVIRONMENTAL AIR SAMPLING PROTOCOL (NON-PERSONAL)

Sample Location	Minimum No. of Samples	Filter Pore Size (Note 1)	Min. Vol.(Note 2) (Liters)	Sampling Rate (liters/min)
Inside Abatement Area	5/1500 Square Feet (Notes 3 & 4)	0.45 microns	1500	2-10
Each Room in Abatement Area Less than 1500 Square Feet	1	0.45 microns	1500	2-10
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:

1. Type of filter is Mixed Cellulose Ester.

2. Ensure detection limit for PCM analysis is established at 0.005 fibers/cc.

3. One sample should be added for each additional 1500 square feet.

4. No less than 5 samples are to be taken per abatement area, plus two field blanks.

TABLE 4

EPA AHERA METHOD: TEM AIR SAMPLING PROTOCOL

Location Sampled	Minimum No. of Samples	Filter Pore Size	Min. Vol. (Liters)	Sampling Rate (liters/min.)
Inside Abatement Area	5	0.45 microns	1199	2-10
Outside Abatement Area	5	0.45 microns	1199	2-10
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:

1. Type of filter is Mixed Cellulose Ester.

2. The detection limit for TEM analysis is 70 structures/square mm.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____

PROJECT ADDRESS _____ _____

CONTRACTOR FIRM NAME _____

EMPLOYEE'S NAME _____,_____,____ __ __ __- __ __- __ __ __ __

(Print) (Last) (First) (MI) Social Security Number

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAVE BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior signing this certification.

FORMAL TRAINING:

_____ a. For Competent Persons and Supervisors: I have completed EPA's formal Model Accreditation Program (MAP) training course, "Contractor/Supervisor" that meets EPA's and this state's requirements.

b. For Workers:

_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker" that meets EPA's and this state's requirements.

_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials (i. e., roofing, siding, floor tile etc.): I have completed EPA's MAP training course, "Worker" that meets EPA's and this state's requirements.

(3) For OSHA Class II work (there will only be abatement of one type of Class II material:

_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926.1101 (k) (9)(viii) in addition to the specific work practices and engineering controls at 29 CFR 29 1926.1101(g) and hands-on training.

_____ (b) I have completed EPA's MAP training course, "Worker" as required for Class II work by this state's requirements.

_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763.92(a)(2) and the elements of 29 CFR 1926.1101(k)(9)(viii) in addition to the specific work practices and engineering controls at 29 CFR 1926.1101 and hands-on training.

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at

40 CFR .763-\(a)(1) and the elements of 29 CFR 1926.1101 (k)(9)(viii) in addition to the specific work practices and engineering controls at 29 CFR 1926.1101 (g) and hands-on training.

_____c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA and this state's requirements.

PROJECT SPECIFIC TRAINING:

_____ I have been provided and have completed the project specific training required by this Contract. My employer's Industrial Hygienist and Designated Competent Person supervisor conducted the training.

RESPIRATORY PROTECTION:

_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair policy of my employer.

RESPIRATOR FIT-TEST TRAINING:

_____ I have been trained in the proper selection, fit, use, care, cleaning, and maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:

_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks;

_____ were identified physical limitations to performing the required work tasks.

Date of the medical examination_____

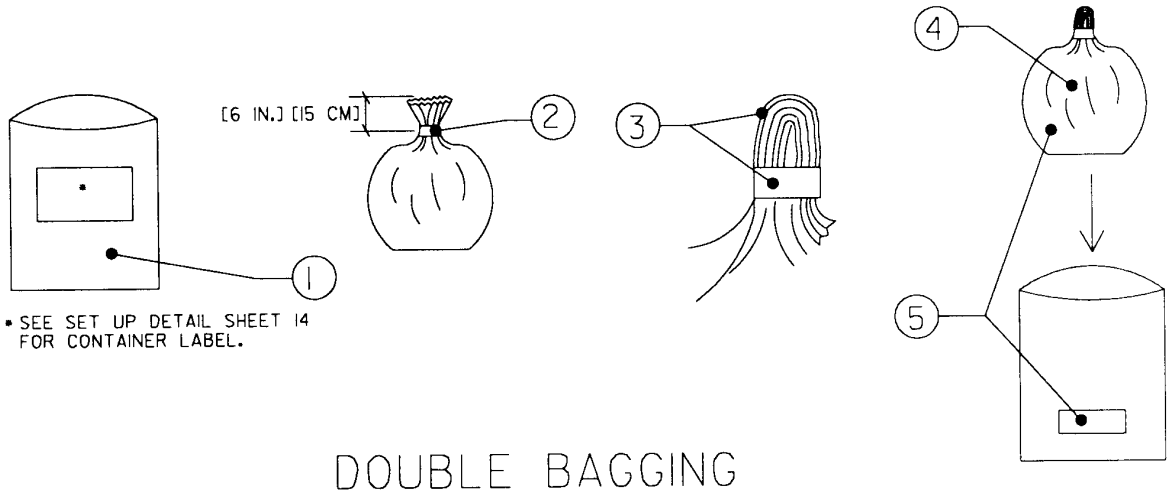
_____ _____

Employee Signature Date

_____ _____

Contractor’s Industrial Hygienist Signature and Seal Date

-- END OF SECTION --



Containers - Double Bagging

1. Place the still-wet asbestos-containing and asbestos-contaminated material into a prelabeled 6-mil polyethylene bag. Do not overfill. Do not use bag for asbestos-containing or asbestos-contaminated material that could puncture the bag. (See Sheet 9C for packaging items that could puncture bags.)

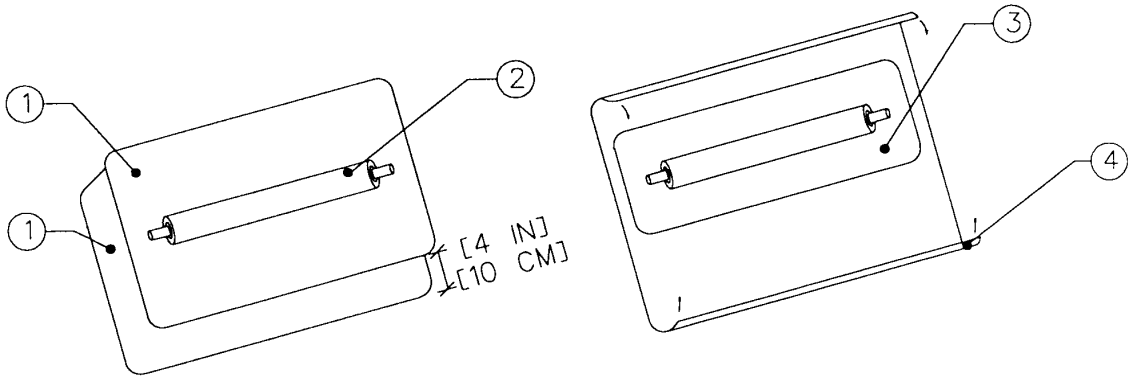
2. Evacuate with HEPA vacuum and seal collapsed bag by twisting top (6 in - 15 cm) closed and wrapping with a minimum of two layers of duct tape.

3. Twist top and fold over. Apply second wrap of duct tape.

4. Adequately wet clean outside of disposal bag by wet wiping, and take bag to the equipment and staging area.

5. Place bag inside a second prelabeled 6-mil polyethylene bag.

6. Seal outer bag by repeating steps 2 and 3 above. Take bag to load-out unit; see Sheet 20.



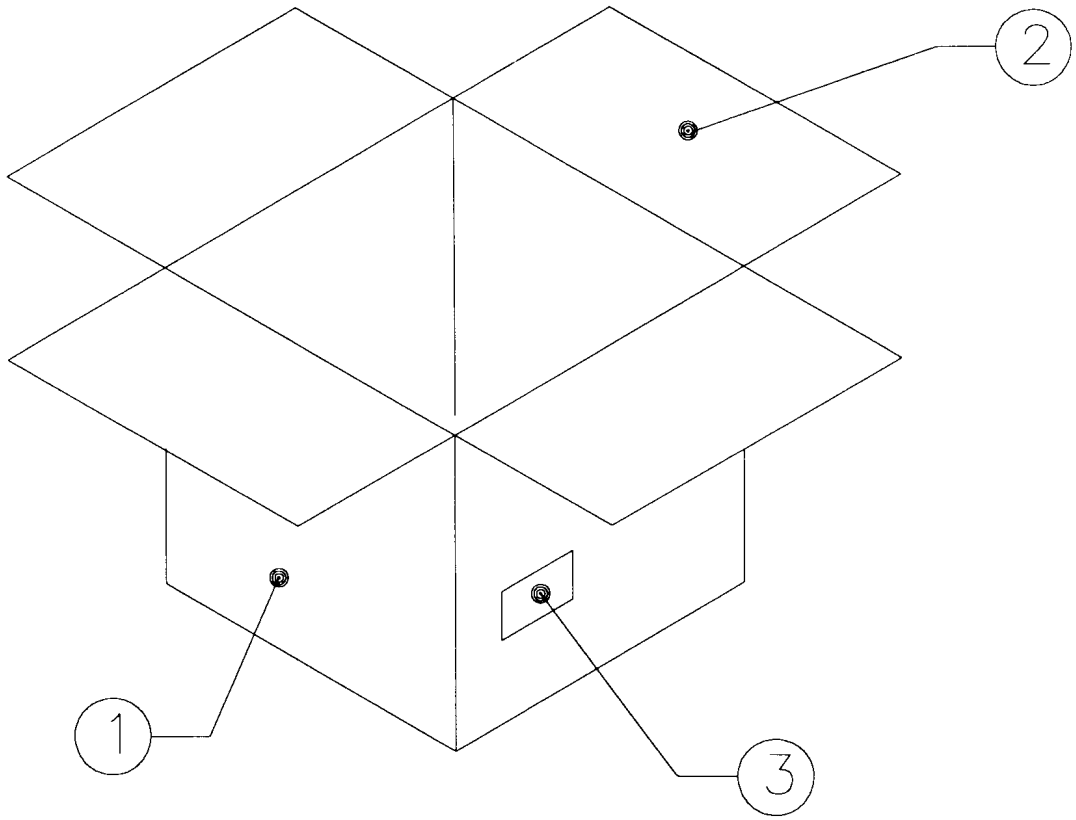
Containers - Leak-Tight Wrapping

1. Place two layers of 6-mil polyethylene sheet on surface so that the bottom layer is offset (10 cm or 4 in) from the top layer.

2. Place the still-wet asbestos-containing or asbestos-contaminated material that is too large (boiler, vessel, pipe segment, etc.) to be placed in disposal bags on the top layer of polyethylene.

3. Wrap the top layer tightly around the contaminated material. Seal all edges of the top layer of sheeting with duct tape. Apply labels; see Sheet 14.

4. Repeat procedure with bottom layer, including labeling. Take to load-out unit; see Sheet 20.

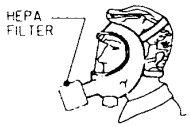
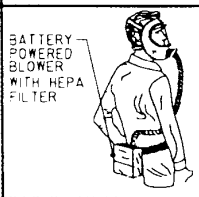
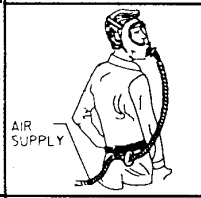
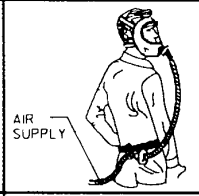
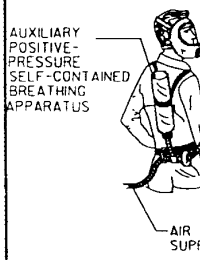


Containers - Corrugated Cardboard Boxes

1. Place still-wet asbestos-containing or asbestos-contaminated material that could puncture disposal bags into heavy-duty corrugated cardboard boxes coated withy plastic or wax that will retard deterioration from moisture.

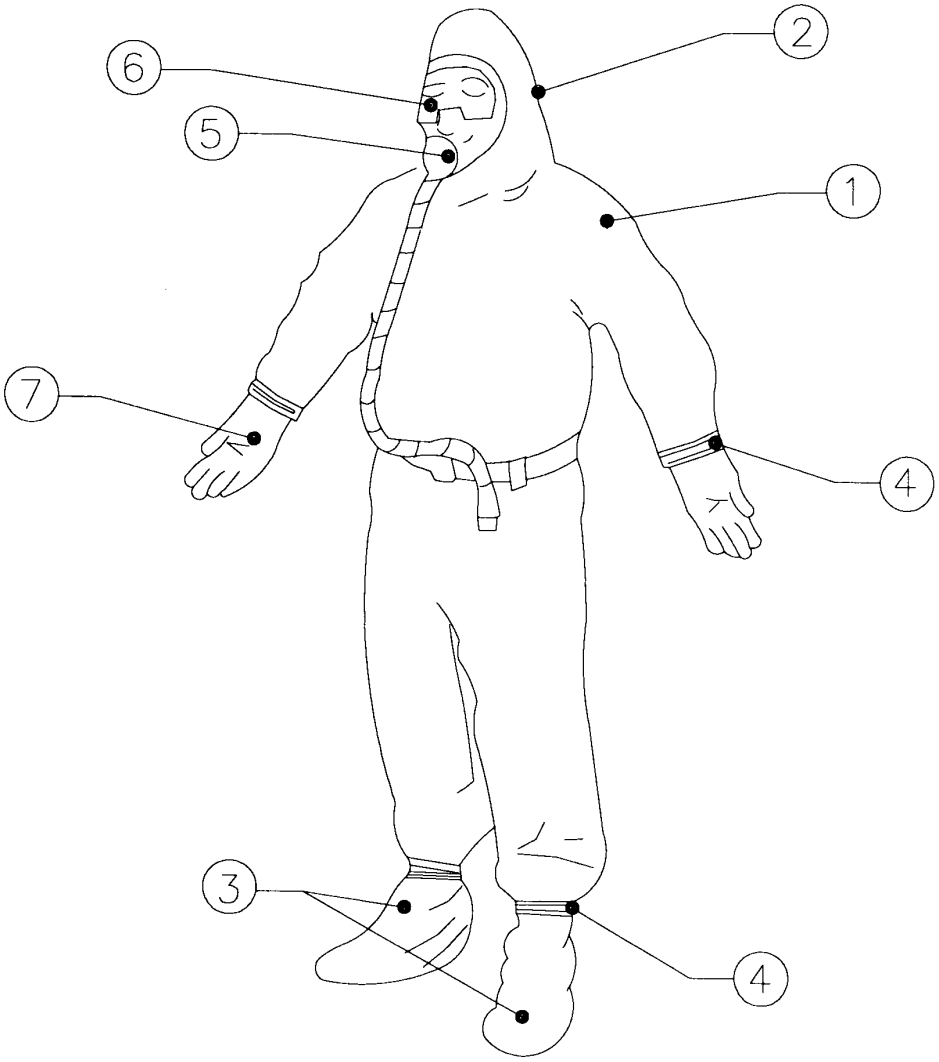
2. Close flaps and seal with duct tape.

3. Apply labels; see Sheet 14. Place box into disposal bags; see Sheet 9A. Take to load-out unit; see Sheet 20.

FIBER CONCENTRATION	MINIMUM REQUIRED RESPIRATOR	
NOT IN EXCESS OF 2 FIBER/CC (10 X PEL)	HALF MASK AIR PURIFYING RESPIRATOR WITH HEPA FILTERS	
NOT IN EXCESS OF 5 FIBERS/CC (25 X PEL)	HELMET OR HOOD POWERED AIR-PURIFYING RESPIRATOR WITH HEPA FILTERS	
NOT IN EXCESS OF 10 FIBERS/CC (50 X PEL)	FULL FACEPIECE AIR-PURIFYING RESPIRATOR WITH HEPA FILTERS HALF-MASK POWERED AIR PURIFYING RESPIRATORS WITH HEPA FILTERS	
NOT IN EXCESS OF 20 FIBERS/CC (100 X PEL)	FULL FACEPIECE POOWERED AIR-PURIFYING RESPIRATOR WITH HEPA FILTERS SUPPLIED AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE	
NOT IN EXCESS OF 200 FIBERS/CC (1000 X PEL)	FULL FACEPIECE SUPPLIED AIR RESPIRATOR OPERATED IN PRESSURE-DEMAND MODE WITH BACK-UP POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS	
GREATER THAN 200 FIBERS/CC (>1000 X PEL) OR UNKNOWN CONCENTRATION	FULL FACEPIECE SUPPLIED AIR RESPIRSTOR OPERATED IN PRESSURE-DEMAND MODE WITH AUXILIARY POSITIVE-PRESSURE SELF-CONTAINED BREATHING APPARATUS FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND MODE	

Respiratory Protection Table

Setup Detail Sheet 12



Protective Clothing

1. Disposable or reusable full body suit with elastic around hood and shoe cover openings is required or as otherwise specified in the contract.

2. Hood shall be worn over respirator's head and neck straps.

3. Shoe covers shall be worn over work shoes.

4. Cuffs shall be taped with duct tape at wrists and ankles in order to prevent infiltration.

5. Cartridge-type air-purifying HEPA filter respirator is minimal requirement. Type shall be selected in accordance with Sheet 12.

6. If eye protection is not integral with respirator, protective goggles are required.

7. Rubber work gloves are recommended to be worn alone or under outer work gloves provided for hand and operation safety.

Certification of Final Cleaning and Visual Inspection

Individual abatement tasks as identified in paragraph, Description of Work and/or Table 1: _____

_____

In accordance with the cleaning and decontamination procedures specified in the Contractor's asbestos hazard abatement plan and this contract, the Contractor hereby certifies that he/she has thoroughly visually inspected the decontaminated regulated work area (all surfaces, including pipes, beams, ledges, walls, ceiling, floor, decontamination unit, etc.) in accordance with ASTM E1368, *Standard Practice for Visual Inspection of Asbestos Abatement Projects*, and has found no dust, debris, or asbestos-containing material residue.

BY: **Contractor**

Signature_____ Date _____

Print Name and Title _____

Contractor's Onsite Supervisor

Signature _____ Date _____

Print Name and Title _____

Contractor's Industrial Hygienist

Signature _____ Date _____

Print Name and Title _____

Contracting Officer Acceptance or Rejection

The Contracting Officer hereby determines that the Contractor has performed final cleaning and visual inspection of the decontaminated regulated work area (all surfaces including pipes, beams, ledges, walls, ceiling, floor, decontamination unit, etc.) and by quality assurance inspection, finds the Contractor's final cleaning to be:

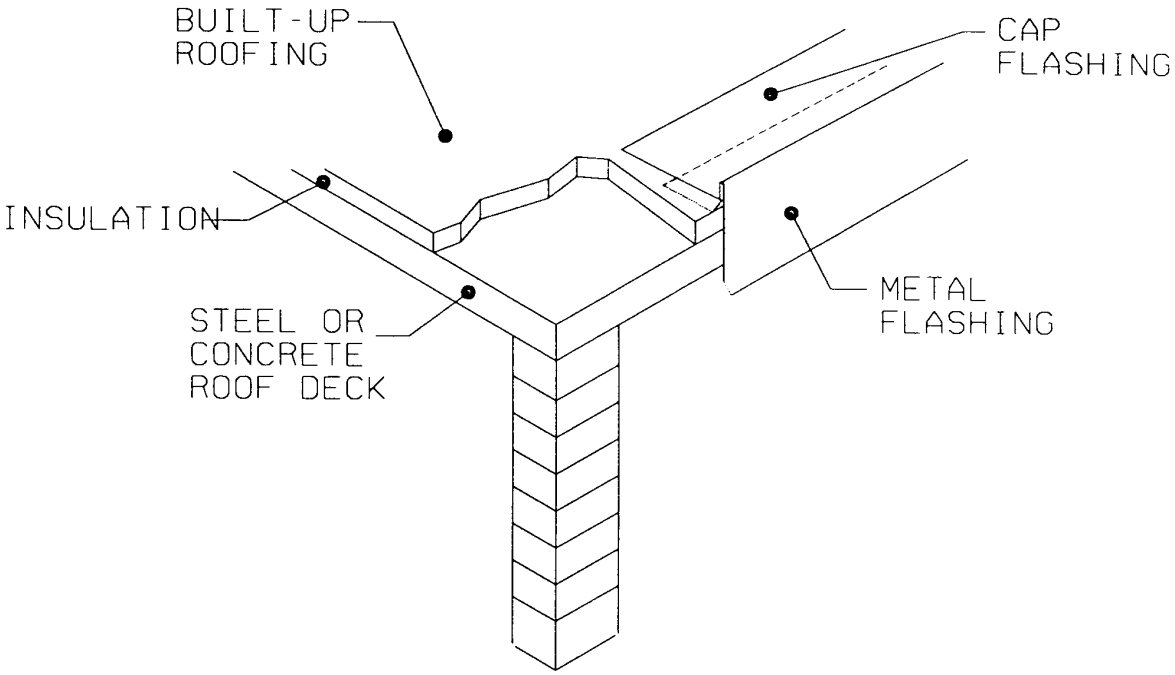
☐ Acceptable

☐ Unacceptable - Contractor instructed to reclean the regulated work area.

BY: **Contracting Officer's Representative**

Signature _____ Date _____

Print Name and Title _____



Removal of Built-Up Roofing and Flashing

1. No containment area is required. Establish boundaries of asbestos-regulated work area so that unauthorized entry is prevented. Provide personal protection and decontamination facilities as specified in Contractor's Asbestos Hazard Abatement Plan.

2. Remove accumulated debris.

3. Adequately wet mist flashing and built-up roofing, initially and during removal procedures. Remove flashing and built-up roofing.

4. Dispose of all materials by carefully sliding them down an enclosed chute into an enclosed Dumpster or truck that is lined with two layers of 6-mil polyethylene. When the Dumpster or truck is filled, fold the polyethylene edges over each other ("burrito" wrap) and seal with duct tape; see Sheet 9 for leak-tight wrapping. Apply labels; see Sheet 14.

5. Clean and HEPA vacuum roof.

6. Inspect and reclean area as necessary.

7. Apply tinted penetrating encapsulant to exposed roof deck, using an airless sprayer. Inspect and reapply encapsulant as necessary.

8. Prepare area for final clearance.

9. Contractor and Contracting Officer will certify visual inspection of work area on Sheet 19, *Certification of Final Cleaning and Visual Inspection*.