AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 of 7

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
0002	16-May-2003		0250570

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than item 6)	CODE
USA ENGINEER DISTRICT, SEATTLE ATTN: CENWS-CT P.O. BOX 3755 SEATTLE WA 98124-3755	DACA67	**See Item 6**	

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
	X	9A. AMENDMENT OF SOLICITATION NO. DACA67-03-R-0210
	X	9B. DATED (SEE ITEM 11) 22-Apr-2003
		10A. MOD. OF CONTRACT/ORDER NO.
		10B. DATED (SEE ITEM 13)
CODE	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer [X] is extended, [ ] is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning 0 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

[ ] A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

[ ] B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).

[ ] C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

[ ] D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [ ] is not, [ ] is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

BATTLE SIMULATION CENTER, FORT LEWIS, WA - SEE CONTINUATION

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) TEL: EMAIL:	
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)	16C. DATE SIGNED 16-May-2003

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

A. This amendment provides for the following revisions to the solicitation:

1. The first page of the solicitation that begins "This procurement is open to both large and small business" is revised to change the telephone number at the bottom page from "766-6806" to "764-6806."

2. Table of Contents Page is revised to show the addition of an attachment: Quality Assurance Surveillance Plan.

3. The Caution Page is revised to add para. 11 which reads as follows: "11. **HUBZONE CERTIFICATION**: Your attention is drawn to FAR Clause 52.219-4, NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999) in section 0600. A HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration Reference: https://el.sba.gov:9000/prodhubzone/hubzone/approval.stm"

4. The Standard Form 1442, block is revised to reflect the extension of the proposal due date to 29 May 2003.

5. Section 00110, Proposal Submission and Evaluation, is revised as follows:
   a. Para. 2.5, Evaluation Standards: The descriptions for marginal and unsatisfactory have been revised.
   b. Para. 5, Summary of Price Proposal Format, is revised to show that the 20% bid bond is for construction work only – 0001 through 0005 and 0007 through 0015.
   c. Para. 5.3 is revised to show that the 20% bid bond is for construction work only – 0001 through 0005 and 0007 through 0015 and that performance and payment bonds will only be required for the construction portion of the work to be performed under this contract.

6. Section 00600, Representations and Certifications, is revised as follows:
   a. Add provision 52.222-25, Affirmative Action Compliance (APR 1984)
   b. Add provision 52.223-4, Recovered Material Certification (OCT 1997)

7. Section 00700, Contract Clauses, is revised as follows:
   a. Delete provision 52.222-25, Affirmative Action Compliance (APR 1984)
   b. Add clause 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (AUG 2000) NOTE: As stated in Federal Acquisition Regulations (FAR) 23.405(b), the list of EPA-designated products is available via the internet at http://www.epa.gov/cpg/.

8. Section 00800, Special Clauses - Construction, is revised as follows:
   a. SC-1.1, Option for Increased Quantity, is revised to show that construction-phase optional items 0007 through 0015 may be awarded, at any time, or not at all, but no later than 90 calendar days after receipt by Contractor of notice to proceed.
   b. The Index of Drawings is revised.
   c. Drawing revisions by notation are listed.
   d. Standard details bound in the specifications are listed.
   e. Sketches SD-1 and SD-2 for drawing S-403 (electric transformer and generator enclosure plan) are attached at the end of Section 00800.

9. Section 00801, Special Clauses – O&M Phase, is revised to add para. SC-A10 Bonding Requirements, which states "A10.1 Performance and payment bonds are required for the construction line items awarded in this contract. No performance or payment bonds are required for the operation and maintenance line items awarded in this contract."

10. Technical Specification Sections are revised as follows:

a. The table of contents is revised to: 1) in Division 8 Door & Windows, **delete 08600 Skylights**; 2) in Division 11 Equipment, **delete 11020 Security Vault Door**; 3) in Division 12 Furnishings, **add 13721 Intrusion Detection System**; 4) in Division 15 Mechanical, **add 16264 Diesel-Generator Set, Stationary 15-300 KW, Stationary Applications** and **add 16410 Automatic Transfer Switch.**

b. Section 01830, Facility Maintenance Program, includes revision to the table of contents, addition of paragraph 1.10, Performance Requirements Summary, and makes miscellaneous changes to the text.

c. Section 04200, Masonry: Under para. 2.2 Concrete Masonry Units, subpara.s 3, color of units, and f, surface texture of units, are revised.

d. Section 06100, Rough Carpentry, the following are revised: 1) Para. 1.1 References (adds the Forest Stewardship Council); and 2) para. 2.1.1.1 Lumber Products.

e. Section 06200, Finish Carpentry, the following are revised: 1) Para. 1.1 References (adds the Forest Stewardship Council); and 2) para. 2.1 Wood Items, Veneer Panels, Siding and Trim.

f. Section 06410, Laminate and Veneer Clad Architectural Casework, the following are revised: 1) Para. 1.1 References (adds the California Air Resource Board, Forest Stewardship Council and South Coast Air Quality Management District); 2) para. 2.1 Wood Materials; 3) para. 2.9.1 Adhesives; and 4) para. 2.9.3 Sealant.

g. Section 06650, Solid Polymer (Solid Surfacing) Fabrications, the following are revised: 1) Para. 1.1 References (adds the California Air Resources Board and South Coast Air Quality Management District).

h. Section 07900, Joint Sealing, the following are revised: 1) Para. 1.1 References (adds the California Air Resources Board and South Coast Air Quality Management District); and 2) new para. 2.1 Indoor Quality is added and the following paragraphs are renumbered.

i. Section 08210, Wood Doors, the following are revised: 1) Para. 1.1 References (adds the Forest Stewardship Council and South Coast Air Quality Management District); 2) para. 2.1.1.1 Interior Flush Doors; 3) para. 2.1.2 Door Frames; and 4) para. 2.3.3 Adhesives and Bonds.

j. Section 08520, Aluminum and Environmental Control Aluminum Windows, the following are revised: 1) para. 1.2.4 Thermal Performance; and 2) miscellaneous typographical change.

k. **Section 08600, Skylights, is deleted**.

l. **Section 08710, Door Hardware, is deleted in its entirety**.

m. Section 08810, Glass and Glazing, the following are revised: 1) Para. 1.2 Submittals; 2) para. 1.4 Delivery, storage and handling; 3) para. 2.3.2 Low-E Insulating Glass; and 4) para. 2.7.1 Glass Mirrors.

n. Section 09650, Resilient Flooring, the following are revised: 1) Para. 1.1 References (adds the California Air Resources Board and South Coast Air Quality Management District); 2) para. 2.2.2 Adhesive for Linoleum Tile and 2.4.1 Adhesive for Wall Base (add AQMD to Rule #1168); and 3) para. 2.6 Caulking and Sealants.

o. Section 09685, Carpet Tile, the following are revised: 1) Para. 1.1 References (adds the South Coast Air Quality Management District); 2) new para. 1.6.3 Adhesives is added.

p. Section 09900, Paints and Coatings, the following revisions were made but not identified by a bar in the margin: 1) Para. 1.1 References adds a new paragraph after Federal Standards (FED-STD) which states: "GREEN SEAL, GS-11, (1993) Standard Establishes Environmental Requirements for Paints."; and table at para. 3.3.1, Existing and New Ferrous Surfaces, removes the "<SPS></SPS>" designations and puts in the correct designations in all cases.

q. Section 10100, Visual Communication Specialties, the following are revised: 1) Para. 1.1 References (adds the South Coast Air Quality Management District); 2) new para. 2.5 Adhesives is added.

r. Section 10260, Wall and Corner Guards, the following are revised: 1) Para. 1.1 References (adds the South Coast Air Quality Management District); 2) para. 2.6 Adhesives.

s. **Section 11020, Security Vault Door, is deleted**.

t. New Section 13721, Intrusion Detection System, is added.

u. Section 13851, Fire Detection and Alarm System, Addressable: Para. 2.8.1.3 Antenna is revised.

v. Section 15515, Low Pressure Water Heating Boilers (Over 800,000 BTU/HR Output): Para. 2.3.1 Gas-Fired Power Burner is revised.

w. Section 15895, Air Supply, Distribution, Ventilation, and Exhaust System: 1) para. 2.6.2.1 Cartridge Type Filters is revised; and 2) new paragraph 3.7.1.9 Extra Materials and Work is added.

x. New Section 16264, Diesel-Generator Set, Stationary 15-300 KW, Standby Applications is added.

y. Section 16375, Electrical Distribution System, Underground: under para. 2.8.1.3 Integral Outgoing Section, subparagraphs i. Terminal Boards, and j. Wire Marking are deleted.

z. New Section 16410, Automatic Transfer Switch, is added.

aa. Section 16415, Electrical Work, Interior, the following are revised: 1) para. 2.9.6, Lighting Inverter, subpara. d; and 2) para. 2.19.2.2 Molded-Case Circuit Breakers, subpara. a.

11. The Quality Assurance Surveillance Plan is provided as an attachment to the solicitation. This plan is provided for information purposes only. The Quality Assurance Surveillance Plan is not part of the Request for Proposal nor will it be made part of any resulting contract. The Government has the right to change or modify inspection methods at its discretion.

B. The minutes of pre-proposal conference and sign-in sheet are provided for information only and do not become part of any contract resulting from this solicitation.

C. The revised attached pages supersede pages of the same number and should be inserted in numerical sequence. All changes are generally identified, for your convenience, either by strikeout for deletions, and underlining of text for additions or single dark line in the margin. All portions of the revised or new pages shall apply to this contract whether or not changes have been indicated.

D. The time and date for receipt of proposals are extended to 3:00 p.m., local time, 29 May 2003.

E. Technical amendment 0003 is being prepared and will be issued on or about 20 May 2003.

F. Offerors must acknowledge receipt of this amendment by number and date on the Standard Form 1442 BACK (page 00010-2) in Block 19 or by telegram.

Enclosures:
Rev. First Page
Rev. Table of Contents Page
Rev. Caution Page
Rev. SF1442 Front and Back
Rev. 00110
Rev. 00600
Rev. 00700
Rev. 00800
Rev. 00801
Rev. Table of Contents - Technical Specifications
Rev. Section 01830
Rev. Section 04200
Rev. Section 06100
Rev. Section 06200
Rev. Section 06410
Rev. Section 06650
Rev. Section 07900
Rev. Section 08210
Rev. Section 08520
Rev. Section 08810
Rev. Section 09650
Rev. Section 09685
Rev. Section 09900
Rev. Section 10100
Rev. Section 10260
New Section 13721
Rev. Section 13851
Rev. Section 15515
Rev. Section 15895
New Section 16264
Rev. Section 16375
New Section 16410
Rev. Section 16415
New Quality Assurance Surveillance Plan
Minutes of pre-proposal conference
Sign-in sheet from pre-proposal conference
Rev. Drawing Sheets (See Section 00800 for list)

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THIS PROCUREMENT IS:

Open to both Large and Small Business

FORT LEWIS SITE VISIT INFORMATION:

There will be a one-time pre-proposal conference and site visit on Thursday, May 8, 2003 at 10:00 a.m. The meeting will be held at the David L. Stone Education Center, Building 6242, Room C-209 at Main Fort Lewis, Washington. Directions to this building are as follows: Go into Fort Lewis at the Main Gate. Turn left at the Exchange (PX) gas station (first traffic light) onto Colorado Avenue. Go about one-half mile. The big, new building on the left is the education center. A temporary 1-day vehicle pass is required to drive on Fort Lewis and may be obtained from the Visitor's Center at the Fort Lewis Main Gate. To receive the temporary pass, you must present a valid driver's license, current vehicle registration, proof of insurance and state your destination on post (i.e. Corps of Engineers, pre-proposal conference).

To receive the temporary pass, transmit an email containing the following information to Charlotte Jenks at charlotte.jenks@nws02.usace.army.mil.

1. Name of the Project Manager
2. Site visit time and date
3. Name of company
4. Names of prospective attendees
5. Driver's License Numbers and dates of birth of prospective attendees

NOTE: EMAIL MUST BE SENT AT LEAST FIVE BUSINESS DAYS BEFORE THE SITE VISIT DATE.

To receive passes, visitors should be at the main gate Visitor's Center at least one and a half hours before the meeting. When arriving at the Visitor's Center, all visitors will present a valid driver's license, current vehicle registration, proof of insurance and must state their post destination (i.e. Corps of Engineers, pre-proposal conference). Visitors will have proof of insurance, vehicle registration, and driver's license at all times while driving on base.

Directions to Visitor's Center at Fort Lewis Main Gate: From I-5, take Exit 120 (Fort Lewis) and proceed to the Visitor's Center just inside and to the right of the Main Gate.

OFFERORS ARE URGED and expected to inspect the site where construction is to be performed and to satisfy themselves as to all general and local conditions which may affect the cost of performance of the contract, to the extent such information is reasonably obtainable. In no event, will a failure to inspect the site constitute grounds for withdrawal of a proposal after opening or for a claim after award of the contract.

PROPOSAL DOCUMENTS: All proposal documents, including planholder's lists, are posted at the Seattle District Internet site: http://www.nws.usace.army.mil/ct/. Registered firms receive email notification of updates/amendments.

FOR INQUIRIES, CONTACT THE FOLLOWING:

TECHNICAL MATTERS: Address questions concerning plans and or specifications to the following internet address: techbid@nws02.usace.army.mil.

ADMINISTRATIVE MATTERS: Mary E. Mitton – Contract Specialist
E-mail: mary.e.mitton@nws02.usace.army.mil
Traditional Mail: Seattle District Corps of Engineers, P.O. Box 3755, Seattle, WA 98124-3755
Street Address: 4735 E. Marginal Way S., Seattle, WA 98134-2329

Monday through Friday between the hours of 8:00 a.m. and 3:00 p.m.
Phone: (206) 7646-6806 Fax: (206) 764-6817

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DACA67-02-R-0210 CONTENTS
Request for Proposal (RFP) No.: DACA67-03-R-0210
Battle Simulation Center, Ft. Lewis, WA

TABLE OF CONTENTS

CAUTION TO OFFERORS

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!!!CAUTION TO OFFERORS!!!

1. **TELEPHONES:** Limited telephone service is provided in the lobby. Only two public telephones may be used by offerors for completing offers.

2. **BUSINESS HOURS:** For the Seattle District Corps of Engineers are from 7:30 A.M. to 4:00 P.M., Monday through Friday.

3. **AVAILABILITY OF FUNDS:** Funds are not presently available for this acquisition. No contract award will be made until appropriated funds are made available from which payment for contract purposes can be made.

BEFORE SIGNING AND MAILING THIS OFFER, PLEASE TAKE NOTE OF THE FOLLOWING, AS FAILURE TO PERFORM ANY ONE OF THESE ACTIONS MAY CAUSE YOUR OFFER TO BE REJECTED

4. **AMENDMENTS: Have you acknowledged receipt of ALL** amendments? All amendments are posted at the Contracting web site: http://www.nws.usace.army.mil/ct/ebs/AdvertisedSolicitations.asp

5. **AMENDED PAGES: If any of the amendments furnished amended pages, the amended pages must be used** in submitting your offer.

6. **MISTAKE IN OFFER:** Have you reviewed your offer price for possible errors in calculation or work left out?

7. **BID GUARANTEE:** Sufficient bid guarantee in proper form must be furnished **with your offer. NOTE: CONCERNING BONDS – Matter of All Seasons Construction, Inc. GAO Decision B-291166.2: Bid Bonds must be accompanied by a Power of Attorney containing an original signature from the surety, which must be affixed to the Power of Attorney after the Power of Attorney has been generated. Computer generated and signed Power's of Attorney will only be accepted if accompanied by an original certification from a current officer of the surety attesting to its authenticity and continuing validity**.

8. **TELEGRAPHIC MODIFICATIONS:** The Seattle District does not have the capability of receiving commercial telegrams directly. Offerors who wish to modify their offer by telegram are urged to ensure that telegrams are submitted within enough time to arrive at the opening office prior to the time specified for receipt of proposals. Any doubt as to time should be resolved in favor of **EXTRA TIME.** Transmission by Fax to this office is **NOT ACCEPTABLE**.

9. **OFFER ACCEPTANCE PERIOD:** The minimum offer acceptance period is specified in block 13D of SF1442-1, Solicitation, Offer and Award. Please ensure that you allow at least the stated number of calendar days for the Government to accept your offer.

10. **CENTRAL CONTRACTOR REGISTRATION:** Your attention is drawn to DFARS Clause 252.204-7004, REQUIRED CENTRAL CONTRACTOR REGISTRATION in section 00100. Lack of registration in the CCR database will make offeror ineligible for award. Information on how to register and the time it takes are detailed in the clause.

11. **HUBZONE CERTIFICATION**: Your attention is drawn to FAR Clause 52.219-4, NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999) in section 0600. A HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration Reference: https://el.sba.gov:9000/prodhubzone/hubzone/approval.stm

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SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NUMBER	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE OF PAGES
	DACA67-03-R-0210	☐ SEALED BID *(IFB)* ☒ NEGOTIATED *(RFP)*	22 April 2003	1

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

4. CONTRACT NUMBER	5. REQUISITION/PURCHASE REQUEST NUMBER	6. PROJECT NUMBER
	W68MD9-3027-6329	

7. ISSUED BY	CODE	8. ADDRESS OFFER TO
Seattle District, Corps of Engineers ATTN: CENWS-CT-CB-MU PO Box 3755 Seattle, WA 98124-3755	W68MD9	Seattle District, Corps of Engineers PO Box 3755 ATTN: CENWS-CT-CB-MU - Mitton Seattle, WA 98124-3755 HAND CARRY: Seattle District Corps of Engineers Contracting Division 4735 East Marginal Way South Seattle, WA 98134-2329

9. FOR INFORMATION CALL ▶	A. NAME	B. TELEPHONE NUMBER *(Include area code) (NO COLLECT CALLS)*
	See Information Page inside Front Cover	See Information Page inside Front Cover

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 number, date):*

Furnish all labor, materials and equipment and perform all work for Battle Simulation Center, Fort Lewis, WA in accordance with the attached Contract Clauses, Special Clauses, Technical Specifications and Drawings.

NOTE: Award will be made pursuant to the Small Business Competitive Demonstration Program

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* * Paragraph SC-1, 00800 *.)*

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

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and See Section 00110 copies to perform the work required are due at the place specified in Item 8 by 3:00 p.m. *(hour)* local time 29 May 2003 *(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.

OFFER *(Must be fully completed by offeror)*

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*	15. TELEPHONE NUMBER *(Include area code)*
Tax ID No: DUNS No: eMail:	Fax No.: 16. REMITTANCE ADDRESS *(Include only if different than Item 14)*
CODE FACILITY CODE	

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

AMOUNTS ▶ See Pages 00010-5 thru 00010-8

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)*

21. ITEMS ACCEPTED

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN ▶ *(4 copies unless otherwise specified)* ITEM	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C. 2304(c) ( ) ☐ 41 U.S.C. 253(c) ( )
26. ADMINISTERED BY CODE United States Army Corps of Engineers Seattle District Northwest Area Office PO Box 92146 Tillicum, WA 98492-0146	27. PAYMENT WILL BE MADE BY US Army Corps of Engineers Finance Center CEFC-AO-P, 5722 Integrity Drive Millington, TN 38054-5005

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _____ copies to the 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

STANDARD FORM 1442 BACK (REV. 4-85)

SECTION 00110 – PROPOSAL SUBMISSION AND EVALUATION

1. INTRODUCTION:

1.1 Your firm is invited to submit a proposal in response to Request for Proposals (RFP) No. DACA67-03-R-0210 entitled "Battle Simulation Center, Fort Lewis, WA." This RFP establishes project requirements and provides procedures, format, and other data to assist offerors in preparing their proposals. **It is the intent of the Government to make award based upon initial offers, without further discussions or additional information.** A contract will be awarded to the firm submitting the proposal that conforms to the RFP, is considered to provide the most advantageous offer in terms of the evaluation factors, including price, and is determined to be in the best interest of the Government.

1.2 This project consists of the construction of a 6280 SM Battle Simulation Center and a five-year period of operation and maintenance of the facility; both by the same contractor. The single story air-conditioned facility will feature a concrete slab-on-grade floor with concrete foundation, steel framing with exterior brick veneer walls, metal and E.P.D.M. roofing. Access for the handicapped will be provided. Building systems include communications system raceways, fire detection/protection, and other necessary support features. The facility includes a 250+ seat auditorium, classroom space, simulation exercise areas, a computer room, VIP area, conference rooms, briefing areas, audiovisual projection rooms, administrative space, communications room, secure compartmentalized intelligence facility (SCIF), general, secure, and sensitive material storage areas, and a mechanical room. Force protection measures will include site fencing and a guard shack. Work includes site clearing and excavation, utility systems, roads, paved parking, sidewalks, curbs and gutters, and landscaping. Following completion of construction, the facility will be continuously maintained for a period of five years by the construction contractor under a performance-based requirement.

2. EVALUATION FACTORS:

2.1 Proposals will be evaluated on the basis of two criteria, **TECHNICAL** and **PRICE**. Award will be based upon evaluation of the technical criteria listed below, and price proposals.

2.2 **TECHNICAL EVALUATION CRITERIA:** The technical criteria, listed in **descending order of importance,** are as follows:

1. Construction Contractor Experience with Similar Projects
2. Construction Contractor Past Performance
3. Five-Year Facility Management Plan
4. Key Construction Personnel
5. Extent of Small Business Participation

2.3 **RELATIVE IMPORTANCE DEFINITIONS:** For this evaluation, the following terms will be used to establish the relative importance of the technical criteria:

- Significantly More Important: The criterion is four times more important in value to the Government than another criterion.

- More Important: The criterion is two times more important in value to the Government than another criterion.

2.4 **SUMMARY OF ORDER OF IMPORTANCE for Technical Criteria:**

- Criterion 1 is more important than criterion 2.
- Criterion 2 is significantly more important than criterion 3.
- Criterion 3 is significantly more important than criterion 4.
- Criterion 4 is significantly more important than criterion 5.

2.5 **EVALUATION STANDARDS.** Evaluation criteria will be rated using the following adjectival descriptions.

OUTSTANDING - Information submitted demonstrates offeror's potential to significantly exceed performance or capability standards. The offeror has clearly demonstrated an understanding of all aspects of the requirements to the extent that timely and the highest quality performance are anticipated. Have exceptional strengths that will significantly benefit the Government. The offeror convincingly demonstrated that the RFP requirements have been analyzed, evaluated, and synthesized into approaches, plans, and techniques that, when implemented, should result in outstanding, effective, efficient, and economical performance under the contract. Significantly exceeds most or all solicitation requirements. **Very high probability of success.**

ABOVE AVERAGE - Information submitted demonstrates offeror's potential to exceed performance or capability standards. Have one or more strengths that will benefit the Government. The areas in which the offeror exceeds the requirements are anticipated to result in a high level of efficiency or productivity or quality. The submittal contains excellent features that will likely produce results very beneficial to the Government. Fully meets all RFP requirements and significantly exceeds many of the RFP requirements. Disadvantages are minimal. **High probability of success.**

SATISFACTORY (Neutral) - Information submitted demonstrates offeror's potential to meet performance or capability standards. An acceptable solution is provided. Either meets all RFP requirements for the criterion or contains weaknesses in some areas that are offset by strengths in other areas. A rating of "Satisfactory" indicates that, in terms of the specific criterion (or sub-criterion), the offeror has a good probability of success, as there is sufficient confidence that a fully compliant level of performance will be achieved. The proposal demonstrates an adequate understanding of the scope and depth of the RFP requirements. No significant advantages or disadvantages. Equates to neutral. **Good probability of success.**

MARGINAL – The submittal is not adequately responsive or does not address the specific criterion. The offeror's interpretation of the Government's requirements is so superficial, incomplete, vague, incompatible, incomprehensible, or incorrect as to be considered deficient. Proposal does not meet some of the minimum requirements. The assignment of a rating within the bounds of "Marginal" indicates that mandatory corrective action would be required to prevent significant deficiencies from affecting the overall project. The offeror's plans or approach will likely result in questionable quality of performance, which represents a moderate level of risk to the Government. ~~Low probability of success a~~A lthough the submittal has a reasonable chance of becoming at least acceptable, there are s~~S~~**ignificant disadvantages and there is a low probability of success.**

UNSATISFACTORY – Fails to meet performance or capability standards. Unacceptable. Requirements can only be met with major changes to the submittal. There is no reasonable expectation that acceptable performance would be achieved. The proposal contains many deficiencies and/or gross omissions; fails to provide a reasonable, logical approach to fulfilling much of the Government's requirements; and/or fails to meet most or all of the minimum requirements. **Very significant disadvantages and very low probability of success.**

2.6 **DEFINITIONS OF STRENGTH, WEAKNESS AND DEFICIENCY:**

Strength: A substantive aspect, attribute, or specific item in the proposal that exceeds the solicitation requirements and enhances the probability of successful contract performance.

Weakness: A flaw in the proposal that increases the risk of unsuccessful contract performance (i.e., meets the RFP requirements, but may have an impact on schedule or quality requirements). A ***weakness need not be corrected*** for a proposal to be considered for award, but ***may*** affect the offeror's rating.

Deficiency: A material failure of a proposal to meet the Government requirement or a combination of significant weaknesses in a proposal that increases the risk of contract performance at an unacceptable level. A deficiency ***must be corrected*** for a proposal to be considered for award.

3. PROPOSAL CONTENTS: Proposals shall be submitted in two parts: (a) Technical proposal and (b) Price proposal. Each part shall be submitted in a separate envelope/package, with the type of proposal (i.e., Technical or Price) clearly printed on the outside of the envelope/package.

4. TECHNICAL PROPOSAL:

4.1 A **COVER LETTER** should be the **first page** of the technical proposal and should include **(do not put this in the price proposal):**

(a) Solicitation number.

(b) Name, address, and telephone and facsimile numbers of the firm signing the SF 1442 (and electronic address).

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

(d) Name, title, and signature of the person authorized to sign the proposal.

(e) A statement specifying agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any and all items upon which prices are offered at the proposed item prices.

(h) **FINAL PROPOSAL REVISION:** If required to submit a Final Proposal Revision, the accompanying cover letter must identify all changes made to the firm's initial proposal.

4.2 **GENERAL TECHNICAL PROPOSAL REQUIREMENTS:** Offerors submitting proposals for this project should limit submissions to data essential for evaluation of proposals so that a minimum of time and monies will have been expended in preparing information required herein. Elaborate artwork, expensive paper and bindings, and expensive/extensive visual and other presentation aids are unnecessary. However, in order to be effectively and equitably evaluated, the proposals must include information sufficiently detailed to clearly describe the offeror's experience and management capabilities to successfully complete the project. Any deviations from requirements should be clearly noted and justified in the proposal.

4.3 **MINIMUM SUBMITTAL REQUIREMENTS FOR TECHNICAL PROPOSAL:**

4.3.1 **CONSTRUCTION CONTRACTOR EXPERIENCE WITH SIMILAR PROJECTS**

Submittal Requirements: Provide a minimum of three (3) projects for the prime construction firm similar to this project in size, scope, complexity, and dollar value that are either currently under construction or were completed within the last five (5) years. List no more than a total of 10 projects for this criterion. Start with the most recent and relevant projects and work backwards in time. To be considered similar, a project must have been for construction of high-complexity computer-oriented facilities such as high-tech office space, simulation-type buildings, laboratories (e.g., computer, science, criminal), college or hospital facilities, or airports. Use a format similar to that shown in the table below to present this information.

Project Title & Location
Project Type (e.g., design-build (DB), design (D), construction (C))
Dollar Value (design $; construction $)
Start & Completion Dates (Month/Year)
Role of Firm(s) (e.g., prime, sub) (address type of work performed and percentage of work, as applicable)
Brief Description of Project (address how this relates to solicitation project)
Customer Point of Contact (i.e., name, relationship to project, agency/firm affiliation, city, state, current phone no.)
Awards or recognition received (if applicable)

Evaluation Method: This criterion will be evaluated for the quantity and quality of experience demonstrated. The greater the relevance and the more recent the prior project experience, the higher the rating assigned during evaluations. Demonstration of experience in completing projects that had the unique characteristics of the proposed project will be evaluated favorably. Experience will not be given consideration unless the project can be shown to be similar to this project considering changes in technology, materials, equipment, codes, etc. ~~Metric projects will be considered favorably.~~ Prior Government or Corps of Engineers project experience is not required to meet the minimum requirements of this criteria, however, it will be favorably considered.

4.3.2 **CONSTRUCTION CONTRACTOR PAST PERFORMANCE**

Submittal Requirements: The Government will utilize performance evaluations contained in the Construction Contract Administration Support System (CCASS) to evaluate this criterion. All performance ratings for the past five (5) years shall be considered. If an offeror does not have past performance available in CCASS or wishes to augment the CCASS system ratings, the offerors may ask customers to submit the Customer Satisfaction Survey form found at the end of this section.

For each project constructed for Private Industry, provide a completed Customer Satisfaction Survey for each applicable project within the last five (5) years. All Customer Satisfaction Surveys must be submitted to the Government from the customer or agency that is providing the information. Further instructions are found on the Customer Satisfaction Survey. It is requested that only relevant projects be included. A relevant project is one of similar scope, cost and complexity as this solicitation.

Submit a list of all customers (including current Point of Contact, phone number, and electronic address) who were requested to provide Customer Satisfaction Surveys.

Should offerors want to review the performance evaluation ratings contained in the Corps of Engineers CCASS Database, they may request the information by fax on company letterhead at the following number: (503) 808-4596.

Evaluation Method. The Government will evaluate the relative merits of each offeror's past performance. The Government reserves the right to consider all aspects of an offeror's performance history, but will attribute more significance to work that was similar in nature, magnitude, and complexity to this project. The Government further reserves the right to contact the evaluators on previous Government or Private Sector work to verify the offeror's construction experience. In the case of an offeror without a record of past performance or for whom information on past performance is not available, the offeror **may not be evaluated as favorable or unfavorable** on past performance (See FAR 15.305(a)(2)(iv)).

4.3.3 **FIVE-YEAR FACILITY MANAGEMENT PLAN**

Submittal Requirements:

Provide a **narrative** describing the approach to be used for successful operation and maintenance of the facility. Describe steps to be taken to assure smooth transition from construction to O&M phase of the contract. Describe contracting method (in-house or subcontractor) to be used. Describe lines of communication and authority to act on behalf of the General Contractor, and individual roles and responsibilities.

Provide an **organizational chart** showing the functional relationships of firms (including types of subcontractors, if applicable) during the five-year operations and maintenance (O&M) phase, as well as linkage and functions of proposed types of workers.

The Government realizes that resumes of specific individuals may not be possible at this time. Therefore, the offeror must submit **sample resumes for the Contractor Facility Manager (CFM) and the Alternate CFM** that identify the level of quality/experience to be expected from the assigned person/subcontractor. Specifically include minimum requirements for education, years of relevant experience, and any relevant training to be required of the individual to be assigned to the CFM and Alternate CFM positions.

Evaluation Method: The proposed technical approach, organizational structure and functional relationships will be evaluated for completeness and reasonableness and the degree to which they demonstrate the offeror's understanding of the aspects required for successfully accomplishing the O&M work described in Section 01830 of the solicitation. Proposals that provide a clear description of the offeror's approach to the O&M phase and clearly explain the construction firm and key subcontractor involvement during the maintenance period will be favorably considered. Evidence of effective lines of communication and authorities will be evaluated favorably. Resumes that provide evidence of quality/experience for the CFM and Alternate CFM will be evaluated favorably.

4.3.4 **KEY CONSTRUCTION PERSONNEL**

Submittal Requirements: Identify the following key personnel to be assigned to this project during the construction phase: Construction Project Manager, On-Site Superintendent, and Contractor Quality Control (CQC) System Manager (refer to Specification Section 01451). Provide a resume for each of these individuals in a format similar to the one shown in the table below. Note that key personnel identified in this proposal must be utilized on the project.

Name/Title
Proposed Duties/Functions (for this project)
Firm Affiliation/Years Affiliated
Years of Experience (performing duties/functions as proposed for this project)
Education (Degree, Year, Specialization)
Active Registrations (and/or Professional/Technical Licenses/Certifications)
Specific Qualifications (for this project, if any)
List of Relevant Projects Including:
Project Title & Location
Project Type (e.g., design-build (DB), design (D), construction (C))
Dollar Value (design $; construction $)
Name of Employing Firm
Start & Completion Dates (Month/Year)
Duties/Functions (address how this relates to role for solicitation project)
Brief Description of Project (address how this relates to solicitation project)
Customer Point of Contact (i.e., name, relationship to project, agency/firm affiliation, city, state, current phone no.)
Awards or Recognition Received (if applicable)

Evaluation Method: The more recent, and the greater the extent and relevance, of the team members' qualifications, prior project experience, and active registrations, the higher the rating assigned for this criterion during evaluations. Only one individual for each of the key personnel categories listed above will be evaluated.

4.3.5 EXTENT OF SMALL BUSINESS PARTICIPATION

Submittal Requirements: No submittal is required for this criterion. The Government will utilize performance evaluations contained in the CCAS System to evaluate this criterion.

Evaluation Method: Firms will be evaluated for the success and extent of their small business participation in their subcontracting with small and disadvantaged business concerns. Firms will be evaluated based on the ratings received for item entitled "Implementation of Subcontracting Plan" of their past performance evaluations retrieved from the CCAS System or based on ratings received on the customer satisfaction surveys. Firms without any evaluations in CCASS or on the surveys, or for which this item was not evaluated (i.e., N/A), will be assigned a neutral rating of satisfactory. Firms that receive a rating below satisfactory for this item in one or more CCASS evaluations or surveys will receive a rating of marginal for this criterion.

4.3.6 **SUMMARY OF TECHNICAL PROPOSAL FORMAT:** As a minimum, each copy of the technical proposal should contain the following general format for the volumes specified in the table below. It is preferred that pages be numbered consecutively throughout the technical proposal. However, giving each page a unique identifier within sections is acceptable (i.e., A-1 through A-5, then B-1 through B-5, etc).

Technical Proposal Format (original and 5 copies required)
- Technical Proposal Cover Letter - Table of Contents. (List all sections of the technical proposal) - Construction Contractor Experience with Similar Projects data - Construction Contractor Past Performance data (if applicable) - Five-Year Facility Management Plan data - Key Construction Personnel data - Extent of Small Business Participation data (if applicable

5. SUMMARY OF PRICE PROPOSAL FORMAT:

Price Proposal Format (original and 1 copy required)
- Standard Form 1442 front and back - Corporate Certificate (use the certificate for joint venture if applicable) - Pricing Schedule (all pages) - Section 00600, Representations and Certifications - Bank and Bonding Points of Contact - 20% Bid Bond (for construction work only – 0001 thru 0005 and 0007 thru 0015) - Small and Small Disadvantaged Business Subcontracting Plan (large businesses only) - Joint Venture Information (if applicable) NOTE: Price proposal and bonds are DUE AT SAME TIME as technical proposals.

5. PRICE PROPOSAL FORMAT:

5.1 The price proposal must be signed by an official authorized to bind the organization. Prices must be provided for all line items on the pricing schedule. Note that the Standard Form 1442, Block 13D, states the minimum number of calendar days after the date offers are due for Government acceptance of the offer. All amendments must be acknowledged on Standard Form 1442 BACK by date and number in Block 19 or by telegram.

5.2 Provide the name, point of contact, phone number, and address for bank and bonding company of firm signing the SF 1442.

5.3 **Bid Bonds** are to be provided for the construction portion of the work only – line items 0001 through 0005 and 0007 through 0015. Bid bonds must be accompanied by a **Power of Attorney containing an original signature from the surety**, which must be affixed to the Power of Attorney after the Power of Attorney has been generated. Computer generated and signed Powers of Attorney will only be accepted if accompanied by an original certification from a current officer of the surety attesting to its authenticity and continuing validity. Performance and payment bonds, which will be required only for the construction portion of the work to be performed under this contract, have the same requirement.

5.4 **Small Business Subcontracting. Large businesses are required to submit a subcontracting plan** (See FAR Clause 52.219-9 Alt II, Small Business Subcontracting Plan, Jan 2002) with initial price proposals. Award will not be made under this solicitation without an approved subcontracting plan. See the "Notice to Large Business Firms" located in the front of this solicitation.

5.5 **Joint Ventures.** No contract may be awarded to a joint venture that is not registered in the Central Contractor Register (CCR). Joint ventures may register in the following way:

(a) The firm that will be the recipient of payments should be registered in the CCR and have a DUNS number. This firm is considered in the CCR to be the "mother firm." If no money is to go to any other firm in the joint venture, the mother firm may make the other firm in the joint venture a "child." This child will be assigned the mother firm's CCR number with an additional four (4) numbers attached. Since the child firm is not receiving any payments, they do not need to get a DUNS number. (HOWEVER, to be safe and cover all possibilities, it might be wise to have each firm registered in the CCR.)

(b) Call the CCR at 1-888-227-2423, choose option "0" to get the mother –child relationship set up. DUN & Bradstreet phone number is 1-800-333-0505.

(c) If the joint venture has a newly created name, then it must have its own DUNS number and register as such in the CCR.

5.5.1 In the cover letter of your proposal, provide the complete names, addresses, and phone and fax numbers of the two firms in the joint venture.

5.5.2 Signature requirements: SF 1442, SOLICITATION, OFFER, AND AWARD (pages 00010-1 and 00010-2), Block 20 requires that the name and title of the person authorized to sign the offer for the joint venture be provided.

5.5.3 Corporate certificate: Ensure that joint-venture portion is completed by both firms.

5.5.4 In the case of a joint venture, the following is required: A contract with joint venturers may involve any combination of individuals, partnerships, or corporations. The contract shall be signed by each participant in the joint venture in the manner prescribed below for each type of participant. When a corporation is participating, the Contracting Officer shall verify that the corporation is authorized to participate in the joint venture.

(a) Individuals. A contract with an individual shall be signed by that individual. A contract with an individual doing business as a firm shall be signed by that individual, and the signature shall be followed by the individual's types, stamped, or printed name and the words "an individual doing business as ……." [insert name of firm].

(b) Partnerships. A contract with a partnership shall be signed in the partnership name. Before signing for the Government, the Contracting Officer shall obtain a list of all partners and ensure that the individual(s) signing for the partnership have authority to bind the partnership.

(c) Corporations. A contract with a corporation shall be signed in the corporate name, followed by the word "by" and the signature and title of the person authorized to sign. The Contracting Officer shall ensure that the person signing for the corporation has authority to bind the corporation.

5.5.5 In addition to the requirements stated above, and to assure a single point of contact for resolution of contractual matters and payments, the Contracting Officer shall obtain a certificate signed by each participant in the joint venture as follows: In the proposal include the following statement:

"The parties hereto expressly understand and agree as follows:

a. **(name, title, and company)** is the principal representative of the joint venture. As such, all communications regarding the administration of the contract and the performance of the work thereunder may be directed to him or her. In the absence of **(same name, title, and company), (enter name, title, and company of alternate)** is the alternate principal representative of the joint venture.

b. Direction, approvals, required notices, and all other communications from the Government to the joint venture, including transmittal of payments by the Government, shall be directed to **(enter name, title, and company of principal),** principal representative of the joint venture**."**

5.5.6 The bid bond form, Block "Principal" requires that the name and title of the person authorized to sign for the joint venture be included.

5.5.7 After award, the performance and payment bonds, and the insurance certificate(s) provided shall be in the name of the joint venture.

6. MAGNITUDE OF CONSTRUCTION AND SERVICES: The dollar magnitude of the construction portion of this solicitation is between **$10 million and $25 million**. The dollar range for the operation and maintenance portion of this solicitation is between **$750,000 and $1,500,000**.

7. EVALUATION PROCEDURES

7.1 **TECHNICAL EVALUATION:** Technical proposals will be evaluated by a Technical Evaluation Team (TET) comprised of representatives of the Corps of Engineers and the Using Agency. Pricing data will not be considered during this evaluation. Criteria for the technical evaluation are set forth elsewhere in the solicitation and will be the sole basis for determining the technical merit of proposals. The TET shall utilize the relative importance definitions and technical merit ratings described earlier in this section of the solicitation to perform their technical evaluation. To be considered for award, proposals must conform to the terms and conditions contained in the RFP. No proposal will be accepted that does not address all criteria specified in this solicitation or which includes stipulations or qualifying conditions unacceptable to the Government.

7.2 **PRICE EVALUATION:** Price is of secondary importance to the technical criteria. Pricing will be independently evaluated to determine reasonableness and to aid in the determination of the firm's understanding of the work and ability to perform the contract. Proposed prices for each of the five years will be evaluated for its percentage of the building cost. Financial capacity and bonding ability will be verified.

8. SELECTION AND AWARD: Subject to provisions contained herein, award of a firm fixed-price contract shall be made to a single firm. The Government will select the best-value offer based on technical merit and price.

8.3.1 **BEST VALUE ANALYSIS.** The Government is more concerned with obtaining superior technical features than with making award at the lowest overall cost to the Government. In determining the best value to the Government, the tradeoff process of evaluation will be utilized. The tradeoff process permits tradeoffs among price and technical factors, and allows the Government to consider award to other than the lowest priced offeror or other than the highest technically rated offeror. You are advised that greater consideration will be given to the evaluation of technical proposals rather than price. It is pointed out, however, that should technical competence between offerors be considered approximately the same, the cost or price could become more important in determining award.

8.3.2 **SELECTION AND AWARD WITHOUT DISCUSSIONS:** *It is the intent of the Government to make award based upon initial offers, without further discussions or additional information.* Therefore, initial proposals should be submitted based on the most favorable terms from a price and technical standpoint. Do not assume there will be an opportunity to clarify, discuss or revise proposals. If award is not made on initial offers, a competitive range will be established and discussions conducted as described below.

8.3.3 **COMPETITIVE RANGE:** If it is not in the Government's best interest to make award on initial offers, the Contracting Officer will establish a competitive range of one or more offers and conduct discussions with those firms. When determining the competitive range, the Contracting Officer will consider the technical ratings and prices offered.

8.3.4 **DISCUSSIONS:** Discussions are usually conducted in writing, but may also be by telephone or in person. Discussions are tailored to each offeror's proposal and are only conducted with offeror(s) in the competitive range. The primary objective of discussions is to maximize the Government's ability to obtain the best value, based on the requirement and the evaluation criteria set forth in this solicitation. If a firm's proposal is eliminated or otherwise removed from consideration for award during discussions, no further revisions to that firm's proposal will be accepted or considered. Discussions will culminate in a request for Final Proposal Revision the date and time of which will be common to all remaining firms.

8.3.5 **AFTER DISCUSSIONS:** Revisions to the proposals submitted during discussions, if any, will be evaluated by the TET and, if warranted, an adjustment made to the rating previously assigned. The Contracting Officer will then perform a best value analysis based on the final prices and technical proposals. Selection will be made on the basis of the responsive, responsible firm whose proposal conforms to the RFP and represents the most advantageous offer to the Government, subject to availability of funds.

8.3.6 **DEBRIEFINGS:** Upon written request, unsuccessful firms will be debriefed and furnished the basis for the selection decision and contract award in accordance with FAR 15.505 and FAR 15.506.

8.3.7 **PROPOSAL EXPENSES AND PRECONTRACT COSTS:** This solicitation does not commit the Government to pay costs incurred in preparation and submission of initial and subsequent proposals or for other costs incurred prior to award of a formal contract.

8.3.8 **RELEASE OF INFORMATION:** After receipt of proposals and until contract award, source selection information will not be furnished to any firm.

END OF SECTION 00110

CUSTOMER SATISFACTION SURVEY (PAGE 1 OF 2) -
DACA67-03-R-0210, Battle Simulation Center, Ft. Lewis, WA

SECTION 1 -- TO BE COMPLETED BY OFFEROR AND PROVIDED TO REFERENCE

Name of Firm Being Evaluated: _____

Project Title & Location: _____

Project Dollar Value: _____

Year Completed: _____ **Project Manager:** _____

SECTION 2 -- TO BE COMPLETED BY THE CUSTOMER REFERENCE AND MAILED, EMAILED, FAXED OR HAND-DELIVERED DIRECTLY TO:

U.S. Army Corps of Engineers, Seattle District
Attn: CENWS-CT-CB-MU Attn: Mary Mitton
P.O. Box 3755
Seattle, WA 98124-3755

FAX: (206) 764-6817
Street Address:
4735 E. Marginal Way S.
Seattle WA 98134-2329

Forms submitted by other than the customer (i.e., by the offeror), may not be considered.

OVERVIEW: The firm shown above has selected you as a customer reference to provide information on the firm's past performance. Your input is important to this firm and responses are required no later than the time and date proposals are due for inclusion in our evaluation.

Name of Individual completing survey: _____
Firm Name: _____ **Phone Number:** _____
Relationship to this Project: _____

The chart below depicts ratings to be used to evaluate this contractor's performance.

O	AA	S	M	U
Outstanding	Above Average	Satisfactory	Marginal	Unsatisfactory
Performance met all contract requirements and exceeded expectations. Problems, if any, were negligible, and were resolved in a timely and highly effective manner.	Performance met all contract requirements and exceeded some. There were a few minor problems which the contractor resolved in a timely, effective manner.	Performance met contract requirements. There were some minor problems, and corrective actions taken by the contractor were satisfactory.	Performance did not meet some contractual requirements. There were problems, some of a serious nature, for which corrective action was only marginally effective.	Performance did not meet contractual requirements. There were serious problems, and the contractor's corrective actions were ineffective.

CUSTOMER SATISFACTION SURVEY (PAGE 2 OF 2)
DACA67-03-R-0210, Battle Simulation Center, Ft. Lewis, WA

In the following blocks, please indicate your overall level of satisfaction with the work performed by the firm shown in Section 1. Reference the chart outlined on page 1 of this survey.

For any marginal or unsatisfactory rating, please provide explanatory narratives in the remarks block. These narratives need not be lengthy; just detailed. If a question is not applicable, circle N/A. If more space is needed, then go to the end of the questionnaire or attach additional pages. Be sure to identify your continued narration with the respect line number, your name and project name.

	Quality of Work	**Circle the appropriate rating using the chart on page 1**
A	Quality of Service	**O AA S M U N/A**
B.	Quality Control	**O AA S M U N/A**
C.	Adequacy of Submittals/Reporting	**O AA S M U N/A**
D	Identification/correction of deficient work in a timely manner	**O AA S M U N/A**
E.	Displayed flexibility in responding to your needs	**O AA S M U N/A**
F.	Organizational structure/functional relationships of the team including subcontractors	**O AA S M U N/A**
G.	Response time to your requirements	**O AA S M U N/A**
H.	Extent of participation of small business concerns as subcontractors under this contract	**O AA S M U N/A**
I.	Overall rating for this project	**O AA S M U N/A**
J	Would you select this contractor again for future projects?	**Yes or No (circle one)**

REMARKS: (Discuss strengths and weaknesses of the firm)

Thank you for completing this form. Your assistance in providing this information is appreciated.

Section 00600 - Representations & Certifications

TABLE OF CONTENTS 00600

CLAUSES INCORPORATED BY FULL TEXT

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 of 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 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) of this provision; 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) of this provison _____ (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) of this provision.

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

(End of clause)

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.

(2) 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, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

(End of provision)

52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

"Common parent," as used in this 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.

"Taxpayer Identification Number (TIN)," as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, 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) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) 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 United States and does not have an office or place of business or a fiscal paying agent in the United States;

___ Offeror is an agency or instrumentality of a foreign government;

___ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

___ Sole proprietorship;

___ Partnership;

___ Corporate entity (not tax-exempt);

___ Corporate entity (tax-exempt);

___ Government entity (Federal, State, or local);

___ Foreign government;

___ International organization per 26 CFR 1.6049-4;

___ Other _____

(f) Common parent.

___ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

___ Name and TIN of common parent:

Name _____

TIN _____

(End of provision)

52.204-5 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (MAY 1999)

(a) Definition. Women-owned business concern, as used in this provision, means a concern that 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 its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

(b) Representation. [Complete only if the offeror is a women-owned business concern and has not represented itself as a small business concern in paragraph (b)(1) of FAR 52.219-1, Small Business Program Representations, of this solicitation.] The offeror represents that it ( ) is a women-owned business concern.

(End of provision)

52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (DEC 2001)

(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, tax evasion, 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.

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 2002) - ALTERNATE I (APR 2002)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is **236220**.

(2) The small business size standard is **annual average gross revenue taken for the last three fiscal years does not exceed $28.5 million**.

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

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

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the 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.

(4) (Complete only if the 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 veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture:_____.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) (Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.) The offeror shall check the category in which its ownership falls:

____ Black American.

____ Hispanic American.

____ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

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

____ Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

____ Individual/concern, other than one of the preceding.

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern," 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.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern," means a small business concern --

(1) That 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; or

(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, HUBZone small, small disadvantaged, or women-owned small 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.

(End of provision)

52.219-19 SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (OCT 2000)

(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 North American Industry Classification System (NAICS) 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 [ ] 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

(End of provision)

52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that --

(a) ( ) It has, ( ) has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation;

(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.

(End of provision)

52.222-25 AFFIRMATIVE ACTION COMPLIANCE (APR 1984)

The offeror represents that

(a) [ ] it has developed and has on file, [ ] has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or

(b) [ ] has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(End of provision)

52.222-38 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (DEC 2001)

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 38 U.S.C. 4212(d) (i.e., if it has any contract containing Federal Acquisition Regulation clause 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans), it has submitted the most recent VETS-100 Report required by that clause.

(End of provision)

52.223-4 RECOVERED MATERIAL CERTIFICATION (OCT 1997)

As required by the Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6962(c)(3)(A)(i)), the offeror certifies, by signing this offer, that the percentage of recovered materials to be used in the performance of the contract will be at least the amount required by the applicable contract specifications.

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(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) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; 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.

(End of clause)

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

(a) "Definitions."

As used in this provision --

(a) "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 such 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 indebtness 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."

If the government of a terrorist country has a significant interest in the Offeror or a subsidiary of the Offeror, the

Offeror shall disclosure such interest in an attachment to its offer. 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.

(End of provision)

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

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

(1) "Entity controlled by a foreign government" means--

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

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

(2) "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 or influence the election or appointment of the Offeror's officers, directors, partners, regents, trustees, or a majority of the Offeror's board of directors by means, e.g., ownership, contract, or operation of law.

(3) "Foreign government" means any governing body organized and existing under the laws of any country other than the United States and its possessions and trust territories and any agent or instrumentality of that government.

(4) "Proscribed information" means--

(i) Top Secret information;

(ii) Communications Security (COMSEC) information, except classified keys used to operate secure telephone unites (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 Compartmental Information (SCI).

(b) Prohibition on award. No contract under a national security program may be awarded to a company owned by an entity controlled by a foreign government if that company requires access to proscribed information to perform the contract, unless the Secretary of Defense or 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 Controlled by a Foreign Government	Description of Interest, Ownership Percentage, and Identification of Foreign Government

(End of provision)

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:

____ (1) Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

____ (2) 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 provision)

Section 00700 - Contract Clauses

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52.246-25	Limitation Of Liability--Services	FEB 1997
52.249-4	Termination For Convenience Of The Government (Services) (Short Form)	APR 1984
52.249-8	Default (Fixed-Price Supply & Service)	APR 1984

CLAUSES INCORPORATED BY FULL TEXT

Successor Contracting Officers (52.201-4001)

The Contracting Officer who signed this contract is the primary Contracting Officer for the contract. Neverthless, any Contracting Officer assigned to the Seattle District and acting within his/her authority may take formal action on this contract when a contract action needs to be taken and the primary Contracting Officer is unavailable.

52.202-1 DEFINITIONS (DEC 2001)

(a) Agency head or head of the agency means the Secretary (Attorney General, Administrator, Governor, Chairperson, or other chief official, as appropriate) of the agency, unless otherwise indicated, including any deputy or assistant chief official of the executive agency.

(b) Commercial component means any component that is a commercial item.

(c) Commercial item means--

(1) Any item, other than real property, that is of a type customarily used by the general public or by non-governmental entities for purposes other than governmental purposes, and that--

(i) Has been sold, leased, or licensed to the general public; or

(ii) Has been offered for sale, lease, or license to the general public;

(2) Any item that evolved from an item described in paragraph (c)(1) of this clause through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation;

(3) Any item that would satisfy a criterion expressed in paragraphs (c)(1) or (c)(2) of this clause, but for--

(i) Modifications of a type customarily available in the commercial marketplace; or

(ii) Minor modifications of a type not customarily available in the commercial marketplace made to meet Federal Government requirements. “Minor” modifications means modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process. Factors to be considered in determining whether a modification is minor include the value and size of the modification and the comparative value and size of the final product. Dollar values and percentages may be used as guideposts, but are not conclusive evidence that a modification is minor;

(4) Any combination of items meeting the requirements of paragraphs (c)(1), (2), (3), or (5) of this clause that are of a type customarily combined and sold in combination to the general public;

(5) Installation services, maintenance services, repair services, training services, and other services if--

(i) Such services are procured for support of an item referred to in paragraph (c)(1), (2), (3), or (4) of this definition, regardless of whether such services are provided by the same source or at the same time as the item; and

(ii) The source of such services provides similar services contemporaneously to the general public under terms and conditions similar to those offered to the Federal Government;

(6) Services of a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed under standard commercial terms and conditions. This does not include services that are sold based on hourly rates without an established catalog or market price for a specific service performed. For purposes of these services--

(i) Catalog price means a price included in a catalog, price list, schedule, or other form that is regularly maintained by the manufacturer or vendor, is either published or otherwise available for inspection by customers, and states prices at which sales are currently, or were last, made to a significant number of buyers constituting the general public; and

(ii) Market prices means current prices that are established in the course of ordinary trade between buyers and sellers free to bargain and that can be substantiated through competition or from sources independent of the offerors.

(7) Any item, combination of items, or service referred to in subparagraphs (c)(1) through (c)(6), notwithstanding the fact that the item, combination of items, or service is transferred between or among separate divisions, subsidiaries, or affiliates of a Contractor; or

(8) A nondevelopmental item, if the procuring agency determines the item was developed exclusively at private expense and sold in substantial quantities, on a competitive basis, to multiple State and local Governments.

(d) Component means any item supplied to the Government as part of an end item or of another component, except that for use in 52.225-9, and 52.225-11 see the definitions in 52.225-9(a) and 52.225-11(a).

(e) Contracting Officer means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(f) Nondevelopmental item means--

(1) Any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;

(2) Any item described in paragraph (f)(1) of this definition that requires only minor modification or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or

(3) Any item of supply being produced that does not meet the requirements of paragraph (f)(1) or (f)(2) solely because the item is not yet in use.

(g) "Contracting Officer" means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(h) Except as otherwise provided in this contract, the term "subcontracts" includes, but is not limited to, purchase orders and changes and modifications to purchase orders under this contract.

(End of clause)

52.202-1 DEFINITIONS (MAY 2001) --ALTERNATE I (MAR 2001)

(a) Agency head or head of the agency means the Secretary (Attorney General, Administrator, Governor, Chairperson, or other chief official, as appropriate) of the agency, unless otherwise indicated, including any deputy or assistant chief official of the executive agency.

(b) Commercial component means any component that is a commercial item.

(c) Component means any item supplied to the Government as part of an end item or of another component, except that for use in 52.225-9, and 52.225-11 see the definitions in 52.225-9(a) and 52.225-11(a).

(d) Contracting Officer means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(e) Nondevelopmental item means--

(1) Any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;

(2) Any item described in paragraph (f)(1) of this definition that requires only minor modification or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or

(3) Any item of supply being produced that does not meet the requirements of paragraph (f)(1) or (f)(2) solely because the item is not yet in use.

(f) "Contracting Officer" means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(g) Except as otherwise provided in this contract, the term "subcontracts" includes, but is not limited to, purchase orders and changes and modifications to purchase orders under this contract.

(End of clause)

52.203-3 GRATUITIES (APR 1984)

(a) The right of the Contractor to proceed may be terminated by written notice if, after notice and hearing, the agency head or a designee determines that the Contractor, its agent, or another representative--

(1) Offered or gave a gratuity (e.g., an entertainment or gift) to an officer, official, or employee of the Government; and

(2) Intended, by the gratuity, to obtain a contract or favorable treatment under a contract.

(b) The facts supporting this determination may be reviewed by any court having lawful jurisdiction.

(c) If this contract is terminated under paragraph (a) of this clause, the Government is entitled--

(1) To pursue the same remedies as in a breach of the contract; and

(2) In addition to any other damages provided by law, to exemplary damages of not less than 3 nor more than 10 times the cost incurred by the Contractor in giving gratuities to the person concerned, as determined by the agency head or a designee. (This subparagraph (c)(2) is applicable only if this contract uses money appropriated to the Department of Defense.)

(d) The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.203-5 COVENANT AGAINST CONTINGENT FEES (APR 1984)

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) "Bona fide agency," as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the

contractor's supervis ion and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.

(End of clause)

52.203-6 RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT (JUL 1995)

(a) Except as provided in (b) of this clause, the Contractor shall not enter into any agreement with an actual or prospective subcontractor, nor otherwise act in any manner, which has or may have the effect of restricting sales by such subcontractors directly to the Government of any item or process (including computer software) made or furnished by the subcontractor under this contract or under any follow-on production contract.

(b) The prohibition in (a) of this clause does not preclude the Contractor from asserting rights that are otherwise authorized by law or regulation.

(c) The Contractor agrees to incorporate the substance of this clause, including this paragraph (c), in all subcontracts under this contract which exceed $100,000.

52.203-7 ANTI-KICKBACK PROCEDURES. (JUL 1995)

(a) Definitions.

"Kickback," as used in this clause, means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided, directly or indirectly, to any prime Contractor, prime Contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract.

"Person," as used in this clause, means a corporation, partnership, business association of any kind, trust, joint-stock company, or individual.

"Prime contract," as used in this clause, means a contract or contractual action entered into by the United States for the purpose of obtaining supplies, materials, equipment, or services of any kind.

"Prime Contractor," as used in this clause, means a person who has entered into a prime contract with the United States.

"Prime Contractor employee," as used in this clause, means any officer, partner, employee, or agent of a prime Contractor.

"Subcontract," as used in this clause, means a contract or contractual action entered into by a prime Contractor or subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind under a prime

contract.

"Subcontractor," as used in this clause, (1) means any person, other than the prime Contractor, who offers to furnish or furnishes any supplies, materials, equipment, or services of any kind under a prime contract or a subcontract entered into in connection with such prime contract, and (2) includes any person who offers to furnish or furnishes general supplies to the prime Contractor or a higher tier subcontractor.

"Subcontractor employee," as used in this clause, means any officer, partner, employee, or agent of a subcontractor.

(b) The Anti-Kickback Act of 1986 (41 U.S.C. 51-58) (the Act), prohibits any person from -

(1) Providing or attempting to provide or offering to provide any kickback;

(2) Soliciting, accepting, or attempting to accept any kickback; or

(3) Including, directly or indirectly, the amount of any kickback in the contract price charged by a prime Contractor to the United States or in the contract price charged by a subcontractor to a prime Contractor or higher tier subcontractor.

(c)(1) The Contractor shall have in place and follow reasonable procedures designed to prevent and detect possible violations described in paragraph (b) of this clause in its own operations and direct business relationships.

(2) When the Contractor has reasonable grounds to believe that a violation described in paragraph (b) of this clause may have occurred, the Contractor shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting agency, the head of the contracting agency if the agency does not have an inspector general, or the Department of Justice.

(3) The Contractor shall cooperate fully with any Federal agency investigating a possible violation described in paragraph (b) of this clause.

(4) The Contracting Officer may (i) offset the amount of the kickback against any monies owed by the United States under the prime contract and/or (ii) direct that the Prime Contractor withhold, from sums owed a subcontractor under the prime contract, the amount of any kickback. The Contracting Officer may order the monies withheld under subdivision (c)(4)(ii) of this clause be paid over to the Government unless the Government has already offset those monies under subdivision (c)(4)(i) of this clause. In either case, the Prime Contractor shall notify the Contracting Officer when the monies are withheld.

(5) The Contractor agrees to incorporate the substance of this clause, including this subparagraph (c)(5) but excepting subparagraph (c)(1), in all subcontracts under this contract which exceed $100,000.

52.203-8 CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) If the Government receives information that a contractor or a person has engaged in conduct constituting a violation of subsection (a), (b), (c), or (d) of Section 27 of the Office of Federal Procurement Policy Act (41 U.S.C. 423) (the Act), as amended by section 4304 of the 1996 National Defense Authorization Act for Fiscal Year 1996 (Pub. L. 104-106), the Government may--

(1) Cancel the solicitation, if the contract has not yet been awarded or issued; or

(2) Rescind the contract with respect to which--

(i) The Contractor or someone acting for the Contractor has been convicted for an offense where the conduct constitutes a violation of subsection 27(a) or (b) of the Act for the purpose of either--

(A) Exchanging the information covered by such subsections for anything of value; or

(B) Obtaining or giving anyone a competitive advantage in the award of a Federal agency procurement contract; or

(ii) The head of the contracting activity has determined, based upon a preponderance of the evidence, that the Contractor or someone acting for the Contractor has engaged in conduct constituting an offense punishable under subsections 27(e)(1) of the Act.

(b) If the Government rescinds the contract under paragraph (a) of this clause, the Government is entitled to recover, in addition to any penalty prescribed by law, the amount expended under the contract.

(c) The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law, regulation, or under this contract.

(End of clause)

52.203-10 PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) The Government, at its election, may reduce the price of a fixed-price type contract and the total cost and fee under a cost-type contract by the amount of profit or fee determined as set forth in paragraph (b) of this clause if the head of the contracting activity or designee determines that there was a violation of subsection 27 (a), (b), or (c) of the Office of Federal Procurement Policy Act, as amended (41 U.S.C. 423), as implemented in section 3.104 of the Federal Acquisition Regulation.

(b) The price or fee reduction referred to in paragraph (a) of this clause shall be--

(1) For cost-plus-fixed-fee contracts, the amount of the fee specified in the contract at the time of award;

(2) For cost-plus-incentive-fee contracts, the target fee specified in the contract at the time of award, notwithstanding any minimum fee or "fee floor" specified in the contract;

(3) For cost-plus-award-fee contracts--

(i) The base fee established in the contract at the time of contract award;

(ii) If no base fee is specified in the contract, 30 percent of the amount of each award fee otherwise payable to the Contractor for each award fee evaluation period or at each award fee determination point.

(4) For fixed-price-incentive contracts, the Government may--

(i) Reduce the contract target price and contract target profit both by an amount equal to the initial target profit specified in the contract at the time of contract award; or

(ii) If an immediate adjustment to the contract target price and contract target profit would have a significant adverse impact on the incentive price revision relationship under the contract, or adversely affect the contract financing

provisions, the Contracting Officer may defer such adjustment until establishment of the total final price of the contract. The total final price established in accordance with the incentive price revision provisions of the contract shall be reduced by an amount equal to the initial target profit specified in the contract at the time of contract award and such reduced price shall be the total final contract price.

(5) For firm-fixed-price contracts, by 10 percent of the initial contract price or a profit amount determined by the Contracting Officer from records or documents in existence prior to the date of the contract award.

(c) The Government may, at its election, reduce a prime contractor's price or fee in accordance with the procedures of paragraph (b) of this clause for violations of the Act by its subcontractors by an amount not to exceed the amount of profit or fee reflected in the subcontract at the time the subcontract was first definitively priced.

(d) In addition to the remedies in paragraphs (a) and (c) of this clause, the Government may terminate this contract for default. The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.203-12 LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JUN 1997)

(a) Definitions.

"Agency," as used in this clause, means executive agency as defined in 2.101.

"Covered Federal action," as used in this clause, means any of the following Federal actions:

(1) The awarding of any Federal contract.

(2) The making of any Federal grant.

(3) The making of any Federal loan.

(4) The entering into of any cooperative agreement.

(5) The extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

"Indian tribe" and "tribal organization," as used in this clause, have the meaning provided in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) and include Alaskan Natives.

"Influencing or attempting to influence," as used in this clause, means making, with the intent to influence, any communication to or appearance before 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 in connection with any covered Federal action.

"Local government," as used in this clause, means a unit of government in a State and, if chartered, established, or otherwise recognized by a State for the performance of a governmental duty, including a local public authority, a special district, an intrastate district, a council of governments, a sponsor group representative organization, and any other instrumentality of a local government.

"Officer or employee of an agency," as used in this clause, includes the following individuals who are employed by an agency:

(1) An individual who is appointed to a position in the Government under Title 5, United States Code, including a position under a temporary appointment.

(2) A member of the uniformed services, as defined in subsection 101(3),Title 37, United States Code.

(3) A special Government employee, as defined in section 202, Title 18, United States Code.

(4) An individual who is a member of a Federal advisory committee, as defined by the Federal Advisory Committee Act, Title 5, United States Code, appendix 2.

"Person," as used in this clause, means an individual, corporation, company, association, authority, firm, partnership, society, State, and local government, regardless of whether such entity is operated for profit, or not for profit. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Reasonable compensation," as used in this clause, means, with respect to a regularly employed officer or employee of any person, compensation that is consistent with the normal compensation for such officer or employee for work that is not furnished to, not funded by, or not furnished in cooperation with the Federal Government.

"Reasonable payment," as used in this clause, means, with respect to professional and other technical services, a payment in an amount that is consistent with the amount normally paid for such services in the private sector.

"Recipient," as used in this clause, includes the Contractor and all subcontractors. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Regularly employed," as used in this clause, means, with respect to an officer or employee of a person requesting or receiving a Federal contract, an officer or employee who is employed by such person for at least 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person for receipt of such contract. An officer or employee who is employed by such person for less than 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person shall be considered to be regularly employed as soon as he or she is employed by such person for 130 working days.

"State," as used in this clause, means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, a territory or possession of the United States, an agency or instrumentality of a State, and multi-State, regional, or interstate entity having governmental duties and powers.

(b) Prohibitions.

(1) Section 1352 of Title 31, United States Code, among other things, prohibits a recipient of a Federal contract, grant, loan, or cooperative agreement from using appropriated funds to pay 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 in connection with any of the following covered Federal actions: 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; or the modification of any Federal contract, grant, loan, or cooperative agreement.

(2) The Act also requires Contractors to furnish a disclosure 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 in connection with a Federal contract, grant, loan, or cooperative agreement.

(3) The prohibitions of the Act do not apply under the following conditions:

(i) Agency and legislative liaison by own employees.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of a payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action if the payment is for agency and legislative liaison activities not directly related to a covered Federal action.

(B) For purposes of subdivision (b)(3)(i)(A) of this clause, providing any information specifically requested by an agency or Congress is permitted at any time.

(C) The following agency and legislative liaison activities are permitted at any time where they are not related to a specific solicitation for any covered Federal action:

(1) Discussing with an agency the qualities and characteristics (including individual demonstrations) of the person's products or services, conditions or terms of sale, and service capabilities.

(2) Technical discussions and other activities regarding the application or adaptation of the person's products or services for an agency's use.

(D) The following agency and legislative liaison activities are permitted where they are prior to formal solicitation of any covered Federal action--

(1) Providing any information not specifically requested but necessary for an agency to make an informed decision about initiation of a covered Federal action;

(2) Technical discussions regarding the preparation of an unsolicited proposal prior to its official submission; and

(3) Capability presentations by persons seeking awards from an agency pursuant to the provisions of the Small Business Act, as amended by Pub. L. 95-507, and subsequent amendments.

(E) Only those services expressly authorized by subdivision (b)(3)(i)(A) of this clause are permitted under this clause.

(ii) Professional and technical services.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of--

(1) A payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action, if payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action.

(2) Any reasonable payment to a person, other than an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action if the payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action. Persons other than officers or employees of a person requesting or receiving a covered Federal action include consultants and trade associations.

(B) For purposes of subdivision (b)(3)(ii)(A) of this clause, "professional and technical services" shall be limited to advice and analysis directly applying any professional or technical discipline. For example, drafting of a legal

document accompanying a bid or proposal by a lawyer is allowable. Similarly, technical advice provided by an engineer on the performance or operational capability of a piece of equipment rendered directly in the negotiation of a contract is allowable. However, communications with the intent to influence made by a professional (such as a licensed lawyer) or a technical person (such as a licensed accountant) are not allowable under this section unless they provide advice and analysis directly applying their professional or technical expertise and unless the advice or analysis is rendered directly and solely in the preparation, submission or negotiation of a covered Federal action. Thus, for example, communications with the intent to influence made by a lawyer that do not provide legal advice or analysis directly and solely related to the legal aspects of his or her client's proposal, but generally advocate one proposal over another are not allowable under this section because the lawyer is not providing professional legal services. Similarly, communications with the intent to influence made by an engineer providing an engineering analysis prior to the preparation or submission of a bid or proposal are not allowable under this section since the engineer is providing technical services but not directly in the preparation, submission or negotiation of a covered Federal action.

(C) Requirements imposed by or pursuant to law as a condition for receiving a covered Federal award include those required by law or regulation and any other requirements in the actual award documents.

(D) Only those services expressly authorized by subdivisions (b)(3)(ii)(A)(1) and (2) of this clause are permitted under this clause.

(E) The reporting requirements of FAR 3.803(a) shall not apply with respect to payments of reasonable compensation made to regularly employed officers or employees of a person.

(c) Disclosure.

(1) The Contractor who requests or receives from an agency a Federal contract shall file with that agency a disclosure form, OMB standard form LLL, Disclosure of Lobbying Activities, if such person has made or has agreed to make any payment using nonappropriated funds (to include profits from any covered Federal action), which would be prohibited under subparagraph (b)(1) of this clause, if paid for with appropriated funds.

(2) The Contractor shall file a disclosure form at the end of each calendar quarter in which there occurs any event that materially affects the accuracy of the information contained in any disclosure form previously filed by such person under subparagraph (c)(1) of this clause. An event that materially affects the accuracy of the information reported includes--

(i) A cumulative increase of $25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or

(ii) A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or

(iii) A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

(3) The Contractor shall require the submittal of a certification, and if required, a disclosure form by any person who requests or receives any subcontract exceeding $100,000 under the Federal contract.

(4) All subcontractor disclosure forms (but not certifications) shall be forwarded from tier to tier until received by the prime Contractor. The prime Contractor shall submit all disclosures to the Contracting Officer at the end of the calendar quarter in which the disclosure form is submitted by the subcontractor. Each subcontractor certification shall be retained in the subcontract file of the awarding Contractor.

(d) Agreement. The Contractor agrees not to make any payment prohibited by this clause.

(e) Penalties.

(1) Any person who makes an expenditure prohibited under paragraph (a) of this clause or who fails to file or amend the disclosure form to be filed or amended by paragraph (b) of this clause shall be subject to civil penalties as provided for by 31 U.S.C. 1352. An imposition of a civil penalty does not prevent the Government from seeking any other remedy that may be applicable.

(2) Contractors may rely without liability on the representation made by their subcontractors in the certification and disclosure form.

(f) Cost allowability. Nothing in this clause makes allowable or reasonable any costs which would otherwise be unallowable or unreasonable. Conversely, costs made specifically unallowable by the requirements in this clause will not be made allowable under any other provision.

(End of clause)

52.204-4 PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER (AUG 2000)

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

“Postconsumer material” means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of “recovered material.” For paper and paper products, postconsumer material means “postconsumer fiber” defined by the U.S. Environmental Protection Agency (EPA) as--

(1) Paper, paperboard, and fibrous materials from retail stores, office buildings, homes, and so forth, after they have passed through their end-usage as a consumer item, including: used corrugated boxes; old newspapers; old magazines; mixed waste paper; tabulating cards; and used cordage; or

(2) All paper, paperboard, and fibrous materials that enter and are collected from municipal solid waste; but not

(3) Fiber derived from printers' over-runs, converters' scrap, and over-issue publications.

“Printed or copied double-sided” means printing or reproducing a document so that information is on both sides of a sheet of paper.

“Recovered material,” for paper and paper products, is defined by EPA in its Comprehensive Procurement Guideline as “recovered fiber” and means the following materials:

(1) Postconsumer fiber; and

(2) Manufacturing wastes such as--

(i) Dry paper and paperboard waste generated after completion of the papermaking process (that is, those manufacturing operations up to and including the cutting and trimming of the paper machine reel into smaller rolls or rough sheets) including: envelope cuttings, bindery trimmings, and other paper and paperboard waste resulting from printing, cutting, forming, and other converting operations; bag, box, and carton manufacturing wastes; and butt rolls, mill wrappers, and rejected unused stock; and

(ii) Repulped finished paper and paperboard from obsolete inventories of paper and paperboard manufacturers, merchants, wholesalers, dealers, printers, converters, or others.

(b) In accordance with Section 101 of Executive Order 13101 of September 14, 1998, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition, the Contractor is encouraged to submit paper documents, such as offers, letters, or reports, that are printed or copied double-sided on recycled paper that meet minimum content standards specified in Section 505 of Executive Order 13101, when not using electronic commerce methods to submit information or data to the Government.

(c) If the Contractor cannot purchase high-speed copier paper, offset paper, forms bond, computer printout paper, carbonless paper, file folders, white wove envelopes, writing and office paper, book paper, cotton fiber paper, and cover stock meeting the 30 percent postconsumer material standard for use in submitting paper documents to the Government, it should use paper containing no less than 20 percent postconsumer material. This lesser standard should be used only when paper meeting the 30 percent postconsumer material standard is not obtainable at a reasonable price or does not meet reasonable performance standards.

(End of clause)

52.209-6 PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT (JUL 1995)

(a) The Government suspends or debars Contractors to protect the Government's interests. The Contractor shall not enter into any subcontract in excess of the $25,000 with a Contractor that is debarred, suspended, or proposed for debarment unless there is a compelling reason to do so.

(b) The Contractor shall require each proposed first-tier subcontractor, whose subcontract will exceed $25,000, to disclose to the Contractor, in writing, whether as of the time of award of the subcontract, the subcontractor, or its principles, is or is not debarred, suspended, or proposed for debarment by the Federal Government.

(c) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is debarred, suspended, or proposed for debarment (see FAR 9.404 for information on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs). The notice must include the following:

(1) The name of the subcontractor.

(2) The Contractor's knowledge of the reasons for the subcontractor being on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(3) The compelling reason(s) for doing business with the subcontractor notwithstanding its inclusion on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(4) The systems and procedures the Contractor has established to ensure that it is fully protecting the Government's interests when dealing with such subcontractor in view of the specific basis for the party's debarment, suspension, or proposed debarment.

(End of clause)

52.212-4007 ENVIRONMENTAL LITIGATION

(a) If the performance of all or any part of the work is suspended, delayed, or interrupted due to an order of a court of competent jurisdiction as a result of environmental litigation, as defined below, the Contracting Officer, at the request

of the Contractor, shall determine whether the order is due in any part to the acts or omissions of the Contractor or a Subcontractor at any tier not required by the terms of this contract. If it is determined that the order is not due in any part to acts or omissions of the Contractor or a Subcontractor at any tier other than as required by the terms of this contract, such suspension, delay, or interruption shall be considered as if ordered by the Contracting Officer in the administration of this contract under the terms of the "Suspension of Work" clause of this contract. The period of such suspension, delay or interruption shall be considered unreasonable, and an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) as provided in that clause, subject to all the provisions thereof.

(b) The term "environmental litigation", as used herein, means a lawsuit alleging that the work will have an adverse effect on the environment or that the Government has not duly considered, either substantially or procedurally, the effect of the work on the environment.

52.215-2 AUDIT AND RECORDS--NEGOTIATION (JUN 1999)

(a) As used in this clause, "records" includes books, documents, accounting procedures and practices, and other data, regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form.

(b) Examination of costs. If this is a cost-reimbursement, incentive, time-and-materials, labor-hour, or price redeterminable contract, or any combination of these, the Contractor shall maintain and the Contracting Officer, or an authorized representative of the Contracting Officer, shall have the right to examine and audit all records and other evidence sufficient to reflect properly all costs claimed to have been incurred or anticipated to be incurred directly or indirectly in performance of this contract. This right of examination shall include inspection at all reasonable times of the Contractor's plants, or parts of them, engaged in performing the contract.

(c) Cost or pricing data. If the Contractor has been required to submit cost or pricing data in connection with any pricing action relating to this contract, the Contracting Officer, or an authorized representative of the Contracting Officer, in order to evaluate the accuracy, completeness, and currency of the cost or pricing data, shall have the right to examine and audit all of the Contractor's records, including computations and projections, related to--

(1) The proposal for the contract, subcontract, or modification;

(2) The discussions conducted on the proposal(s), including those related to negotiating;

(3) Pricing of the contract, subcontract, or modification; or

(4) Performance of the contract, subcontract or modification.

(d) Comptroller General--(1) The Comptroller General of the United States, or an authorized representative, shall have access to and the right to examine any of the Contractor's directly pertinent records involving transactions related to this contract or a subcontract hereunder.

(2) This paragraph may not be construed to require the Contractor or subcontractor to create or maintain any record that the Contractor or subcontractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) Reports. If the Contractor is required to furnish cost, funding, or performance reports, the Contracting Officer or an authorized representative of the Contracting Officer shall have the right to examine and audit the supporting records and materials, for the purpose of evaluating (1) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports and (2) the data reported.

(f) Availability. The Contractor shall make available at its office at all reasonable times the records, materials, and other evidence described in paragraphs (a), (b), (c), (d), and (e) of this clause, for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in Subpart 4.7, Contractor Records Retention, of the Federal Acquisition Regulation (FAR), or for any longer period required by statute or by other clauses of this contract. In addition--

(1) If this contract is completely or partially terminated, the Contractor shall make available the records relating to the work terminated until 3 years after any resulting final termination settlement; and

(2) The Contractor shall make available records relating to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to this contract until such appeals, litigation, or claims are finally resolved.

(g) The Contractor shall insert a clause containing all the terms of this clause, including this paragraph (g), in all subcontracts under this contract that exceed the simplified acquisition threshold, and--

(1) That are cost-reimbursement, incentive, time-and-materials, labor-hour, or price-redeterminable type or any combination of these;

(2) For which cost or pricing data are required; or

(3) That require the subcontractor to furnish reports as discussed in paragraph (e) of this clause.

The clause may be altered only as necessary to identify properly the contracting parties and the Contracting Officer under the Government prime contract.

(End of clause)

52.215-8 ORDER OF PRECEDENCE--UNIFORM CONTRACT FORMAT (OCT 1997)

Any inconsistency in this solicitation or contract shall be resolved by giving precedence in the following order:

(a) The Schedule (excluding the specifications).

(b) Representations and other instructions.

(c) Contract clauses.

(d) Other documents, exhibits, and attachments.

(e) The specifications.

(End of clause)

52.215-11 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) This clause shall become operative only for any modification to this contract involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, except that this clause does not apply to any modification if an exception under FAR 15.403-1 applies.

(b) If any price, including profit or fee, negotiated in connection with any modification under this clause, or any cost reimbursable under this contract, was increased by any significant amount because (1) the Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data, (2) a subcontractor or prospective subcontractor furnished the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data, or (3) any of these parties furnished data of any description that were not accurate, the price or cost shall be reduced accordingly and the contract shall be modified to reflect the reduction. This right to a price reduction is limited to that resulting from defects in data relating to modifications for which this clause becomes operative under paragraph (a) of this clause.

(c) Any reduction in the contract price under paragraph (b) of this clause due to defective data from a prospective subcontractor that was not subsequently awarded the subcontract shall be limited to the amount, plus applicable overhead and profit markup, by which--

(1) The actual subcontract; or

(2) The actual cost to the Contractor, if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided, that the actual subcontract price was not itself affected by defective cost or pricing data.

(d)(1) If the Contracting Officer determines under paragraph (b) of this clause that a price or cost reduction should be made, the Contractor agrees not to raise the following matters as a defense:

(i) The Contractor or subcontractor was a sole source supplier or otherwise was in a superior bargaining position and thus the price of the contract would not have been modified even if accurate, complete, and current cost or pricing data had been submitted.

(ii) The Contracting Officer should have known that the cost or pricing data in issue were defective even though the Contractor or subcontractor took no affirmative action to bring the character of the data to the attention of the Contracting Officer.

(iii) The contract was based on an agreement about the total cost of the contract and there was no agreement about the cost of each item procured under the contract.

(iv) The Contractor or subcontractor did not submit a Certificate of Current Cost or Pricing Data.

(2)(i) Except as prohibited by subdivision (d)(2)(ii) of this clause, an offset in an amount determined appropriate by the Contracting Officer based upon the facts shall be allowed against the amount of a contract price reduction if--

(A) The Contractor certifies to the Contracting Officer that, to the best of the Contractor's knowledge and belief, the Contractor is entitled to the offset in the amount requested; and

(B) The Contractor proves that the cost or pricing data were available before the “as of” date specified on its Certificate of Current Cost or Pricing Data, and that the data were not submitted before such date.

(ii) An offset shall not be allowed if--

(A) The understated data were known by the Contractor to be understated before the “as of” date specified on its Certificate of Current Cost or Pricing Data; or

(B) The Government proves that the facts demonstrate that the contract price would not have increased in the amount to be offset even if the available data had been submitted before the “as of” date specified on its Certificate of Current Cost or Pricing Data.

(e) If any reduction in the contract price under this clause reduces the price of items for which payment was made prior to the date of the modification reflecting the price reduction, the Contractor shall be liable to and shall pay the United States at the time such overpayment is repaid--

(1) Simple interest on the amount of such overpayment to be computed from the date(s) of overpayment to the Contractor to the date the Government is repaid by the Contractor at the applicable underpayment rate effective for each quarter prescribed by the Secretary of the Treasury under 26 U.S.C. 6621(a)(2); and

A penalty equal to the amount of the overpayment, if the Contractor or subcontractor knowingly submitted cost or pricing data that were incomplete, inaccurate, or noncurrent.

(End of clause)

52.215-13 SUBCONTRACTOR COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) The requirements of paragraphs (b) and (c) of this clause shall--

(1) Become operative only for any modification to this contract involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4; and

(2) Be limited to such modifications.

(b) Before awarding any subcontract expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, on the date of agreement on price or the date of award, whichever is later; or before pricing any subcontract modification involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless an exception under FAR 15.403-1 applies.

(c) The Contractor shall require the subcontractor to certify in substantially the form prescribed in FAR 15.406-2 that, to the best of its knowledge and belief, the data submitted under paragraph (b) of this clause were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

The Contractor shall insert the substance of this clause, including this paragraph (d), in each subcontract that exceeds the threshold for submission of cost or pricing data at FAR 15.403-4 on the date of agreement on price or the date of award, whichever is later.

(End of clause)

52.215-19 NOTIFICATION OF OWNERSHIP CHANGES (OCT 1997)

(a) The Contractor shall make the following notifications in writing:

(1) When the Contractor becomes aware that a change in its ownership has occurred, or is certain to occur, that could result in changes in the valuation of its capitalized assets in the accounting records, the Contractor shall notify the Administrative Contracting Officer (ACO) within 30 days.

(2) The Contractor shall also notify the ACO within 30 days whenever changes to asset valuations or any other cost changes have occurred or are certain to occur as a result of a change in ownership.

(b) The Contractor shall--

(1) Maintain current, accurate, and complete inventory records of assets and their costs;

(2) Provide the ACO or designated representative ready access to the records upon request;

(3) Ensure that all individual and grouped assets, their capitalized values, accumulated depreciation or amortization, and remaining useful lives are identified accurately before and after each of the Contractor's ownership changes; and

(4) Retain and continue to maintain depreciation and amortization schedules based on the asset records maintained before each Contractor ownership change.

The Contractor shall include the substance of this clause in all subcontracts under this contract that meet the applicability requirement of FAR 15.408(k).

(End of clause)

52.215-21 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) Exceptions from cost or pricing data. (1) In lieu of submitting cost or pricing data for modifications under this contract, for price adjustments expected to exceed the threshold set forth at FAR 15.403-4 on the date of the agreement on price or the date of the award, whichever is later, the Contractor may submit a written request for exception by submitting the information described in the following subparagraphs. The Contracting Officer may require additional supporting information, but only to the extent necessary to determine whether an exception should be granted, and whether the price is fair and reasonable--

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

(ii) Information on modifications of contracts or subcontracts for commercial items. (A) If--

(1) The original contract or subcontract was granted an exception from cost or pricing data requirements because the price agreed upon was based on adequate price competition or prices set by law or regulation, or was a contract or subcontract for the acquisition of a commercial item; and

(2) The modification (to the contract or subcontract) is not exempted based on one of these exceptions, then the Contractor may provide information to establish that the modification would not change the contract or subcontract from a contract or subcontract for the acquisition of a commercial item to a contract or subcontract for the acquisition of an item other than a commercial item.

(B) For a commercial item exception, the Contractor shall provide, at a minimum, information on prices at which the same item or similar items have previously been sold that is adequate for evaluating the reasonableness of the price of the modification. Such information may include--

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

the proposed quantities.

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

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

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

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

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

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

(End of clause)

52.217-8 OPTION TO EXTEND SERVICES (NOV 1999)

The Government may require continued performance of any services within the limits and at the rates specified in contract. These rates may be adjusted only as a result of revisions to prevailing labor rates provided by the Secretary of Labor. The option provision may be exercised more than once, but the total extension of performance hereunder shall not exceed 6 months. The Contracting Officer may exercise the option by written notice to the Contractor **at least 15 calendar days before the contract expires**.

(End of clause)

52.217-9 OPTION TO EXTEND THE TERM OF THE CONTRACT (MAR 2000)

(a) The Government may extend the term of this contract by written notice to the Contractor **at least 15 calendar days before the contract expires**; provided that the Government gives the Contractor a preliminary written notice of its intent to extend **at least 60 calendar days before the contract expires**. The preliminary notice does not commit the Government to an extension.

(b) If the Government exercises this option, the extended contract shall be considered to include this option clause.

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed **five years of the maintenance phase of contract performance.**
(End of clause)

52.219-4 NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999)

(a) Definition. HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

(b) Evaluation preference. (1) Offers will be evaluated by adding a factor of 10 percent to the price of all offers, except--

(i) Offers from HUBZone small business concerns that have not waived the evaluation preference;

(ii) Otherwise successful offers from small business concerns;

(iii) Otherwise successful offers of eligible products under the Trade Agreements Act when the dollar threshold for application of the Act is exceeded (see 25.402 of the Federal Acquisition Regulation (FAR)); and

(iv) Otherwise successful offers where application of the factor would be inconsistent with a Memorandum of Understanding or other international agreement with a foreign government.

(2) The factor of 10 percent shall be applied on a line item basis or to any group of items on which award may be made. Other evaluation factors described in the solicitation shall be applied before application of the factor.

(3) A concern that is both a HUBZone small business concern and a small disadvantaged business concern will receive the benefit of both the HUBZone small business price evaluation preference and the small disadvantaged business price evaluation adjustment (see FAR clause 52.219-23). Each applicable price evaluation preference or adjustment shall be calculated independently against an offeror's base offer.

These individual preference amounts shall be added together to arrive at the total evaluated price for that offer.

(c) Waiver of evaluation preference. A HUBZone small business concern may elect to waive the evaluation preference, in which case the factor will be added to its offer for evaluation purposes. The agreements in paragraph (d) of this clause do not apply if the offeror has waived the evaluation preference.

___ Offeror elects to waive the evaluation preference.

(d) Agreement. A HUBZone small business concern agrees that in the performance of the contract, in the case of a contract for

(1) Services (except construction), at least 50 percent of the cost of personnel for contract performance will be spent for employees of the concern or employees of other HUBZone small business concerns;

(2) Supplies (other than procurement from a nonmanufacturer of such supplies), at least 50 percent of the cost of manufacturing, excluding the cost of materials, will be performed by the concern or other HUBZone small business concerns;

(3) General construction, at least 15 percent of the cost of the contract performance incurred for personnel will be will be spent on the concern's employees or the employees of other HUBZone small business concerns; or

(4) Construction by special trade contractors, at least 25 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns.

(e) A HUBZone joint venture agrees that in the performance of the contract, the applicable percentage specified in paragraph (d) of this clause will be performed by the HUBZone small business participant or participants.

(f) A HUBZone small business concern nonmanufacturer agrees to furnish in performing this contract only end items manufactured or produced by HUBZone small business manufacturer concerns. This paragraph does not apply in connection with construction or service contracts.

(End of clause)

52.219-8 UTILIZATION OF SMALL BUSINESS CONCERNS (OCT 2000)

(a) It is the policy of the United States that small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems. It is further the policy of the United States that its prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts with small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

Definitions. As used in this contract--

HUBZone small business concern means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

Small disadvantaged business concern means a small business concern that represents, as part of its offer that--

(1) It has received certification as a small disadvantaged business concern consistent with 13 CFR part 124, subpart B;

(2) No material change in disadvantaged ownership and control has occurred since its certification;

(3) Where the concern is owned by one or more individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(4) It is identified, on the date of its representation, as a certified small disadvantaged business in the database maintained by the Small Business Administration (PRO-Net).

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern--

(1) That 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) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as a small business concern, a veteran-owned small business concern, a service-disabled veteran-owned small business concern, a HUBZone small business concern, a small disadvantaged business concern, or a women-owned small business concern.

(End of clause)

52.219-9 SMALL BUSINESS SUBCONTRACTING PLAN (JAN 2002)--ALTERNATE II (OCT 2001).

(a) This clause does not apply to small business concerns.

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

Commercial item means a product or service that satisfies the definition of commercial item in section 2.101 of the Federal Acquisition Regulation.

Commercial plan means a subcontracting plan (including goals) that covers the offeror's fiscal year and that applies to the entire production of commercial items sold by either the entire company or a portion thereof (e.g., division, plant, or product line).

Individual contract plan means a subcontracting plan that covers the entire contract period (including option periods), applies to a specific contract, and has goals that are based on the offeror's planned subcontracting in support of the specific contract, except that indirect costs incurred for common or joint purposes may be allocated on a prorated basis to the contract.

Master plan means a subcontracting plan that contains all the required elements of an individual contract plan, except goals, and may be incorporated into individual contract plans, provided the master plan has been approved.

Subcontract means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(c) Proposals submitted in response to this solicitation shall include a subcontracting plan that separately addresses subcontracting with small business, veteran-owner small business, HUBZone small business, small dis advantaged business, and women-owned small business concerns. If the offeror is submitting an individual contract plan, the plan must separately address subcontracting with small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns, with a separate part for the basic contract and separate parts for each option (if any). The plan shall be included in and made a part of the resultant contract. The subcontracting plan shall be negotiated within the time specified by the Contracting Officer. Failure to submit and negotiate a subcontracting plan shall make the offeror ineligible for award of a contract.

(d) The offeror's subcontracting plan shall include the following:

(1) Goals, expressed in terms of percentages of total planned subcontracting dollars, for the use of small business, veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns as subcontractors. The offeror shall include all subcontracts that contribute to contract performance, and may include a proportionate share of products and services that are normally allocated as indirect costs.

(2) A statement of--

(i) Total dollars planned to be subcontracted for an individual contract plan; or the offeror's total projected sales, expressed in dollars, and the total value of projected subcontracts to support the sales for a commercial plan;

(ii) Total dollars planned to be subcontracted to small business concerns;

(iii) Total dollars planned to be subcontracted to veteran-owned small business concerns;

(iv) Total dollars planned to be subcontracted to HUBZone small business concerns;

(v) Total dollars planned to be subcontracted to small disadvantaged business concerns; and

(vi) Total dollars planned to be subcontracted to women-owned small business concerns.

(3) A description of the principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to--

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(4) A description of the method used to develop the subcontracting goals in paragraph (d)(1) of this clause.

(5) A description of the method used to identify potential sources for solicitation purposes (e.g., existing company source lists, the Procurement Marketing and Access Network (PRO-Net) of the Small Business Administration (SBA), veterans service organizations, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small, HUBZone, small disadvantaged, and women-owned small business trade associations). A firm may rely on the information contained in PRO-Net as an accurate representation of a concern's size and ownership characteristics for the purposes of maintaining a small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business source list. Use of PRO-Net as its source list does not relieve a firm of its responsibilities (e.g., outreach, assistance, counseling, or publicizing subcontracting opportunities) in this clause.

(6) A statement as to whether or not the offeror in included indirect costs in establishing subcontracting goals, and a description of the method used to determine the proportionate share of indirect costs to be incurred with—

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(7) The name of the individual employed by the offeror who will administer the offeror's subcontracting program, and a description of the duties of the individual.

(8) A description of the efforts the offeror will make to assure that small business, veteran-owned small business, HUBZone small business, small disadvantaged business and women-owned small business concerns have an equitable opportunity to compete for subcontracts.

(9) Assurances that the offeror will include the clause of this contract entitled ``Utilization of Small Business Concerns'' in all subcontracts that offer further subcontracting opportunities, and that the offeror will require all subcontractors (except small business concerns) that receive subcontracts in excess of $500,000 ($1,000,000 for construction of any public facility) to adopt a subcontracting plan that complies with the requirements of this clause.

(10) Assurances that the offeror will--

(i) Cooperate in any studies or surveys as may be required;

(ii) Submit periodic reports so that the Government can determine the extent of compliance by the offeror with the subcontracting plan;

(iii) Submit Standard Form (SF) 294, Subcontracting Report for Individual Contracts, and/or SF 295, Summary Subcontract Report, in accordance with paragraph (j) of this clause. The reports shall provide information on subcontract awards to small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, small disadvantaged business concerns, women-owned small business concerns, and Historically Black Colleges and Universities and Minority Institutions. Reporting shall be in accordance with the instructions on the forms or as provided in agency regulations.

(iv) Ensure that its subcontractors agree to submit SF 294 and SF 295.

(11) A description of the types of records that will be maintained concerning procedures that have been adopted to comply with the requirements and goals in the plan, including establishing source lists; and a description of the

offeror's efforts to locate small business, veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns and award subcontracts to them. The records shall include at least the following (on a plant-wide or company-wide basis, unless otherwise indicated)

(i) Source lists (e.g., PRO-Net), guides, and other data that identify small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns.

(ii) Organizations contacted in an attempt to locate sources that are small business, veteran-owned small business, HUBZone small business, small disadvantaged business, or women-owned small business concerns.

(iii) Records on each subcontract solicitation resulting in an award of more than $100,000, indicating--

(A) Whether small business concerns were solicited and, if not, why not;

(B) Whether veteran-owned small business concerns were solicited and, if not, why not;

(C) Whether HUBZone small business concerns were solicited and, if not, why not;

(D) Whether small disadvantaged business concerns were solicited and, if not, why not;

(E) Whether women-owned small business concerns were solicited and, if not, why not; and

(F) If applicable, the reason award was not made to a small business concern.

(iv) Records of any outreach efforts to contact--

(A) Trade associations;

(B) Business development organizations;

(C) Conferences and trade fairs to locate small, HUBZone small, small disadvantaged, and women-owned small business sources; and

(D) Veterans service organizations.

(v) Records of internal guidance and encouragement provided to buyers through--

(A) Workshops, seminars, training, etc.; and

(B) Monitoring performance to evaluate compliance with the program's requirements.

(vi) On a contract-by-contract basis, records to support award data submitted by the offeror to the Government, including the name, address, and business size of each subcontractor. Contractors having commercial plans need not comply with this requirement.

(e) In order to effectively implement this plan to the extent consistent with efficient contract performance, the Contractor shall perform the following functions:

(1) Assist small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation by such concerns. Where the Contractor's lists of potential small business, veteran-owner small business, HUBZone small business, small disadvantaged

business, and women-owned small business subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.

(2) Provide adequate and timely consideration of the potentialities of small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns in all ``make-or-buy'' decisions.

(3) Counsel and discuss subcontracting opportunities with representatives of small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business firms.

(4) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business status as small, veteran-owner small business, HUBZone small, small disadvantaged, or women-owned small business for the purpose of obtaining a subcontract that is to be included as part or all of a goal contained in the Contractor's subcontracting plan.

(f) A master plan on a plant or division-wide basis that contains all the elements required by paragraph (d) of this clause, except goals, may be incorporated by reference as a part of the subcontracting plan required of the offeror by this clause; provided--
(1) the master plan has been approved, (2) the offeror ensures that the master plan is updated as necessary and provides copies of the approved master plan, including evidence of its approval, to the Contracting Officer, and (3) goals and any deviations from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of this contract are set forth in the individual subcontracting plan.

(g) A commercial plan is the preferred type of subcontracting plan for contractors furnishing commercial items. The commercial plan shall relate to the offeror's planned subcontracting generally, for both commercial and Government business, rather than solely to the Government contract. Commercial plans are also preferred for subcontractors that provide commercial items under a prime contract, whether or not the prime contractor is supplying a commercial item.

(h) Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the Contracting Officer in determining the responsibility of the offeror for award of the contract.

(i) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization Of Small Business Concerns," or (2) an approved plan required by this clause, shall be a material breach of the contract.

(j) The Contractor shall submit the following reports:

(1) Standard Form 294, Subcontracting Report for Individual Contracts. This report shall be submitted to the Contracting Officer semiannually and at contract completion. The report covers subcontract award data related to this contract. This report is not required for commercial plans.

(2) Standard Form 295, Summary Subcontract Report. This report encompasses all of the contracts with the awarding agency. It must be submitted semi-annually for contracts with the Department of Defense and annually for contracts with civilian agencies. If the reporting activity is covered by a commercial plan, the reporting activity must report annually all subcontract awards under that plan. All reports submitted at the close of each fiscal year (both individual and commercial plans) shall include a breakout, in the Contractor's format, of subcontract awards, in whole dollars, to small disadvantaged business concerns by North American Industry Classification System (NAICS) Industry Subsector. For a commercial plan, the Contractor may obtain from each of its subcontractors a predominant NAICS Industry Subsector and report all awards to that subcontractor under its predominant NAICS Industry Subsector.

(End of clause)

52.219-16 LIQUIDATED DAMAGES-SUBCONTRACTING PLAN (JAN 1999)

(a) Failure to make a good faith effort to comply with the subcontracting plan, as used in this clause, means a willful or intentional failure to perform in accordance with the requirements of the subcontracting plan approved under the clause in this contract entitled "Small Business Subcontracting Plan," or willful or intentional action to frustrate the plan.

(b) Performance shall be measured by applying the percentage goals to the total actual subcontracting dollars or, if a commercial plan is involved, to the pro rata share of actual subcontracting dollars attributable to Government contracts covered by the commercial plan. If, at contract completion or, in the case of a commercial plan, at the close of the fiscal year for which the plan is applicable, the Contractor has failed to meet its subcontracting goals and the Contracting Officer decides in accordance with paragraph (c) of this clause that the Contractor failed to make a good faith effort to comply with its subcontracting plan, established in accordance with the clause in this contract entitled "Small Business Subcontracting Plan," the Contractor shall pay the Government liquidated damages in an amount stated. The amount of probable damages attributable to the Contractor's failure to comply shall be an amount equal to the actual dollar amount by which the Contractor failed to achieve each subcontract goal.

(c) Before the Contracting Officer makes a final decision that the Contractor has failed to make such good faith effort, the Contracting Officer shall give the Contractor written notice specifying the failure and permitting the Contractor to demonstrate what good faith efforts have been made and to discuss the matter. Failure to respond to the notice may be taken as an admission that no valid explanation exists. If, after consideration of all the pertinent data, the Contracting Officer finds that the Contractor failed to make a good faith effort to comply with the subcontracting plan, the Contracting Officer shall issue a final decision to that effect and require that the Contractor pay the Government liquidated damages as provided in paragraph (b) of this clause.

(d) With respect to commercial plans, the Contracting Officer who approved the plan will perform the functions of the Contracting Officer under this clause on behalf of all agencies with contracts covered by the commercial plan.

(e) The Contractor shall have the right of appeal, under the clause in this contract entitled Disputes, from any final decision of the Contracting Officer.

(f) Liquidated damages shall be in addition to any other remedies that the Government may have.

(End of clause)

52.219-25 SMALL DISADVANTAGED BUSINESS PARTICIPATION PROGRAM—DISADVANTAGED STATUS AND REPORTING (OCT 1999)

(a) Disadvantaged status for joint venture partners, team members, and subcontractors. This clause addresses disadvantaged status for joint venture partners, teaming arrangement members, and subcontractors and is applicable if this contract contains small disadvantaged business (SDB) participation targets. The Contractor shall obtain representations of small disadvantaged status from joint venture partners, teaming arrangement members, and subcontractors through use of a provision substantially the same as paragraph (b)(1)(i) of the provision at FAR 52.219-22, Small Disadvantaged Business Status. The Contractor shall confirm that a joint venture partner, team member, or subcontractor representing itself as a small disadvantaged business concern, is identified as a certified small disadvantaged business in the database maintained by the Small Business Administration (PRO-Net) or by contacting the SBA's Office of Small Disadvantaged Business Certification and Eligibility.

(b) Reporting requirement. If this contract contains SDB participation targets, the Contractor shall report on the participation of SDB concerns at contract completion, or as otherwise provided in this contract. Reporting may be on Optional Form 312, Small Disadvantaged Business Participation Report, or in the Contractor's own format providing

the same information. This report is required for each contract containing SDB participation targets. If this contract contains an individual Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, reports may be submitted with the final Subcontracting Report for Individual Contracts (Standard Form 294) at the completion of the contract.

(End of clause)

52.222-1 NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FEB 1997)

If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Contracting Officer.

(End of clause)

52.222-3 CONVICT LABOR (AUG 1996)

The Contractor agrees not to employ in the performance of this contract any person undergoing a sentence of imprisonment which has been imposed by any court of a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands. This limitation, however, shall not prohibit the employment by the Contractor in the performance of this contract of persons on parole or probation to work at paid employment during the term of their sentence or persons who have been pardoned or who have served their terms. Nor shall it prohibit the employment by the Contractor in the performance of this contract of persons confined for violation of the laws of any of the States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands who are authorized to work at paid employment in the community under the laws of such jurisdiction, if--

(a)(1) The worker is paid or is in an approved work training program on a voluntary basis;

(2) Representatives of local union central bodies or similar labor union organizations have been consulted;

(3) Such paid employment will not result in the displacement of employed workers, or be applied in skills, crafts, or trades in which there is a surplus of available gainful labor in the locality, or impair existing contracts for services; and

(4) The rates of pay and other conditions of employment will not be less than those paid or provided for work of a similar nature in the locality in which the work is being performed; and

(b) The Attorney General of the United States has certified that the work-release laws or regulations of the jurisdiction involved are in conformity with the requirements of Executive Order 11755, as amended by Executive Orders 12608 and 12943.

(End of clause)

52.222-4 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION. (SEP 2000)

(a) Overtime requirements. No Contractor or subcontractor employing laborers or mechanics (see Federal Acquisition Regulation 22.300) shall require or permit them to work over 40 hours in any workweek unless they are paid at least 1 and 1/2 times the basic rate of pay for each hour worked over 40 hours.

(b) Violation; liability for unpaid wages; liquidated damages. The responsible Contractor and subcontractor are liable for unpaid wages if they violate the terms in paragraph (a) of this clause. In addition, the Contractor and subcontractor are liable for liquidated damages payable to the Government. The Contracting Officer will assess liquidated damages at the rate of $10 per affected employee for each calendar day on which the employer required or permitted the employee to work in excess of the standard workweek of 40 hours without paying overtime wages required by the Contract Work Hours and Safety Standards Act.

(c) Withholding for unpaid wages and liquidated damages. The Contracting Officer will withhold from payments due under the contract sufficient funds required to satisfy any Contractor or subcontractor liabilities for unpaid wages and liquidated damages. If amounts withheld under the contract are insufficient to satisfy Contractor or subcontractor liabilities, the Contracting Officer will withhold payments from other Federal or Federally assisted contracts held by the same Contractor that are subject to the Contract Work Hours and Safety Standards Act.

(d) Payrolls and basic records.

(1) The Contractor and its subcontractors shall maintain payrolls and basic payroll records for all laborers and mechanics working on the contract during the contract and shall make them available to the Government until 3 years after contract completion. The records shall contain the name and address of each employee, social security number, labor classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records need not duplicate those required for construction work by Department of Labor regulations at 29 CFR 5.5(a)(3) implementing the Davis-Bacon Act.

(2) The Contractor and its subcontractors shall allow authorized representatives of the Contracting Officer or the Department of Labor to inspect, copy, or transcribe records maintained under paragraph (d)(1) of this clause. The Contractor or subcontractor also shall allow authorized representatives of the Contracting Officer or Department of Labor to interview employees in the workplace during working hours.

(e) Subcontracts. The Contractor shall insert the provisions set forth in paragraphs (a) through (d) of this clause in subcontracts exceeding $100,000 and require subcontractors to include these provisions in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower-tier subcontractor with the provisions set forth in paragraphs (a) through (d) of this clause.

(End of clause)

52.222-6 DAVIS-BACON ACT (FEB 1995)

(a) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (d) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred

during such period. Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (b) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(b)(1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (b)(2) and (b)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(c) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(3) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(End of clause)

52.222-7 WITHHOLDING OF FUNDS (FEB 1988)

The Contracting Officer shall, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other Federally assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(End of clause)

52.222-8 PAYROLLS AND BASIC RECORDS (FEB 1988)

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the clause entitled Davis-Bacon Act, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)(1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify--

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR Part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (b)(2) of this clause.

(4) The falsification of any of the certifications in this clause may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(End of clause)

52.222-9 APPRENTICES AND TRAINEES (FEB 1988)

(a) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in this paragraph, shall be paid not less than the applicable wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of

Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(End of clause)

52.222-10 COMPLIANCE WITH COPELAND ACT REQUIREMENTS (FEB 1988)

The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

(End of clause)

52.222-11 SUBCONTRACTS (LABOR STANDARDS (FEB 1988)

(a) The Contractor or subcontractor shall insert in any subcontracts the clauses entitled Davis -Bacon Act, Contract Work Hours and Safety Standards Act-Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Withholding of Funds, Subcontracts (Labor Standards), Contract Termination-Debarment, Disputes Concerning Labor Standards, Compliance with Davis -Bacon and Related Act Regulations, and Certification of Eligibility, and such other clauses as the Contracting Officer may, by appropriate instructions, require, and also a clause requiring subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses cited in this paragraph.

(b)(1) Within 14 days after award of the contract, the Contractor shall deliver to the Contracting Officer a completed Statement and Acknowledgment Form (SF 1413) for each subcontract, including the subcontractor's signed and

dated acknowledgment that the clauses set forth in paragraph (a) of this clause have been included in the subcontract.

(iii) Within 14 days after the award of any subsequently awarded subcontract the Contractor shall deliver to the Contracting Officer an updated completed SF 1413 for such additional subcontract.

(End of clause)

52.222-12 CONTRACT TERMINATION--DEBARMENT (FEB 1988)

A breach of the contract clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act--Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Subcontracts (Labor Standards), Compliance with Davis-Bacon and Related Act Regulations, or Certification of Eligibility may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 CFR 5.12.

(End of clause)

52.222-13 COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS (FEB 1988)

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are hereby incorporated by reference in this contract.

(End of clause)

52.222-14 DISPUTES CONCERNING LABOR STANDARDS (FEB 1988)

The United States Department of Labor has set forth in 29 CFR Parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(End of clause)

52.222-15 CERTIFICATION OF ELIGIBILITY (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(4) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(End of clause)

52.222-21 PROHIBITION OF SEGREGATED FACILITIES (FEB 1999)

(a) Segregated facilities, as used in this clause, 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, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(b) The Contractor agrees 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 Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

(End of clause)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
6.2 percent	**6.9 percent**

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and

women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is **Pierce County, Tacoma, WA.**

52.222-26 EQUAL OPPORTUNITY (APR 2002)

(a) Definition. United States, as used in this clause, means the 50 States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, and Wake Island.

(b) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply with paragraphs (b)(1) through (b)(11) of this clause, except for work performed outside the United States by employees who were not recruited within the United States. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. However, it shall not be a violation of this clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor,

state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall als o file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(8) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary of Labor; or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraphs (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)

52.222-27 AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (FEB 1999)

(a) Definitions. "Covered area," as used in this clause, means the geographical area described in the solicitation for this contract.

"Deputy Assistant Secretary," as used in this clause, means Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, or a designee.

"Employer's identification number," as used in this clause, means the Federal Social Security number used on the employer's quarterly federal tax return, U.S. Treasury Department Form 941.

"Minority," as used in this clause, means--

(1) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

(2) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands);

(3) Black (all persons having origins in any of the black African racial groups not of Hispanic origin); and

(4) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race).

(b) If the Contractor, or a subcontractor at any tier, subcontracts a portion of the work involving any construction trade, each such subcontract in excess of $10,000 shall include this clause and the Notice containing the goals for minority and female participation stated in the solicitation for this contract.

(c) If the Contractor is participating in a Hometown Plan (41 CFR 60-4) approved by the U.S. Department of Labor in a covered area, either individually or through an association, its affirmative action obligations on all work in the plan area (including goals) shall comply with the plan for those trades that have unions participating in the plan. Contractors must be able to demonstrate participation in, and compliance with, the provisions of the plan. Each Contractor or subcontractor participating in an approved plan is also required to comply with its obligations under the Equal Opportunity clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good-faith performance by other Contractors or subcontractors toward a goal in an approved plan does not excuse any Contractor's or subcontractor's failure to make good-faith efforts to achieve the plan's goals.

(d) The Contractor shall implement the affirmative action procedures in subparagraphs (g)(1) through (16) of this clause. The goals stated in the solicitation for this contract are expressed as percentages of the total hours of employment and training of minority and female utilization that the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where that work is actually performed. The Contractor is expected to make substantially uniform progress toward its goals in each craft.

(e) Neither the terms and conditions of any collective bargaining agreement, nor the failure by a union with which the Contractor has a collective bargaining agreement, to refer minorities or women shall excuse the Contractor's obligations under this clause, Executive Order 11246, as amended, or the regulations thereunder.

(f) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

(g) The Contractor shall take affirmative action to ensure equal employment opportunity. The evaluation of the

Contractor's compliance with this clause shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and implement affirmative action steps at least as extensive as the following:

(1) Ensure a working environment free of harassment, intimidation, and coercion at all sites and in all facilities where the Contractor's employees are assigned to work. The Contractor, if possible, will assign two or more women to each construction project. The Contractor shall ensure that foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at these sites or facilities.

(2) Establish and maintain a current list of sources for minority and female recruitment. Provide written notification to minority and female recruitment sources and community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Establish and maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant, referrals of minorities or females from unions, recruitment sources, or community organizations, and the action taken with respect to each individual. If an individual was sent to the union hiring hall for referral and not referred back to the Contractor by the union or, if referred back, not employed by the Contractor, this shall be documented in the file, along with whatever additional actions the Contractor may have taken.

(4) Immediately notify the Deputy Assistant Secretary when the union or unions with which the Contractor has a collective bargaining agreement has not referred back to the Contractor a minority or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area that expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under subparagraph (g)(2) of this clause.

(6) Disseminate the Contractor's equal employment policy by--

(i) Providing notice of the policy to unions and to training, recruitment, and outreach programs, and requesting their cooperation in assisting the Contractor in meeting its contract obligations;

(ii) Including the policy in any policy manual and in collective bargaining agreements;

(iii) Publicizing the policy in the company newspaper, annual report, etc.;

(iv) Reviewing the policy with all management personnel and with all minority and female employees at least once a year; and

(v) Posting the policy on bulletin boards accessible to employees at each location where construction work is performed.

(7) Review, at least annually, the Contractor's equal employment policy and affirmative action obligations with all employees having responsibility for hiring, assignment, layoff, termination, or other employment decisions. Conduct review of this policy with all on-site supervisory personnel before initiating construction work at a job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's equal employment policy externally by including it in any advertising in the news

media, specifically including minority and female news media. Provide written notification to, and discuss this policy with, other Contractors and subcontractors with which the Contractor does or anticipates doing business.

(9) Direct recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than 1 month before the date for acceptance of applications for apprenticeship or training by any recruitment source, send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit minority persons and women. Where reasonable, provide after-school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

(11) Validate all tests and other selection requirements where required under 41 CFR 60-3.

(12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities. Encourage these employees to seek or to prepare for, through appropriate training, etc., opportunities for promotion.

(13) Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the Contractor's obligations under this contract are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user rest rooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

(15) Maintain a record of solicitations for subcontracts for minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's equal employment policy and affirmative action obligations.

(h) The Contractor is encouraged to participate in voluntary associations that may assist in fulfilling one or more of the affirmative action obligations contained in subparagraphs (g)(1) through (16) of this clause. The efforts of a contractor association, joint contractor-union, contractor-community, or similar group of which the contractor is a member and participant may be asserted as fulfilling one or more of its obligations under subparagraphs (g)(1) through (16) of this clause, provided the Contractor--

(1) Actively participates in the group;

(2) Makes every effort to ensure that the group has a positive impact on the employment of minorities and women in the industry;

(3) Ensures that concrete benefits of the program are reflected in the Contractor's minority and female workforce participation;

(4) Makes a good-faith effort to meet its individual goals and timetables; and

(5) Can provide access to documentation that demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply is the Contractor's, and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

(i) A single goal for minorities and a separate single goal for women shall be established. The Contractor is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of Executive Order 11246, as amended, if a particular group is employed in a substantially disparate manner.

(j) The Contractor shall not use goals or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

(k) The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts under Executive Order 11246, as amended.

(l) The Contractor shall carry out such sanctions and penalties for violation of this clause and of the Equal Opportunity clause, including suspension, termination, and cancellation of existing subcontracts, as may be imposed or ordered under Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. Any failure to carry out these sanctions and penalties as ordered shall be a violation of this clause and Executive Order 11246, as amended.

(m) The Contractor in fulfilling its obligations under this clause shall implement affirmative action procedures at least as extensive as those prescribed in paragraph (g) of this clause, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of Executive Order 11246, as amended, the implementing regulations, or this clause, the Deputy Assistant Secretary shall take action as prescribed in 41 CFR 60-4.8.

(n) The Contractor shall designate a responsible official to--

(1) Monitor all employment-related activity to ensure that the Contractor's equal employment policy is being carried out;

(2) Submit reports as may be required by the Government; and

(3) Keep records that shall at least include for each employee the name, address, telephone number, construction trade, union affiliation (if any), employee identification number, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, separate records are not required to be maintained.

Nothing contained herein shall be construed as a limitation upon the application of other laws that establish different standards of compliance or upon the requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(End of clause)

52.222-35 EQUAL OPPORTUNITY FOR SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS (DEC 2001)

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

All employment openings means all positions except executive and top management, those positions that will be filled from within the Contractor's organization, and positions lasting 3 days or less. This term includes full-time employment, temporary employment of more than 3 days duration, and part-time employment.

Executive and top management means any employee--

(1) Whose primary duty consists of the management of the enterprise in which the individual is employed or of a customarily recognized department or subdivision thereof;

(2) Who customarily and regularly directs the work of two or more other employees;

(3) Who has the authority to hire or fire other employees or whose suggestions and recommendations as to the hiring or firing and as to the advancement and promotion or any other change of status of other employees will be given particular weight;

(4) Who customarily and regularly exercises discretionary powers; and

(5) Who does not devote more than 20 percent or, in the case of an employee of a retail or service establishment, who does not devote more than 40 percent of total hours of work in the work week to activities that are not directly and closely related to the performance of the work described in paragraphs (1) through (4) of this definition. This paragraph (5) does not apply in the case of an employee who is in sole charge of an establishment or a physically separated branch establishment, or who owns at least a 20 percent interest in the enterprise in which the individual is employed.

Other eligible veteran means any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized.

Positions that will be filled from within the Contractor's organization means employment openings for which the Contractor will give no consideration to persons outside the Contractor's organization (including any affiliates, subsidiaries, and parent companies) and includes any openings the Contractor proposes to fill from regularly established “recall” lists. The exception does not apply to a particular opening once an employer decides to consider applicants outside of its organization.

Qualified special disabled veteran means a special disabled veteran who satisfies the requisite skill, experience, education, and other job-related requirements of the employment position such veteran holds or desires, and who, with or without reasonable accommodation, can perform the essential functions of such position.

Special disabled veteran means--

(1) A veteran who is entitled to compensation (or who but for the receipt of military retired pay would be entitled to compensation) under laws administered by the Department of Veterans Affairs for a disability--

(i) Rated at 30 percent or more; or

(ii) Rated at 10 or 20 percent in the case of a veteran who has been determined under 38 U.S.C. 3106 to have a serious employment handicap (i.e., a significant impairment of the veteran's ability to prepare for, obtain, or retain employment consistent with the veteran's abilities, aptitudes, and interests); or

(2) A person who was discharged or released from active duty because of a service-connected disability.

Veteran of the Vietnam era means a person who--

(1) Served on active duty for a period of more than 180 days and was discharged or released from active duty with other than a dishonorable discharge, if any part of such active duty occurred--

(i) In the Republic of Vietnam between February 28, 1961, and May 7, 1975; or

(ii) Between August 5, 1964, and May 7, 1975, in all other cases; or

(2) Was discharged or released from active duty for a service-connected disability if any part of the active duty was performed--

(i) In the Republic of Vietnam between February 28, 1961, and May 7, 1975; or

(ii) Between August 5, 1964, and May 7, 1975, in all other cases.
(b) General. (1) The Contractor shall not discriminate against the individual because the individual is a special disabled veteran, a veteran of the Vietnam era, or other eligible veteran, regarding any position for which the employee or applicant for employment is qualified. The Contractor shall take affirmative action to employ, advance in employment, and otherwise treat qualified special disabled veterans, veterans of the Vietnam era, and other eligible veterans without discrimination based upon their disability or veterans' status in all employment practices such as--

(i) Recruitment, advertising, and job application procedures;

(ii) Hiring, upgrading, promotion, award of tenure, demotion, transfer, layoff, termination, right of return from layoff and rehiring;

(iii) Rate of pay or any other form of compensation and changes in compensation;

(iv) Job assignments, job classifications, organizational structures, position descriptions, lines of progression, and seniority lists;

(v) Leaves of absence, sick leave, or any other leave;

(vi) Fringe benefits available by virtue of employment, whether or not administered by the Contractor;

(vii) Selection and financial support for training, including apprenticeship, and on-the-job training under 38 U.S.C. 3687, professional meetings, conferences, and other related activities, and selection for leaves of absence to pursue training;

(viii) Activities sponsored by the Contractor including social or recreational programs; and

(ix) Any other term, condition, or privilege of employment.

(2) The Contractor shall comply with the rules, regulations, and relevant orders of the Secretary of Labor issued under the Vietnam Era Veterans' Readjustment Assistance Act of 1972 (the Act), as amended (38 U.S.C. 4211 and 4212).

(c) Listing openings. (1) The Contractor shall immediately list all employment openings that exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract, and including those occurring at an establishment of the Contractor other than the one where the contract is being performed, but excluding those of independently operated corporate affiliates, at an appropriate local public employment service office of the State wherein the opening occurs. Listing employment openings with the U.S. Department of Labor's America's Job Bank shall satisfy the requirement to list jobs with the local employment service office.

(2) The Contractor shall make the listing of employment openings with the local employment service office at least concurrently with using any other recruitment source or effort and shall involve the normal obligations of placing a bona fide job order, including accepting referrals of veterans and nonveterans. This listing of employment openings does not require hiring any particular job applicant or hiring from any particular group of job applicants and is not

intended to relieve the Contractor from any requirements of Executive orders or regulations concerning nondiscrimination in employment.

(3) Whenever the Contractor becomes contractually bound to the listing terms of this clause, it shall advise the State public employment agency in each State where it has establishments of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these terms and has so advised the State agency, it need not advise the State agency of subsequent contracts. The Contractor may advise the State agency when it is no longer bound by this contract clause.

(d) Applicability. This clause does not apply to the listing of employment openings that occur and are filled outside the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, American Samoa, Guam, the Virgin Islands of the United States, and Wake Island.

(e) Postings. (1) The Contractor shall post employment notices in conspicuous places that are available to employees and applicants for employment.

(2) The employment notices shall--

(i) State the rights of applicants and employees as well as the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified employees and applicants who are special disabled veterans, veterans of the Vietnam era, and other eligible veterans; and

(ii) Be in a form prescribed by the Deputy Assistant Secretary for Federal Contract Compliance Programs, Department of Labor (Deputy Assistant Secretary of Labor), and provided by or through the Contracting Officer.

(3) The Contractor shall ensure that applicants or employees who are special disabled veterans are informed of the contents of the notice (e.g., the Contractor may have the notice read to a visually disabled veteran, or may lower the posted notice so that it can be read by a person in a wheelchair).

(4) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement, or other contract understanding, that the Contractor is bound by the terms of the Act and is committed to take affirmative action to employ, and advance in employment, qualified special disabled veterans, veterans of the Vietnam era, and other eligible veterans.

(f) Noncompliance. If the Contractor does not comply with the requirements of this clause, the Government may take appropriate actions under the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(g) Subcontracts. The Contractor shall insert the terms of this clause in all subcontracts or purchase orders of $25,000 or more unless exempted by rules, regulations, or orders of the Secretary of Labor. The Contractor shall act as specified by the Deputy Assistant Secretary of Labor to enforce the terms, including action for noncompliance.

(End of clause)

52.222-36 AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES (JUN 1998)

(a) General. (1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against any employee or applicant because of physical or mental disability. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified individuals with disabilities without discrimination based upon their physical or mental disability in all employment practices such as--

(i) Recruitment, advertising, and job application procedures;

(ii) Hiring, upgrading, promotion, award of tenure, demotion, transfer, layoff, termination, right of return from layoff, and rehiring;

(iii) Rates of pay or any other form of compensation and changes in compensation;

(iv) Job assignments, job classifications, organizational structures, position descriptions, lines of progression, and seniority lists;

(v) Leaves of absence, sick leave, or any other leave;

(vi) Fringe benefits available by virtue of employment, whether or not administered by the Contractor;

(vii) Selection and financial support for training, including apprenticeships, professional meetings, conferences, and other related activities, and selection for leaves of absence to pursue training;

(viii) Activities sponsored by the Contractor, including social or recreational programs; and

(ix) Any other term, condition, or privilege of employment.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Rehabilitation Act of 1973 (29 U.S.C. 793) (the Act), as amended.

(b) Postings. (1) The Contractor agrees to post employment notices stating--

(i) The Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified individuals with disabilities; and

(ii) The rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. The Contractor shall ensure that applicants and employees with disabilities are informed of the contents of the notice (e.g., the Contractor may have the notice read to a visually disabled individual, or may lower the posted notice so that it might be read by a person in a wheelchair). The notices shall be in a form prescribed by the Deputy Assistant Secretary for Federal Contract Compliance of the U.S. Department of Labor (Deputy Assistant Secretary) and shall be provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Act and is committed to take affirmative action to employ, and advance in employment, qualified individuals with physical or mental disabilities.

(c) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(d) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order in excess of $10,000 unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Deputy Assistant Secretary to enforce the terms, including action for noncompliance.

(End of clause)

52.222-37 EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS (DEC 2001)

(a) Unless the Contractor is a State or local government agency, the Contractor shall report at least annually, as required by the Secretary of Labor, on--

(1) The number of disabled veterans and the number of veterans of the Vietnam era in the workforce of the contractor by job category and hiring location; and

(2) The total number of new employees hired during the period covered by the report, and of that total, the number of disabled veterans, and the number of veterans of the Vietnam era.

(b) The above items shall be reported by completing the form entitled "Federal Contractor Veterans' Employment Report VETS-100."

(c) Reports shall be submitted no later than September 30 of each year beginning September 30, 1988.

(d) The employment activity report required by paragraph (a)(2) of this clause shall reflect total hires during the most recent 12-month period as of the ending date selected for the employment profile report required by paragraph (a)(1) of this clause. Contractors may select an ending date: (1) As of the end of any pay period during the period January through March 1st of the year the report is due, or (2) as of December 31, if the contractor has previous written approval from the Equal Employment Opportunity Commission to do so for purposes of submitting the Employer Information Report EEO-1 (Standard Form 100).

(e) The count of veterans reported according to paragraph (a) of this clause shall be based on voluntary disclosure. Each Contractor subject to the reporting requirements at 38 U.S.C. 4212 shall invite all disabled veterans and veterans of the Vietnam era who wish to benefit under the affirmative action program at 38 U.S.C. 4212 to identify themselves to the Contractor. The invitation shall state that the information is voluntarily provided; that the information will be kept confidential; that disclosure or refusal to provide the information will not subject the applicant or employee to any adverse treatment; and that the information will be used only in accordance with the regulations promulgated under 38 U.S.C. 4212.

(f) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary.

(End of clause)

52.222-41 SERVICE CONTRACT ACT OF 1965, AS AMENDED (MAY 1989)

(a) Definitions. "Act," as used in this clause, means the Service Contract Act of 1965, as amended (41 U.S.C. 351, et seq.).

"Contractor," as used in this clause or in any subcontract, shall be deemed to refer to the subcontractor, except in the term "Government Prime Contractor."

"Service employee," as used in this clause, means any person engaged in the performance of this contract other than any person employed in a bona fide executive, administrative, or professional capacity, as these terms are defined in Part 541 of Title 29, Code of Federal Regulations, as revised. It includes all such persons regardless of any contractual relationship that may be alleged to exist between a Contractor or subcontractor and such persons.

(b) Applicability. This contract is subject to the following provisions and to all other applicable provisions of the Act and regulations of the Secretary of Labor (29 CFR Part 4). This clause does not apply to contracts or subcontracts administratively exempted by the Secretary of Labor or exempted by 41 U.S.C. 356, as interpreted in Subpart C of 29 CFR Part 4.

(c) Compensation. (1) Each service employee employed in the performance of this contract by the Contractor or any subcontractor shall be paid not less than the minimum monetary wages and shall be furnished fringe benefits in accordance with the wages and fringe benefits determined by the Secretary of Labor, or authorized representative, as specified in any wage determination attached to this contract.

(2)(i) If a wage determination is attached to this con- tract, the Contractor shall classify any class of service employee which is not listed therein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination) so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed class of employees shall be paid the monetary wages and furnished the fringe benefits as are determined pursuant to the procedures in this paragraph (c).

(ii) This conforming procedure shall be initiated by the Contractor prior to the performance of contract work by the unlisted class of employee. The Contractor shall submit Standard Form (SF) 1444, Request For Authorization of Additional Classification and Rate, to the Contracting Officer no later than 30 days after the unlisted class of employee performs any contract work. The Contracting Officer shall review the proposed classification and rate and promptly submit the completed SF 1444 (which must include information regarding the agreement or disagreement of the employees' authorized representatives or the employees themselves together with the agency recommendation), and all pertinent informa-tion to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor. The Wage and Hour Division will approve, modify, or disapprove the action or render a final determination in the event of disagreement within 30 days of receipt or will notify the Contracting Officer within 30 days of receipt that additional time is necessary.

(iii) The final determination of the conformance action by the Wage and Hour Division shall be transmitted to the Contracting Officer who shall promptly notify the Contractor of the action taken. Each affected employee shall be furnished by the Contractor with a written copy of such determination or it shall be posted as a part of the wage determination.

(iv)(A) The process of establishing wage and fringe benefit rates that bear a reasonable relationship to those listed in a wage determination cannot be reduced to any single formula. The approach used may vary from wage determination to wage determination depending on the circumstances. Standard wage and salary administration practices which rank various job classifications by pay grade pursuant to point schemes or other job factors may, for example, be relied upon. Guidance may also be obtained from the way different jobs are rated under Federal pay systems (Federal Wage Board Pay System and the General Schedule) or from other wage determina- tions issued in the same locality. Basic to the establishment of any conformable wage rate(s) is the concept that a pay relationship should be maintained between job classifications based on the skill required and the duties performed.

(B) In the case of a contract modification, an exercise of an option, or extension of an existing contract, or in any other case where a Contractor succeeds a contract under which the classification in question was previously conformed pursuant to paragraph (c) of this clause, a new conformed wage rate and fringe benefits may be assigned to the conformed classification by indexing (i.e., adjusting) the previous conformed rate and fringe benefits by an amount equal to the average (mean) percentage increase (or decrease, where appropriate) between the wages and fringe benefits specified for all classifications to be used on the contract which are listed in the current wage determination, and those specified for the corresponding classifications in the previously applicable wage determination. Where conforming actions are accomplished in accordance with this paragraph prior to the performance of contract work by the unlisted class of employees, the Contractor shall advise the Contracting Officer of the action taken but the other procedures in subdivision (c)(2)(ii) of this clause need not be followed.

(C) No employee engaged in performing work on this contract shall in any event be paid less than the currently applicable minimum wage specified under section 6(a)(1) of the Fair Labor Standards Act of 1938, as amended.

(v) The wage rate and fringe benefits finally determined under this subparagraph (c)(2) of this clause shall be paid to all employees performing in the classification from the first day on which contract work is performed by them in the classification. Failure to pay the unlisted employees the compensation agreed upon by the interested parties and/or finally determined by the Wage and Hour Division retroactive to the date such class of employees commenced contract work shall be a violation of the Act and this contract.

(vi) Upon discovery of failure to comply with subparagraph (c)(2) of this clause, the Wage and Hour Division shall make a final determination of conformed classification, wage rate, and/or fringe benefits which shall be retroactive to the date such class or classes of employees commenced contract work.

(3) Adjustment of Compensation. If the term of this contract is more than 1 year, the minimum monetary wages and fringe benefits required to be paid or fur- nished thereunder to service employees under this contract shall be subject to adjustment after 1 year and not less often than once every 2 years, under wage determinations issued by the Wage and Hour Division.

(d) Obligation to Furnish Fringe Benefits. The Contractor or subcontractor may discharge the obligation to furnish fringe benefits specified in the attachment or determined under subparagraph (c)(2) of this clause by furnishing equivalent combinations of bona fide fringe benefits, or by making equivalent or differential cash payments, only in accordance with Subpart D of 29 CFR Part 4.

(e) Minimum Wage. In the absence of a minimum wage attachment for this contract, neither the Contractor nor any subcontractor under this contract shall pay any person performing work under this contract (regardless of whether the person is a service employee) less than the minimum wage specified by section 6(a)(1) of the Fair Labor Standards Act of 1938. Nothing in this clause shall relieve the Contractor or any subcontractor of any other obligation under law or contract for payment of a higher wage to any employee.

(f) Successor Contracts. If this contract succeeds a contract subject to the Act under which substantially the same services were furnished in the same locality and service employees were paid wages and fringe benefits provided for in a collective bargaining agreement, in the absence of the minimum wage attachment for this contract setting forth such collectively bargained wage rates and fringe benefits, neither the Contractor nor any subcontractor under this contract shall pay any service employee performing any of the contract work (regardless of whether or not such employee was employed under the predecessor contract), less than the wages and fringe benefits provided for in such collective bargaining agreement, to which such employee would have been entitled if employed under the predecessor contract, including accrued wages and fringe benefits and any prospective increases in wages and fringe benefits provided for under such agreement. No Contractor or subcontractor under this contract may be relieved of the foregoing obligation unless the limitations of 29 CFR 4.1b(b) apply or unless the Secretary of Labor or the Secretary's authorized representative finds, after a hearing as provided in 29 CFR 4.10 that the wages and/or fringe benefits provided for in such agreement are substantially at variance with those which prevail for services of a character similar in the locality, or determines, as provided in 29 CFR 4.11, that the collective bargaining agreement applicable to service employees employed under the predecessor contract was not entered into as a result of arm's length negotiations. Where it is found in accordance with the review procedures provided in 29 CFR 4.10 and/or 4.11 and Parts 6 and 8 that some or all of the wages and/or fringe benefits contained in a predecessor Contractor's collective bargaining agreement are substantially at variance with those which prevail for services of a character similar in the locality, and/or that the collective bargaining agreement applicable to service employees employed under the predecessor contract was not entered into as a result of arm's length negotiations, the Department will issue a new or revised wage determination setting forth the applicable wage rates and fringe benefits. Such determination shall be made part of the contract or subcontract, in accordance with the decision of the Administrator, the Administrative Law Judge, or the Board of Service Contract Appeals, as the case may be, irrespective of whether such issuance occurs prior to or after the award of a contract or subcontract (53 Comp. Gen. 401 (1973)). In the case of a wage determination issued solely as a result of a finding of substantial variance, such determination shall be

effective as of the date of the final administrative decision.

(g) Notification to Employees. The Contractor and any subcontractor under this contract shall notify each service employee commencing work on this contract of the minimum monetary wage and any fringe benefits required to be paid pursuant to this contract, or shall post the wage determination attached to this contract. The poster provided by the Department of Labor (Publication WH 1313) shall be posted in a prominent and accessible place at the worksite. Failure to comply with this requirement is a violation of section 2(a)(4) of the Act and of this contract.

(h) Safe and Sanitary Working Conditions. The Contractor or subcontractor shall not permit any part of the services called for by this contract to be performed in buildings or surroundings or under working conditions provided by or under the control or supervision of the Contractor or subcontractor which are unsanitary, hazardous, or dangerous to the health or safety of the service employees. The Contractor or subcontractor shall comply with the safety and health standards applied under 29 CFR Part 1925.

(i) Records. (1) The Contractor and each subcontractor performing work subject to the Act shall make and maintain for 3 years from the completion of the work, and make them available for inspection and transcription by authorized representatives of the Wage and Hour Division, Employment Standards Administration, a record of the following:

(i) For each employee subject to the Act--

(A) Name and address and social security number;

(B) Correct work classification or classifications, rate or rates of monetary wages paid and fringe benefits provided, rate or rates of payments in lieu of fringe benefits, and total daily and weekly compensation;

(C) Daily and weekly hours worked by each employee; and

(D) Any deductions, rebates, or refunds from the total daily or weekly compensation of each employee.

(ii) For those classes of service employees not included in any wage determination attached to this contract, wage rates or fringe benefits determined by the interested parties or by the Administrator or authorized representative under the terms of paragraph (c) of this clause. A copy of the report required by subdivision (c)(2)(ii) of this clause will fulfill this requirement.

(iii) Any list of the predecessor Contractor's employees which had been furnished to the Contractor as prescribed by paragraph (n) of this clause.

(2) The Contractor shall also make available a copy of this contract for inspection or transcription by authorized representatives of the Wage and Hour Division.

(3) Failure to make and maintain or to make available these records for inspection and transcription shall be a violation of the regulations and this contract, and in the case of failure to produce these records, the Contracting Officer, upon direction of the Department of Labor and notification to the Contractor, shall take action to cause suspension of any further payment or advance of funds until the violation ceases.

(4) The Contractor shall permit authorized representatives of the Wage and Hour Division to conduct interviews with employees at the worksite during normal working hours.

(j) Pay Periods. The Contractor shall unconditionally pay to each employee subject to the Act all wages due free and clear and without subsequent deduction (except as otherwise provided by law or regulations, 29 CFR Part 4), rebate, or kickback on any account. These payments shall be made no later than one pay period following the end of the regular pay period in which the wages were earned or accrued. A pay period under this Act may not be of any duration longer than semi-monthly.

(k) Withholding of Payments and Termination of Contract. The Contracting Officer shall withhold or cause to be withheld from the Government Prime Contractor under this or any other Government contract with the Prime Contractor such sums as an appropriate official of the Department of Labor requests or such sums as the Contracting Officer decides may be necessary to pay underpaid employees employed by the Contractor or subcontractor. In the event of failure to pay any employees subject to the Act all or part of the wages or fringe benefits due under the Act, the Contracting Officer may, after authorization or by direction of the Department of Labor and written notification to the Contractor, take action to cause suspension of any further payment or advance of funds until such violations have ceased. Additionally, any failure to comply with the requirements of this clause may be grounds for termination of the right to proceed with the contract work. In such event, the Government may enter into other contracts or arrangements for completion of the work, charging the Contractor in default with any additional cost.

(l) Subcontracts. The Contractor agrees to insert this clause in all subcontracts subject to the Act.

(m) Collective Bargaining Agreements Applicable to Service Employees. If wages to be paid or fringe benefits to be furnished any service employees employed by the Government Prime Contractor or any subcontractor under the contract are provided for in a collective bargaining agreement which is or will be effective during any period in which the contract is being performed, the Government Prime Contractor shall report such fact to the Contracting Officer, together with full information as to the application and accrual of such wages and fringe benefits, including any prospective increases, to service employees engaged in work on the contract, and a copy of the collective bargaining agreement. Such report shall be made upon commencing performance of the contract, in the case of collective bargaining agreements effective at such time, and in the case of such agreements or provisions or amendments thereof effective at a later time during the period of contract performance such agreements shall be reported promptly after negotiation thereof.

(n) Seniority List. Not less than 10 days prior to completion of any contract being performed at a Federal facility where service employees may be retained in the performance of the succeeding contract and subject to a wage determination which contains vacation or other benefit provisions based upon length of service with a Contractor (predecessor) or successor (29 CFR 4.173), the incumbent Prime Contractor shall furnish the Contracting Officer a certified list of the names of all service employees on the Contractor's or subcontractor's payroll during the last month of contract performance. Such list shall also contain anniversary dates of employment on the contract either with the current or predecessor Contractors of each such service employee. The Contracting Officer shall turn over such list to the successor Contractor at the commencement of the succeeding contract.

(o) Rulings and Interpretations. Rulings and interpretations of the Act are contained in Regulations, 29 CFR Part 4.

(p) Contractor's Certification. (1) By entering into this contract, the Contractor (and officials thereof) certifies that neither it (nor he or she) nor any person or firm who has a substantial interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of the sanctions imposed under section 5 of the Act.

(2) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract under section 5 of the Act.

(3) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(q) Variations, Tolerances, and Exemptions Involving Employment. Notwithstanding any of the provisions in paragraphs (b) through (o) of this clause, the following employees may be employed in accordance with the following variations, tolerances, and exemptions, which the Secretary of Labor, pursuant to section 4(b) of the Act prior to its amendment by Pub. L. 92-473, found to be necessary and proper in the public interest or to avoid serious impairment of the conduct of Government business:

(1) Apprentices, student-learners, and workers whose earning capacity is impaired by age, physical or mental deficiency, or injury may be employed at wages lower than the minimum wages otherwise required by section 2(a)(1)

or 2(b)(1) of the Act without diminishing any fringe benefits or cash payments in lieu thereof required under section 2(a)(2) of the Act, in accordance with the conditions and procedures prescribed for the employment of apprentices, student-learners, handicapped persons, and handicapped clients of sheltered workshops under section 14 of the Fair Labor Standards Act of 1938, in the regulations issued by the Administrator (29 CFR Parts 520, 521, 524, and 525).

(2) The Administrator will issue certificates under the Act for the employment of apprentices, student-learners, handicapped persons, or handicapped clients of sheltered workshops not subject to the Fair Labor Standards Act of 1938, or subject to different minimum rates of pay under the two acts, authorizing appropriate rates of minimum wages (but without changing requirements concerning fringe benefits or supplementary cash payments in lieu thereof), applying procedures prescribed by the applicable regulations issued under the Fair Labor Standards Act of 1938 (29 CFR Parts 520, 521, 524, and 525).

(3) The Administrator will also withdraw, annul, or cancel such certificates in accordance with the regulations in 29 CFR Parts 525 and 528.

(r) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed and individually registered in a bona fide apprenticeship program registered with a State Apprenticeship Agency which is recognized by the U.S. Department of Labor, or if no such recognized agency exists in a State, under a program registered with the Bureau of Apprenticeship and Training, Employment and Training Administration, U.S. Department of Labor. Any employee who is not registered as an apprentice in an approved program shall be paid the wage rate and fringe benefits contained in the applicable wage determination for the journeyman classification of work actually performed. The wage rates paid apprentices shall not be less than the wage rate for their level of progress set forth in the registered program, expressed as the appropriate percentage of the journeyman's rate contained in the applicable wage determination. The allowable ratio of apprentices to journeymen employed on the contract work in any craft classification shall not be greater than the ratio permitted to the Contractor as to his entire work force under the registered program.

(s) Tips. An employee engaged in an occupation in which the employee customarily and regularly receives more than $30 a month in tips may have the amount of these tips credited by the employer against the minimum wage required by section 2(a)(1) or section 2(b)(1) of the Act, in accordance with section 3(m) of the Fair Labor Standards Act and Regulations, 29 CFR Part 531. However, the amount of credit shall not exceed $1.34 per hour beginning January 1, 1981. To use this provision--

(1) The employer must inform tipped employees about this tip credit allowance before the credit is utilized;

(2) The employees must be allowed to retain all tips (individually or through a pooling arrangement and regardless of whether the employer elects to take a credit for tips received);

(3) The employer must be able to show by records that the employee receives at least the applicable Service Contract Act minimum wage through the combination of direct wages and tip credit; and

(4) The use of such tip credit must have been permitted under any predecessor collective bargaining agreement applicable by virtue of section 4(c) of the Act.

Disputes Concerning Labor Standards. The U.S. Department of Labor has set forth in 29 CFR Parts 4, 6, and 8 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(End of clause)

52.222-43 FAIR LABOR STANDARDS ACT AND SERVICE CONTRACT ACT--PRICE ADJUSTMENT (MULTIPLE YEAR AND OPTION CONTRACTS) (MAY 1989)

(a) This clause applies to both contracts subject to area prevailing wage determinations and contracts subject to collective bargaining agreements.

(b) The Contractor warrants that the prices in this contract do not include any allowance for any contingency to cover increased costs for which adjustment is provided under this clause.

(c) The wage determination, issued under the Service Contract Act of 1965, as amended, (41 U.S.C. 351, et seq.), by the Administrator, Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, current on the anniversary date of a multiple year contract or the beginning of each renewal option period, shall apply to this contract. If no such determination has been made applicable to this contract, then the Federal minimum wage as established by section 6(a)(1) of the Fair Labor Standards Act of 1938, as amended, (29 U.S.C. 206) current on the anniversary date of a multiple year contract or the beginning of each renewal option period, shall apply to this contract.

(d) The contract price or contract unit price labor rates will be adjusted to reflect the Contractor's actual increase or decrease in applicable wages and fringe benefits to the extent that the increase is made to comply with or the decrease is voluntarily made by the Contractor as a result of:

(1) The Department of Labor wage determination applicable on the anniversary date of the multiple year contract, or at the beginning of the renewal option period. For example, the prior year wage determination required a minimum wage rate of $4.00 per hour. The Contractor chose to pay $4.10. The new wage determination increases the minimum rate to $4.50 per hour. Even if the Contractor voluntarily increases the rate to $4.75 per hour, the allowable price adjustment is $.40 per hour;

(2) An increased or decreased wage determination otherwise applied to the contract by operation of law; or

(3) An amendment to the Fair Labor Standards Act of 1938 that is enacted after award of this contract, affects the minimum wage, and becomes applicable to this contract under law.

(e) Any adjustment will be limited to increases or decreases in wages and fringe benefits as described in paragraph (c) of this clause, and the accompanying increases or decreases in social security and unemployment taxes and workers' compensation insurance, but shall not otherwise include any amount for general and administrative costs, overhead, or profit.

(f) The Contractor shall notify the Contracting Officer of any increase claimed under this clause within 30 days after receiving a new wage determination unless this notification period is extended in writing by the Contracting Officer. The Contractor shall promptly notify the Contracting Officer of any decrease under this clause, but nothing in the clause shall preclude the Government from asserting a claim within the period permitted by law. The notice shall contain a statement of the amount claimed and any relevant supporting data, including payroll records, that the Contracting Officer may reasonably require. Upon agreement of the parties, the contract price or contract unit price labor rates shall be modified in writing. The Contractor shall continue performance pending agreement on or determination of any such adjustment and its effective date.

(g) The Contracting Officer or an authorized representative shall have access to and the right to examine any directly pertinent books, documents, papers and records of the Contractor until the expiration of 3 years after final payment under the contract.
(End of clause)

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, 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 identical data acquired from other sources.

(End of clause)

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.

(End of clause)

52.223-6 DRUG-FREE WORKPLACE (MAY 2001)

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

"Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812) and as further defined in regulation at 21 CFR 1308.11 - 1308.15.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to deter- mine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession, or use of any controlled substance.

"Drug-free workplace" means the site(s) for the performance of work done by the Contractor in connection with a specific contract at which employees of the Contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

"Employee" means an employee of a Contractor directly engaged in the performance of work under a Government contract. "Directly engaged" is defined to include all direct cost employees and any other Contractor employee who has other than a minimal impact or involvement in contract performance.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

(b) The Contractor, if other than an individual, shall-- within 30 days after award (unless a longer period is agreed to in writing for contracts of 30 days or more performance duration), or as soon as possible for contracts of less than 30 days performance duration--

(1) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;

(2) Establish an ongoing drug-free awareness program to inform such employees about--

(i) The dangers of drug abuse in the workplace;

(ii) The Contractor's policy of maintaining a drug-free workplace;

(iii) Any available drug counseling, rehabilitation, and employee assistance programs; and

(iv) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(3) Provide all employees engaged in performance of the contract with a copy of the statement required by subparagraph (b)(1) of this clause;

(4) Notify such employees in writing in the statement required by subparagraph (b)(1) of this clause that, as a condition of continued employment on this contract, the employee will--

(i) Abide by the terms of the statement; and

(ii) Notify the employer in writing of the employee's conviction under a criminal drug statute for a violation occurring in the workplace no later than 5 days after such conviction.

(5) Notify the Contracting Officer in writing within 10 days after receiving notice under subdivision (b)(4)(ii) of this clause, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

(6) Within 30 days after receiving notice under subdivision (b)(4)(ii) of this clause of a conviction, take one of the following actions with respect to any employee who is convicted of a drug abuse violation occurring in the workplace:

(i) Taking appropriate personnel action against such employee, up to and including termination; or

(ii) Require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency; and

(7) Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs (b)(1) though (b)(6) of this clause.

(c) The Contractor, if an individual, agrees by award of the contract or acceptance of a purchase order, not to engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance while performing this contract.

(d) In addition to other remedies available to the Government, the Contractor's failure to comply with the requirements of paragraph (b) or (c) of this clause may, pursuant to FAR 23.506, render the Contractor subject to suspension of contract payments, termination of the contract for default, and suspension or debarment.

(End of clause)

52.223-9 ESTIMATE OF PERCENTAGE OF RECOVERED MATERIAL CONTENT FOR EPA-DESIGNATED PRODUCTS (AUG 2000)

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

Postconsumer material means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of "recovered material."

Recovered material means waste materials and by-products recovered or diverted from solid waste, but the term does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.

(b) The Contractor, on completion of this contract, shall--

(1) Estimate the percentage of the total recovered material used in contract performance, including, if applicable, the percentage of postconsumer material content; and

(2) Submit this estimate to **U.S. Army, Corps of Engineers, Seattle District, CENWS-CT-CB-MU (Sherrell), P.O. Box 3755, Seattle, WA 98124-3755**.

(End of clause)

52.223-10 WASTE REDUCTION PROGRAM (AUG 2000)

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

Recycling means the series of activities, including collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use in the form of raw materials in the manufacture of products other than fuel for producing heat or power by combustion.

Waste prevention means any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they are discarded. Waste prevention also refers to the reuse of products or materials.

Waste reduction means preventing or decreasing the amount of waste being generated through waste prevention, recycling, or purchasing recycled and environmentally preferable products.

(b) Consistent with the requirements of Section 701 of Executive Order 13101, the Contractor shall establish a program to promote cost-effective waste reduction in all operations and facilities covered by this contract. The Contractor's programs shall comply with applicable Federal, State, and local requirements, specifically including Section 6002 of the Resource Conservation and Recovery Act (42 .S.C. 6962, et seq.) and implementing regulations (40 CFR part 247).

(End of clause)

52.223-12 REFRIGERATION EQUIPMENT AND AIR CONDITIONERS. (MAY 1995)

The Contractor shall comply with the applicable requirements of Sections 608 and 609 of the Clean Air Act (42 U.S.C. 7671g and 7671h) as each or both apply to this contract.

(End of clause)

52.223-14 TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(a) Unless otherwise exempt, the Contractor, as owner or operator of a facility 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). The Contractor shall file, for each facility subject to the Form R filing and reporting requirements, the annual Form R throughout the life of the contract.

(b) A Contractor owned or operated facility used in the performance of this contract is exempt from the requirement to file an annual Form R if--

(1) 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);

(2) 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);

(3) The facility does not meet the reporting thresholds of toxic chemicals established under 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);

(4) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

(5) 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.

(c) If the Contractor has certified to an exemption 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 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, as owner or operator of a facility used in the performance of this contract that is no longer 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 facility becomes eligible; and (ii) continue to file the annual Form R for the life of the contract for such facility.

(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 of commercial items, as defined in FAR Part 2, 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), the substance of this clause, except this paragraph (e).

(End of clause)

52.224-1 PRIVACY ACT NOTIFICATION (APR 1984)

The Contractor will be required to design, develop, or operate a system of records on individuals, to accomplish an agency function subject to the Privacy Act of 1974, Public Law 93-579, December 31, 1974 (5 U.S.C. 552a) and applicable agency regulations. Violation of the Act may involve the imposition of criminal penalties.

(End of clause)

52.224-2 PRIVACY ACT (APR 1984)

(a) The Contractor agrees to--

(1) Comply with the Privacy Act of 1974 (the Act) and the agency rules and regulations issued under the Act in the design, development, or operation of any system of records on individuals to accomplish an agency function when the contract specifically identifies--

(i) The systems of records; and

(ii) The design, development, or operation work that the contractor is to perform;

(2) Include the Privacy Act notification contained in this contract in every solicitation and resulting subcontract and in every subcontract awarded without a solicitation, when the work statement in the proposed subcontract requires the redesign, development, or operation of a system of records on individuals that is subject to the Act; and

(3) Include this clause, including this subparagraph (3), in all subcontracts awarded under this contract which requires the design, development, or operation of such a system of records.

(b) In the event of violations of the Act, a civil action may be brought against the agency involved when the violation concerns the design, development, or operation of a system of records on individuals to accomplish an agency function, and criminal penalties may be imposed upon the officers or employees of the agency when the violation concerns the operation of a system of records on individuals to accomplish an agency function. For purposes of the Act, when the contract is for the operation of a system of records on individuals to accomplish an agency function, the Contractor is considered to be an employee of the agency.

(c)(1) "Operation of a system of records," as used in this clause, means performance of any of the activities associated with maintaining the system of records, including the collection, use, and dissemination of records.

(2) "Record," as used in this clause, means any item, collection, or grouping of information about an individual that is maintained by an agency, including, but not limited to, education, financial transactions, medical history, and criminal or employment history and that contains the person's name, or the identifying number, symbol, or other identifying particular assigned to the individual, such as a fingerprint or voiceprint or a photograph.

(3) "System of records on individuals," as used in this clause, means a group of any records under the control of any agency from which information is retrieved by the name of the individual or by some identifying number, symbol, or other identifying particular assigned to the individual.

(End of clause)

52.225-11 BUY AMERICAN ACT--CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (JUL 2002)

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

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the end product.

Designated country means any of the following countries: Aruba, Austria, Bangladesh, Belgium, Benin, Bhutan, Botswana, Burkina Faso, Burundi, Canada, Cape Verde, Central African Republic, Chad, Comoros, Denmark.

Djibouti, Equatorial Guinea, Finland, France, Gambia, Germany, Greece, Guinea, Guinea-Bissau, Haiti, Hong Kong, Ireland, Israel, Italy, Japan.

Kiribati, Korea, Republic of, Lesotho, Liechtenstein, Luxembourg, Malawi, Maldives, Mali, Mozambique, Nepal, Netherlands, Niger, Norway, Portugal, Rwanda.

Sao Tome and Principe, Sierra Leone, Singapore, Somalia, Spain, Sweden, Switzerland, Tanzania U.R., Togo, Tuvalu, Uganda, United Kingdom, Vanuatu, Western Samoa, Yemen.

Designated country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different construction material distinct from the materials from which it was transformed.

Domestic construction material means--

(1) An unmanufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic.

Foreign construction material means a construction material other than a domestic construction material.

North American Free Trade Agreement country means Canada or Mexico.

North American Free Trade Agreement country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a North American Free Trade Agreement (NAFTA) country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a NAFTA country into a new and different construction material distinct from the materials from which it was transformed.

United States means the 50 States and the District of Columbia, U.S. territories and possessions, Puerto Rico, the Northern Mariana Islands, and any other place subject to U.S. jurisdiction, but does not include leased bases.

(b) Construction materials. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) and the Balance of Payments Program by providing a preference for domestic construction material. In addition, the Contracting Officer has determined that the Trade Agreements Act and the North American Free Trade Agreement (NAFTA) apply to this acquisition. Therefore, the Buy American Act restrictions are waived for designated country and NAFTA country construction materials.

(2) The Contractor shall use only domestic, designated country, or NAFTA country construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

(3) The requirement in paragraph (b)(2) of this clause does not apply to the construction materials or components listed by the Government as follows: **NONE**

(4) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(3) of this clause if the Government determines that--

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the restrictions of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent;

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act.

(1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(4) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American Act applies, use of foreign construction material is noncompliant with the Buy American Act.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....
Item 2:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....

\1\ Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).

List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

(End of clause)

52.225-13 RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (JUL 2000)

(a) The Contractor shall not acquire, for use in the performance of this contract, any supplies or services originating from sources within, or that were located in or transported from or through, countries whose products are banned from importation into the United States under regulations of the Office of Foreign Assets Control, Department of the Treasury. Those countries are Cuba, Iran, Iraq, Libya, North Korea, Sudan, the territory of Afghanistan controlled by the Taliban, and Serbia (excluding the territory of Kosovo).

(b) The Contractor shall not acquire for use in the performance of this contract any supplies or services from entities controlled by the government of Iraq.

(c) The Contractor shall insert this clause, including this paragraph (c), in all subcontracts.

(End of clause)

52.227-1 AUTHORIZATION AND CONSENT (JUL 1995)

(a) The Government authorizes and consents to all use and manufacture, in performing this contract or any subcontract at any tier, of any invention described in and covered by a United States patent (1) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract or (2) used in machinery, tools, or methods whose use necessarily results from compliance by the Contractor or a subcontractor with (i) specifications or written provisions forming a part of this contract or (ii) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely by the provisions of the indemnity clause, if any, included in this contract or any subcontract hereunder (including any lower-tier subcontract), and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted.

(b) The Contractor agrees to include, and require inclusion of, this clause, suitably modified to identify the parties, in all subcontracts at any tier for supplies or services (including construction, architect-engineer services, and materials, supplies, models, samples, and design or testing services expected to exceed the simplified acquisition threshold (however, omission of this clause from any subcontract, including those at or below the simplified acquisition threshold, does not affect this authorization and consent.)

(End of clause)

52.227-2 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (AUG 1996)

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed under this contract, the Contractor shall furnish to the Government, when requested by the

Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(5) The Contractor agrees to include, and require inclusion of, this clause in all subcontracts at any tier for supplies or services (including construction and architect-engineer subcontracts and those for material, supplies, models, samples, or design or testing services) expected to exceed the simplified acquisition threshold at (FAR) 2.101.to exceed the dollar amount set forth in 13.000 of the Federal Acquisition Regulation (FAR).

(End of clause)

52.227-3 PATENT INDEMNITY (APR 1984)

(a) The Contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of any United States patent (except a patent issued upon an application that is now or may hereafter be withheld from issue pursuant to a Secrecy Order under 35 U.S.C. 181) arising out of the manufacture or delivery of supplies, the performance of services, or the construction, alteration, modification, or repair of real property (hereinafter referred to as "construction work") under this contract, or out of the use or disposal by or for the account of the Government of such supplies or construction work.

(b) This indemnity shall not apply unless the Contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in its defense. Further, this indemnity shall not apply to (1) an infringement resulting from compliance with specific written instructions of the Contracting Officer directing a change in the supplies to be delivered or in the materials or equipment to be used, or directing a manner of performance of the contract not normally used by the Contractor, (2) an infringement resulting from addition to or change in supplies or components furnished or construction work performed that was made subsequent to delivery or performance, or (3) a claimed infringement that is unreasonably settled without the consent of the Contractor, unless required by final decree of a court of competent jurisdiction.

(End of clause)

52.227-4 PATENT INDEMNITY--CONSTRUCTION CONTRACTS (APR 1984)

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any United States patent (except a patent issued upon an application that is now or may hereafter be withheld from issue pursuant to a Secrecy Order under 35 U.S.C. 181) arising out of performing this contract or out of the use or disposal by or for the account of the Government of supplies furnished or work performed under this contract.

(End of clause)

52.227-14 RIGHTS IN DATA--GENERAL (JUN 1987)

(a) Definitions. "Computer software," as used in this clause, means computer programs, computer data bases, and documentation thereof.

"Data," as used in this clause, means recorded information, regardless of form or the media on which it may be

recorded. The term includes technical data and computer software. The term does not include information incidental to contract administration, such as financial, administrative, cost or pricing, or management information.

"Form, fit, and function data," as used in this clause, means data relating to items, components, or processes that are sufficient to enable physical and functional interchangeability, as well as data identifying source, size, configuration, mating, and attachment characteristics, functional characteristics, and performance requirements; except that for computer software it means data identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithm, process, formulae, and flow charts of the software.

"Limited rights," as used in this clause, means the rights of the Government in limited rights data as set forth in the Limited Rights Notice of subparagraph (g)(2) if included in this clause.

"Limited rights data," as used in this clause, means data (other than computer software) that embody trade secrets or are commercial or financial and confidential or privileged, to the extent that such data pertain to items, components, or processes developed at private expense, including minor modifications thereof.

"Restricted computer software," as used in this clause, means computer software developed at private expense and that is a trade secret; is commercial or financial and is confidential or privileged; or is published copyrighted computer software, including minor modifications of such computer software.

"Restricted rights," as used in this clause, means the rights of the Government in restricted computer software, as set forth in a Restricted Rights Notice of subparagraph (g)(3) if included in this clause, or as otherwise may be provided in a collateral agreement incorporated in and made part of this contract, including minor modifications of such computer software.

"Technical data," as used in this clause, means data (other than computer software) which are of a scientific or technical nature.

"Unlimited rights," as used in this clause, means the right of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so.

(b) Allocation of rights.

(1) Except as provided in paragraph (c) of this clause regarding copyright, the Government shall have unlimited rights in--

(i) Data first produced in the performance of this contract;

(ii) Form, fit, and function data delivered under this contract;

(iii) Data delivered under this contract (except for restricted computer software) that constitute manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under this contract; and

(iv) All other data delivered under this contract unless provided otherwise for limited rights data or restricted computer software in accordance with paragraph (g) of this clause.

(2) The Contractor shall have the right to--

(i) Use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, unless provided otherwise in paragraph (d) of this clause;

(ii) Protect from unauthorized disclosure and use those data which are limited rights data or restricted computer software to the extent provided in paragraph (g) of this clause;

(iii) Substantiate use of, add or correct limited rights, restricted rights, or copyright notices and to take other appropriate action, in accordance with paragraphs (e) and (f) of this clause; and

Establish claim to copyright subsisting in data first produced in the performance of this contract to the extent provided in subparagraph (c)(1) of this clause.

(c) Copyright.

(1) Data first produced in the performance of this contract. Unless provided otherwise in paragraph (d) of this clause, the Contractor may establish, without prior approval of the Contracting Officer, claim to copyright subsisting in scientific and technical articles based on or containing data first produced in the performance of this contract and published in academic, technical or professional journals, symposia proceedings or similar works. The prior, express written permission of the Contracting Officer is required to establish claim to copyright subsisting in all other data first produced in the performance of this contract. When claim to copyright is made, the Contractor shall affix the applicable copyright notices of 17 U.S.C. 401 or 402 and acknowledgment of Government sponsorship (including contract number) to the data when such data are delivered to the Government, as well as when the data are published or deposited for registration as a published work in the U.S. Copyright Office. For data other than computer software the Contractor grants to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable worldwide license in such copyrighted data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government. For computer software, the Contractor grants to the Government and others acting in its behalf, a paid-up nonexclusive, irrevocable worldwide license in such copyrighted computer software to reproduce, prepare derivative works, and perform publicly and display publicly by or on behalf of the Government.

(2) Data not first produced in the performance of this contract. The Contractor shall not, without prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract and which contains the copyright notice of 17 U.S.C. 401 or 402, unless the Contractor identifies such data and grants to the Government, or acquires on its behalf, a license of the same scope as set forth in subparagraph (c)(1) of this clause; provided, however, that if such data are computer software the Government shall acquire a copyright license as set forth in subparagraph (g)(3) of this clause if included in this contract or as otherwise may be provided in a collateral agreement incorporated in or made part of this contract.

(3) Removal of copyright notices. The Government agrees not to remove any copyright notices placed on data pursuant to this paragraph (c), and to include such notices on all reproductions of the data.

(d) Release, publication and use of data.

(1) The Contractor shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, except to the extent such data may be subject to the Federal export control or national security laws or regulations, or unless otherwise provided in this paragraph of this clause or expressly set forth in this contract.

(2) The Contractor agrees that to the extent it receives or is given access to data necessary for the performance of this contract which contain restrictive markings, the Contractor shall treat the data in accordance with such markings unless otherwise specifically authorized in writing by the Contracting Officer.

(e) Unauthorized marking of data.

(1) Notwithstanding any other provisions of this contract concerning inspection or acceptance, if any data delivered under this contract are marked with the notices specified in subparagraph (g)(2) or (g)(3) of this clause and use of

such is not authorized by this clause, or if such data bears any other restrictive or limiting markings not authorized by this contract, the Contracting Officer may at any time either return the data to the Contractor, or cancel or ignore the markings. However, the following procedures shall apply prior to canceling or ignoring the markings.

(i) The Contracting Officer shall make written inquiry to the Contractor affording the Contractor 30 days from receipt of the inquiry to provide written justification to substantiate the propriety of the markings;

(ii) If the Contractor fails to respond or fails to provide written justification to substantiate the propriety of the markings within the 30-day period (or a longer time not exceeding 90 days approved in writing by the Contracting Officer for good cause shown), the Government shall have the right to cancel or ignore the markings at any time after said period and the data will no longer be made subject to any disclosure prohibitions.

(iii) If the Contractor provides written justification to substantiate the propriety of the markings within the period set in subdivision (e)(1)(i) of this clause, the Contracting Officer shall consider such written justification and determine whether or not the markings are to be cancelled or ignored. If the Contracting Officer determines that the markings are authorized, the Contractor shall be so notified in writing. If the Contracting Officer determines, with concurrence of the head of the contracting activity, that the markings are not authorized, the Contracting Officer shall furnish the Contractor a written determination, which determination shall become the final agency decision regarding the appropriateness of the markings unless the Contractor files suit in a court of competent jurisdiction within 90 days of receipt of the Contracting Officer's decision. The Government shall continue to abide by the markings under this subdivision (e)(1)(iii) until final resolution of the matter either by the Contracting Officer's determination becoming final (in which instance the Government shall thereafter have the right to cancel or ignore the markings at any time and the data will no longer be made subject to any disclosure prohibitions), or by final disposition of the matter by court decision if suit is filed.

(2) The time limits in the procedures set forth in subparagraph (e)(1) of this clause may be modified in accordance with agency regulations implementing the Freedom of Information Act (5 U.S.C. 552) if necessary to respond to a request thereunder.

(3) This paragraph (e) does not apply if this contract is for a major system or for support of a major system by a civilian agency other than NASA and the U.S. Coast Guard agency subject to the provisions of Title III of the Federal Property and Administrative Services Act of 1949.

(4) Except to the extent the Government's action occurs as the result of final disposition of the matter by a court of competent jurisdiction, the Contractor is not precluded by this paragraph (e) from bringing a claim under the Contract Disputes Act, including pursuant to the Disputes clause of this contract, as applicable, that may arise as the result of the Government removing or ignoring authorized markings on data delivered under this contract.

(f) Omitted or incorrect markings.

(1) Data delivered to the Government without either the limited rights or restricted rights notice as authorized by paragraph (g) of this clause, or the copyright notice required by paragraph (c) of this clause, shall be deemed to have been furnished with unlimited rights, and the Government assumes no liability for the disclosure, use, or reproduction of such data. However, to the extent the data has not been disclosed without restriction outside the Government, the Contractor may request, within 6 months (or a longer time approved by the Contracting Officer for good cause shown) after delivery of such data, permission to have notices placed on qualifying data at the Contractor's expense, and the Contracting Officer may agree to do so if the Contractor--

(i) Identifies the data to which the omitted notice is to be applied;

(ii) Demonstrates that the omission of the notice was inadvertent;

(iii) Establishes that the use of the proposed notice is authorized; and

(iv) Acknowledges that the Government has no liability with respect to the disclosure, use, or reproduction of any such data made prior to the addition of the notice or resulting from the omission of the notice.

(2) The Contracting Officer may also (i) permit correction at the Contractor's expense of incorrect notices if the Contractor identifies the data on which correction of the notice is to be made, and demonstrates that the correct notice is authorized, or (ii) correct any incorrect notices.

(g) Protection of limited rights data and restricted computer software.

(1) When data other than that listed in subdivisions (b)(1)(i), (ii), and (iii) of this clause are specified to be delivered under this contract and qualify as either limited rights data or restricted computer software, if the Contractor desires to continue protection of such data, the Contractor shall withhold such data and not furnish them to the Government under this contract. As a condition to this withholding, the Contractor shall identify the data being withheld and furnish form, fit, and function data in lieu thereof. Limited rights data that are formatted as a computer data base for delivery to the Government are to be treated as limited rights data and not restricted computer software.

(2) Reserved.

(3) Reserved.

(h) Subcontracting. The Contractor has the responsibility to obtain from its subcontractors all data and rights therein necessary to fulfill the Contractor's obligations to the Government under this contract. If a subcontractor refuses to accept terms affording the Government such rights, the Contractor shall promptly bring such refusal to the attention of the Contracting Officer and not proceed with subcontract award without further authorization.

Relationship to patents. Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government.

(End of clause)

52.228-2 ADDITIONAL BOND SECURITY (OCT 1997)

The Contractor shall promptly furnish additional security required to protect the Government and persons supplying labor or materials under this contract if--

(a) Any surety upon any bond, or issuing financial institution for other security, furnished with this contract becomes unacceptable to the Government.

(b) Any surety fails to furnish reports on its financial condition as required by the Government;

(c) The contract price is increased so that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer; or

(d) An irrevocable letter of credit (ILC) used as security will expire before the end of the period of required security. If the Contractor does not furnish an acceptable extension or replacement ILC, or other acceptable substitute, at least 30 days before an ILC's scheduled expiration, the Contracting officer has the right to immediately draw on the ILC.

(End of clause)

52.228-5 INSURANCE--WORK ON A GOVERNMENT INSTALLATION (JAN 1997)

(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 notify 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.

(End of clause)

52.228-11 PLEDGES OF ASSETS (FEB 1992)

(a) Offerors shall obtain from each person acting as an individual surety on a bid guarantee, a performance bond, or a payment bond--

(1) Pledge of assets; and

(2) Standard Form 28, Affidavit of Individual Surety.

(b) Pledges of assets from each person acting as an individual surety shall be in the form of--

(1) Evidence of an escrow account containing cash, certificates of deposit, commercial or Government securities, or other assets described in FAR 28.203-2 (except see 28.203-2(b)(2) with respect to Government securities held in book entry form) and/or;

(2) A recorded lien on real estate. The offeror will be required to provide--

(i) Evidence of title in the form of a certificate of title prepared by a title insurance company approved by the United States Department of Justice. This title evidence must show fee simple title vested in the surety along with any concurrent owners; whether any real estate taxes are due and payable; and any recorded encumbrances against the property, including the lien filed in favor of the Government as required by FAR 28.203-3(d);

(ii) Evidence of the amount due under any encumbrance shown in the evidence of title;

(iii) A copy of the current real estate tax assessment of the property or a current appraisal dated no earlier than 6 months prior to the date of the bond, prepared by a professional appraiser who certifies that the appraisal has been conducted in accordance with the generally accepted appraisal standards as reflected in the Uniform Standards of Professional Appraisal Practice, as promulgated by the Appraisal Foundation.

(End of clause)

52.228-12 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 requester.

(End of clause)

52.228-14 IRREVOCABLE LETTER OF CREDIT (DEC 1999)

(a) "Irrevocable letter of credit" (ILC), as used in this clause, means a written commitment by a federally insured financial institution to pay all or part of a stated amount of money, until the expiration date of the letter, upon presentation by the Government (the beneficiary) of a written demand therefor. Neither the financial institution nor the offeror/Contractor can revoke or condition the letter of credit.

(b) If the offeror intends to use an ILC in lieu of a bid bond, or to secure other types of bonds such as performance and payment bonds, the letter of credit and letter of confirmation formats in paragraphs (e) and (f) of this clause shall be used.

(c) The letter of credit shall be irrevocable, shall require presentation of no document other than a written demand and the ILC (including confirming letter, if any), shall be issued/confirmed by an acceptable federally insured financial institution as provided in paragraph (d) of this clause, and--

(1) If used as a bid guarantee, the ILC shall expire no earlier than 60 days after the close of the bid acceptance period;

(2) If used as an alternative to corporate or individual sureties as security for a performance or payment bond, the offeror/Contractor may submit an ILC with an initial expiration date estimated to cover the entire period for which financial security is required or may submit an ILC with an initial expiration date that is a minimum period of one year from the date of issuance. The ILC shall provide that, unless the issuer provides the beneficiary written notice of non-renewal at least 60 days in advance of the current expiration date, the ILC is automatically extended without amendment for one year from the expiration date, or any future expiration date, until the period of required coverage is completed and the Contracting Officer provides the financial institution with a written statement waiving the right to payment. The period of required coverage shall be:

(i) For contracts subject to the Miller Act, the later of--

(A) One year following the expected date of final payment;

(B) For performance bonds only, until completion of any warranty period; or

(C) For payment bonds only, until resolution of all claims filed against the payment bond during the one-year period following final payment.

(ii) For contracts not subject to the Miller Act, the later of--

(A) 90 days following final payment; or

(B) For performance bonds only, until completion of any warranty period.

(d) Only federally insured financial institutions rated investment grade or higher shall issue or confirm the ILC. The

offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institution has the required rating(s) as of the date of issuance of the ILC. Unless the financial institution issuing the ILC had letter of credit business of less than $25 million in the past year, ILCs over $5 million must be confirmed by another acceptable financial institution that had letter of credit business of less than $25 million in the past year.

(e) The following format shall be used by the issuing financial institution to create an ILC:

_____

[Issuing Financial Institution's Letterhead or Name and Address]

Issue Date _____

IRREVOCABLE LETTER OF CREDIT NO. _____

Account party's name _____

Account party's address _____

For Solicitation No. _____(for reference only)

TO: [U.S. Government agency]

[U.S. Government agency's address]

1. We hereby establish this irrevocable and transferable Letter of Credit in your favor for one or more drawings up to United States $_____. This Letter of Credit is payable at [issuing financial institution's and, if any, confirming financial institution's] office at [issuing financial institution's address and, if any, confirming financial institution's address] and expires with our close of business on _____, or any automatically extended expiration date.

2. We hereby undertake to honor your or the transferee's sight draft(s) drawn on the issuing or, if any, the confirming financial institution, for all or any part of this credit if presented with this Letter of Credit and confirmation, if any, at the office specified in paragraph 1 of this Letter of Credit on or before the expiration date or any automatically extended expiration date.

3. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this Letter of Credit that it is deemed to be automatically extended without amendment for one year from the expiration date hereof, or any future expiration date, unless at least 60 days prior to any expiration date, we notify you or the transferee by registered mail, or other receipted means of delivery, that we elect not to consider this Letter of Credit renewed for any such additional period. At the time we notify you, we also agree to notify the account party (and confirming financial institution, if any) by the same means of delivery.

4. This Letter of Credit is transferable. Transfers and assignments of proceeds are to be effected without charge to either the beneficiary or the transferee/assignee of proceeds. Such transfer or assignment shall be only at the written direction of the Government (the beneficiary) in a form satisfactory to the issuing financial institution and the confirming financial institution, if any.

5. This Letter of Credit is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution, if any, otherwise state of issuing financial institution].

6. If this credit expires during an interruption of business of this financial institution as described in Article 17 of the

UCP, the financial institution specifically agrees to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Issuing financial institution]

(f) The following format shall be used by the financial institution to confirm an ILC:

_____
[Confirming Financial Institution's Letterhead or Name and Address]

(Date) _____

Our Letter of Credit Advice Number _____

Beneficiary: _____ [U.S. Government agency]

Issuing Financial Institution: _____

Issuing Financial Institution's LC No.: _____

Gentlemen:

1. We hereby confirm the above indicated Letter of Credit, the original of which is attached, issued by _____ [name of issuing financial institution] for drawings of up to United States dollars _____/U.S. $_____ and expiring with our close of business on _____ [the expiration date], or any automatically extended expiration date.

2. Draft(s) drawn under the Letter of Credit and this Confirmation are payable at our office located at _____.

3. We hereby undertake to honor sight draft(s) drawn under and presented with the Letter of Credit and this Confirmation at our offices as specified herein.

4. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this confirmation that it be deemed automatically extended without amendment for one year from the expiration date hereof, or any automatically extended expiration date, unless:

(a) At least 60 days prior to any such expiration date, we shall notify the Contracting Officer, or the transferee and the issuing financial institution, by registered mail or other receipted means of delivery, that we elect not to consider this confirmation extended for any such additional period; or

(b) The issuing financial institution shall have exercised its right to notify you or the transferee, the account party, and ourselves, of its election not to extend the expiration date of the Letter of Credit.

5. This confirmation is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution].

6. If this confirmation expires during an interruption of business of this financial institution as described in Article 17

of the UCP, we specifically agree to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Confirming financial institution]

(g) The following format shall be used by the Contracting Officer for a sight draft to draw on the Letter of Credit:

SIGHT DRAFT

_____

[City, State]

(Date) _____

[Name and address of financial institution]

Pay to the order of _____ [Beneficiary Agency] _____ the sum of United States $_____. This draft is drawn under Irrevocable Letter of Credit No. _____.

_____

[Beneficiary Agency]

By: _____

(End of clause)

52.228-15 PERFORMANCE AND PAYMENT BONDS--CONSTRUCTION (JUL 2000)-

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

Original contract price means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) Amount of required bonds. Unless the resulting contract price is $100,000 or less, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

(1) Performance bonds (Standard Form 25). The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

(2) Payment Bonds (Standard Form 25-A). The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

(3) Additional bond protection. (i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) Furnishing executed bonds. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) Surety or other security for bonds. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the Federal Register or may be obtained from the U.S. Department of Treasury, Financial Management Service, Surety Bond Branch, 401 14th Street, NW, 2nd Floor, West Wing, Washington, DC 20227.

(e) Notice of subcontractor waiver of protection (40 U.S.C. 270b(c). Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

(End of clause)

52.229-3 FEDERAL, STATE, AND LOCAL TAXES (JAN 1991)

(a) "Contract date," as used in this clause, means the date set for bid opening or, if this is a negotiated contract or a modification, the effective date of this contract or modification.

"All applicable Federal, State, and local taxes and duties," as used in this clause, means all taxes and duties, in effect on the contract date, that the taxing authority is imposing and collecting on the transactions or property covered by this contract.

"After-imposed Federal tax," as used in this clause, means any new or increased Federal excise tax or duty, or tax that was exempted or excluded on the contract date but whose exemption was later revoked or reduced during the contract period, on the transactions or property covered by this contract that the Contractor is required to pay or bear as the result of legislative, judicial, or administrative action taking effect after the contract date. It does not include social security tax or other employment taxes.
"After-relieved Federal tax," as used in this clause, means any amount of Federal excise tax or duty, except social security or other employment taxes, that would otherwise have been payable on the transactions or property covered by this contract, but which the Contractor is not required to pay or bear, or for which the Contractor obtains a refund or drawback, as the result of legislative, judicial, or administrative action taking effect after the contract date.

(b) The contract price includes all applicable Federal, State, and local taxes and duties.

(c) The contract price shall be increased by the amount of any after-imposed Federal tax, provided the Contractor warrants in writing that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the contract price, as a contingency reserve or otherwise.

(d) The contract price shall be decreased by the amount of any after-relieved Federal tax.

(e) The contract price shall be decreased by the amount of any Federal excise tax or duty, except social security or other employment taxes, that the Contractor is required to pay or bear, or does not obtain a refund of, through the Contractor's fault, negligence, or failure to follow instructions of the Contracting Officer.

(f) No adjustment shall be made in the contract price under this clause unless the amount of the adjustment exceeds $250.

(g) The Contractor shall promptly notify the Contracting Officer of all matters relating to any Federal excise tax or duty that reasonably may be expected to result in either an increase or decrease in the contract price and shall take appropriate action as the Contracting Officer directs.

(h) The Government shall, without liability, furnish evidence appropriate to establish exemption from any Federal, State, or local tax when the Contractor requests such evidence and a reasonable basis exists to sustain the exemption.

(End of clause)

52.232-1 PAYMENTS (APR 1984)

The Government shall pay the Contractor, upon the submission of proper invoices or vouchers, the prices stipulated in this contract for supplies delivered and accepted or services rendered and accepted, less any deductions provided in this contract. Unless otherwise specified in this contract, payment shall be made on partial deliveries accepted by the Government if--

(a) The amount due on the deliveries warrants it; or

(b) The Contractor requests it and the amount due on the deliveries is at least $1,000 or 50 percent of the total contract price.

(End of clause)

52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (SEP 2002)

(a) Payment of price. The Government shall pay the Contractor the contract price as provided in this contract.

(b) Progress payments. The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer.

(1) The Contractor's request for progress payments shall include the following substantiation:

(i) An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested.

(ii) A listing of the amount included for work performed by each subcontractor under the contract.

(iii) A listing of the total amount of each subcontract under the contract.

(iv) A listing of the amounts previously paid to each such subcontractor under the contract.

(v) Additional supporting data in a form and detail required by the Contracting Officer.

(2) In the preparation of estimates, the Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site also may be taken into consideration if--

(i) Consideration is specifically authorized by this contract; and

(ii) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

(c) Contractor certification. Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made: (However, if the Contractor elects to delete paragraph (c)(4) from the certification, the certification is still acceptable.)

I hereby certify, to the best of my knowledge and belief, that--

(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

(2) All payments due to subcontractors and suppliers from previous payments received under the contract have been made, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of chapter 39 of Title 31, United States Code;

(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract; and

(4) This certification is not to be construed as final acceptance of a subcontractor's performance.

_____

(Name)

_____

(Title)

_____

(Date)

(d) Refund of unearned amounts. If the Contractor, after making a certified request for progress payments, discovers that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this contract (hereinafter referred to as the "unearned amount"), the Contractor shall--

(1) Notify the Contracting Officer of such performance deficiency; and

(2) Be obligated to pay the Government an amount (computed by the Contracting Officer in the manner provided in paragraph (j) of this clause) equal to interest on the unearned amount from the 8th day after the date of receipt of the unearned amount until--

(i) The date the Contractor notifies the Contracting Officer that the performance deficiency has been corrected; or

(ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

(e) Retainage. If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage.

(f) Title, liability, and reservation of rights. All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as--

(1) Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

(2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(g) Reimbursement for bond premiums. In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of progress payments attributable to bond premiums.

(h) Final payment. The Government shall pay the amount due the Contractor under this contract after--

(1) Completion and acceptance of all work;

(2) Presentation of a properly executed voucher; and

(3) Presentation of release of all claims against
the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of 1940 (31 U.S.C. 3727 and 41 U.S.C. 15).

(i) Limitation because of undefinitized work. Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

(j) Interest computation on unearned amounts. In accordance with 31 U.S.C. 3903(c)(1), the amount payable under subparagraph (d)(2) of this clause shall be--

(1) Computed at the rate of average bond equivalent rates of 91-day Treasury bills auctioned at the most recent auction of such bills prior to the date the Contractor receives the unearned amount; and

(2) Deducted from the next available payment to the Contractor.

(End of clause)

52.232-8 DISCOUNTS FOR PROMPT PAYMENT (FEB 2002)

(a) Discounts for prompt payment will not be considered in the evaluation of offers. However, any offered discount will form a part of the award, and will be taken if payment is made within the discount period indicated in the offer by the offeror. As an alternative to offering a discount for prompt payment in conjunction with the offer, offerors awarded contracts may include discounts for prompt payment on individual invoices.

(b) In connection with any discount offered for prompt payment, time shall be computed from the date of the invoice. If the Contractor has not placed a date on the invoice, the due date shall be calculated from the date the designated billing office receives a proper invoice, provided the agency annotates such invoice with the date of receipt at the time of receipt. For the purpose of computing the discount earned, payment shall be considered to have been made on the date that appears on the payment check or, for an electronic funds transfer, the specified payment date. When the discount date falls on a Saturday, Sunday, or legal holiday when Federal Government offices are closed and Government business is not expected to be conducted, payment may be made on the following business day.

(End of clause)

52.232-9 LIMITATION ON WITHHOLDING OF PAYMENTS (APR 1984)

If more than one clause or Schedule term of this contract authorizes the temporary withholding of amounts otherwise payable to the Contractor for supplies delivered or services performed, the total of the amounts withheld at any one time shall not exceed the greatest amount that may be withheld under any one clause or Schedule term at that time; provided, that this limitation shall not apply to--

(a) Withholdings pursuant to any clause relating to wages or hours of employees;

(b) Withholdings not specifically provided for by this contract;

(c) The recovery of overpayments; and

(d) Any other withholding for which the Contracting Officer determines that this limitation is inappropriate.

(End of clause)

52.232-11 EXTRAS (APR 1984)

Except as otherwise provided in this contract, no payment for extras shall be made unless such extras and the price therefore have been authorized in writing by the Contracting Officer.

(End of clause)

52.232-17 INTEREST (JUNE 1996)

(a) Except as otherwise provided in this contract under a Price Reduction for Defective Cost or Pricing Data clause or a Cost Accounting Standards clause, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code (26 U.S.C. 1481)) shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 12 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in paragraph (b) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid. reproduce, prepare derivative works, distribute copies to the public, and (b) Amounts shall be due at the earliest of the following dates:

(1) The date fixed under this contract.

(2) The date of the first written demand for payment consistent with this contract, including any demand resulting from a default termination.

(3) The date the Government transmits to the Contractor a proposed supplemental agreement to confirm completed negotiations establishing the amount of debt.

(4) If this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or a negotiated pricing agreement not confirmed by contract modification.

(c) The interest charge made under this clause may be reduced under the procedures prescribed in 32.614-2 of the Federal Acquisition Regulation in effect on the date of this contract.

(End of clause)

52.232-23 ASSIGNMENT OF CLAIMS (JAN 1986)

(a) The Contractor, under the Assignment of Claims Act, as amended, 31 U.S.C. 3727, 41 U.S.C. 15 (hereafter referred to as "the Act"), may assign its rights to be paid amounts due or to become due as a result of the performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency. The assignee under such an assignment may thereafter further assign or reassign its right under the original assignment to any type of financing institution described in the preceding sentence.

(b) Any assignment or reassignment authorized under the Act and this clause shall cover all unpaid amounts payable under this contract, and shall not be made to more than one party, except that an assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in the financing of this contract.

(c) The Contractor shall not furnish or disclose to any assignee under this contract any classified document (including this contract) or information related to work under this contract until the Contracting Officer authorizes such action in writing.

(End of clause)

52.232-25 PROMPT PAYMENT (FEB 2002)

Notwithstanding any other payment clause in this contract, the Government will make invoice payments under the terms and conditions specified in this clause. The Government considers payment as being made on the day a check

is dated or the date of an electronic funds transfer (EFT). Definitions of pertinent terms are set forth in sections 2.101, 32.001, and 32.902 of the Federal Acquisition Regulation. All days referred to in this clause are calendar days, unless otherwise specified. (However, see paragraph (a)(4) of this clause concerning payments due on Saturdays, Sundays, and legal holidays.)

(a) Invoice payments--(1) Due date. (i) Except as indicated in paragraphs (a)(2) and (c) of this clause, the due date for making invoice payments by the designated payment office is the later of
the following two events:

(A) The 30th day after the designated billing office receives a proper invoice from the Contractor (except as provided in paragraph (a)(1)(ii) of this clause).

(B) The 30th day after Government acceptance of supplies delivered or services performed. For a final invoice, when the payment amount is subject to contract settlement actions, acceptance is deemed to occur on the effective date of the contract settlement.

(ii) If the designated billing office fails to annotate the invoice with the actual date of receipt at the time of receipt, the invoice payment due date is the 30th day after the date of the Contractor's invoice, provided the designated billing office receives a proper invoice and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(2) Certain food products and other payments. (i) Due dates on Contractor invoices for meat, meat food products, or fish; perishable agricultural commodities; and dairy products, edible fats or oils, and food products prepared from edible fats or oils are--

(A) For meat or meat food products, as defined in section 2(a)(3) of the Packers and Stockyard Act of 1921 (7 U.S.C. 182(3)), and as further defined in Pub. L. 98-181, including any edible fresh or frozen poultry meat, any perishable poultry meat food product, fresh eggs, and any perishable egg product, as close as possible to, but not later than, the 7th day after product delivery.

(B) For fresh or frozen fish, as defined in section 204(3) of the Fish and Seafood Promotion Act of 1986 (16 U.S.C. 4003(3)), as close as possible to, but not later than, the 7th day after product delivery.

C) For perishable agricultural commodities, as defined in section 1(4) of the Perishable Agricultural Commodities Act of 1930 (7 U.S.C. 499a(4)), as close as possible to, but not later than, the 10th day after product delivery, unless another date is specified in the contract.

(D) For dairy products, as defined in section 111(e) of the Dairy Production Stabilization Act of 1983 (7 U.S.C. 4502(e)), edible fats or oils, and food products prepared from edible fats or oils, as close as possible to, but not later than, the 10th day after the date on which a proper invoice has been received. Liquid milk, cheese, certain processed cheese products, butter, yogurt, ice cream, mayonnaise, salad dressings, and other similar products, fall within this classification. Nothing in the Act limits this classification to refrigerated products. When questions arise regarding the proper classification of a specific product, prevailing industry practices will be followed in specifying a contract payment due date. The burden of proof that a classification of a specific product is, in fact, prevailing industry practice is upon the Contractor making the representation.

(ii) If the contract does not require submission of an invoice for payment (e.g., periodic lease payments), the due date will be as specified in the contract.

(3) Contractor's invoice. The Contractor shall prepare and submit invoices to the designated billing office specified in the contract. A proper invoice must include the items listed in paragraphs (a)(3)(i) through (a)(3)(x) of this clause. If the invoice does not comply with these requirements, the designated billing office will return it within 7 days after receipt (3 days for meat, meat food products, or fish; 5 days for perishable agricultural commodities, dairy products,

edible fats or oils, and food products prepared from edible fats or oils), with the reasons why it is not a proper invoice. The Government will take into account untimely notification when computing any interest penalty owed the Contractor.

(i) Name and address of the Contractor.

(ii) Invoice date and invoice number. (The Contractor should date invoices as close as possible to the date of the mailing or transmission.)

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

(iv) Description, quantity, unit of measure, unit price, and extended price of supplies delivered or services performed.

(v) Shipping and payment terms (e.g., shipment number and date of shipment, discount for prompt payment terms). Bill of lading number and weight of shipment will be shown for shipments on Government bills of lading.

(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 notify in the event of a defective invoice.

(viii) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(ix) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision (e.g., 52.232-38, Submission of Electronic Funds Transfer Information with Offer), contract clause (e.g., 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration, or 52.232-34, Payment by Electronic Funds Transfer--Other Than Central Contractor Registration), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

(x) Any other information or documentation required by the contract (e.g., evidence of shipment).

(4) Interest penalty. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if payment is not made by the due date and the conditions listed in paragraphs (a)(4)(i) through (a)(4)(iii) of this clause are met, if applicable. However, when the due date falls on a Saturday, Sunday, or legal holiday, the designated payment office may make payment on the following working day without incurring a late payment interest penalty.

(i) The designated billing office received a proper invoice.

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

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

(5) Computing penalty amount. The Government will compute the interest penalty in accordance with the Office of Management and Budget prompt payment regulations at 5 CFR part 1315.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor, Government acceptance is deemed to occur constructively on the 7th day (unless otherwise specified in this contract) after the Contractor delivers the supplies or performs the services in accordance with the terms and conditions of the contract, unless there is a disagreement over quantity, quality, or Contractor compliance with a contract provision. If actual acceptance occurs within the constructive acceptance period, the Government will base the determination of an interest penalty on the actual date of acceptance. The constructive acceptance requirement does not, however, compel Government officials to accept supplies or services, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The prompt payment regulations at 5 CFR 1315.10(c) do not require the Government to pay interest penalties if payment delays are due to disagreement between the Government and the 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. The Government and the Contractor shall resolve claims involving disputes and any interest that may be payable in accordance with the clause at FAR 52.233-1, Disputes.

(6) Discounts for prompt payment. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if the Government takes a discount for prompt payment improperly. The Government will calculate the interest penalty in accordance with the prompt payment regulations at 5 CFR part 1315.

(7) Additional interest penalty. (i) The designated payment office will pay a penalty amount, calculated in accordance with the prompt payment regulations at 5 CFR part 1315 in addition to the interest penalty amount only if--

(A) The Government owes an interest penalty of $1 or more;

(B) The designated payment office does not pay the interest penalty within 10 days after the date the invoice amount is paid; and

(C) The Contractor makes a written demand to the designated payment office for additional penalty payment, in accordance with paragraph (a)(7)(ii) of this clause, postmarked not later than 40 days after the invoice amount is paid.

(ii)(A) The Contractor shall support written demands for additional penalty payments with the following data. The Government will not request any additional data. The Contractor shall--

(1) Specifically assert that late payment interest is due under a specific invoice, and request payment of all overdue late payment interest penalty and such additional penalty as may be required;

(2) Attach a copy of the invoice on which the unpaid late payment interest is due; and

(3) State that payment of the principal has been received, including the date of receipt.

(B) If there is no postmark or the postmark is illegible--

(1) The designated payment office that receives the demand will annotate it with the date of receipt, provided the demand is received on or before the 40th day after payment was made; or

(2) If the designated payment office fails to make the required annotation, the Government will determine the demand's validity based on the date the Contractor has placed on the demand, provided such date is no later than the 40th day after payment was made.

(iii) The additional penalty does not apply to payments regulated by other Government regulations (e.g., payments under utility contracts subject to tariffs and regulation).

(b) Contract financing payment. If this contract provides for contract financing, the Government will make contract financing payments in accordance with the applicable contract financing clause.

(c) Fast payment procedure due dates. If this contract contains the clause at 52.213-1, Fast Payment Procedure, payments will be made within 15 days after the date of receipt of the invoice.

(d) Overpayments. If the Contractor becomes aware of a duplicate payment or that the Government has otherwise overpaid on an invoice payment, the Contractor shall immediately notify the Contracting Officer and request instructions for disposition of the overpayment.

(End of clause)

52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (FEB 2002)

Notwithstanding any other payment terms in this contract, the Government will make invoice payments under the terms and conditions specified in this clause. The Government considers payment as being made on the day a check is dated or the date of an electronic funds transfer. Definitions of pertinent terms are set forth in sections 2.101, 32.001, and 32.902 of the Federal Acquisition Regulation. All days referred to in this clause are calendar days, unless otherwise specified. (However, see paragraph (a)(3) concerning payments due on Saturdays, Sundays, and legal holidays.)

(a) Invoice payments--(1) Types of invoice payments. For purposes of this clause, there are several types of invoice payments that 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 is 14 days after the designated billing office receives a proper payment request. If the designated billing office fails to annotate the payment request with the actual date of receipt at the time of receipt, the payment due date is the 14th day after the date of the Contractor's payment request, provided the designated billing office receives a proper payment request 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, is as specified in the contract or, if not specified, 30 days after approval by the Contracting Officer for release to the Contractor.

(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 is the later of the following two events:

(1) The 30th day after the designated billing office receives a proper invoice from the Contractor.

(2) The 30th day after Government acceptance of the work or services completed by the Contractor. For a final invoice when the payment amount is subject to contract settlement actions (e.g., release of claims), acceptance is deemed to occur on the effective date of the contract settlement.

(B) If the designated billing office fails to annotate the invoice with the date of actual receipt at the time of receipt, the invoice payment due date is the 30th day after the date of the Contractor's invoice, provided the designated billing office receives a proper invoice and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(2) Contractor's invoice. The Contractor shall prepare and submit invoices to the designated billing office specified in the contract. A proper invoice must include the items listed in paragraphs (a)(2)(i) through (a)(2)(xi) of this clause. If the invoice does not comply with these requirements, the designated billing office must return it within 7 days after receipt, with the reasons why it is not a proper invoice. When computing any interest penalty owed the Contractor, the Government will take into account if the Government notifies the Contractor of an improper invoice in an untimely manner.

(i) Name and address of the Contractor.

(ii) Invoice date and invoice number. (The Contractor should date invoices as close as possible to the date of mailing or transmission.)

(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., discount for prompt payment 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 notify in the event of a defective invoice.

(viii) For payments described in paragraph (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) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(x) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision (e.g., 52.232-38, Submission of Electronic Funds Transfer Information with Offer), contract clause (e.g.,

52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration, or 52.232-34, Payment by Electronic Funds Transfer--Other Than Central Contractor Registration), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

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

(3) Interest penalty. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if payment is not made by the due date and the conditions listed in paragraphs (a)(3)(i) through (a)(3)(iii) of this clause are met, if applicable. However, when the due date falls on a Saturday, Sunday, or legal holiday, the designated payment office may make payment on the following working day without incurring a late payment interest penalty.

(i) The designated billing office received a proper invoice.

(ii) The Government processed a receiving report or other Government documentation authorizing payment 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) Computing penalty amount. The Government will compute the interest penalty in accordance with the Office of Management and Budget prompt payment regulations at 5 CFR part 1315.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor for payments described in paragraph (a)(1)(ii) of this clause, Government acceptance or approval is deemed to occur constructively on the 7th day after the Contractor has completed the work or services in accordance with the terms and conditions of the contract. If actual acceptance or approval occurs within the constructive acceptance or approval period, the Government will base the determination of an interest penalty 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 prompt payment regulations at 5 CFR 1315.10(c) do not require the Government to pay interest penalties if payment delays are due to disagreement between the Government and the 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. The Government and the Contractor shall resolve claims involving disputes, and any interest that may be payable in accordance with the clause at FAR 52.233-1, Disputes.

(5) Discounts for prompt payment. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if the Government takes a discount for prompt payment improperly. The Government will calculate the interest penalty in accordance with the prompt payment regulations at 5 CFR part 1315.

(6) Additional interest penalty. (i) The designated payment office will pay a penalty amount, calculated in accordance with the prompt payment regulations at 5 CFR part 1315 in addition to the interest penalty amount only if--

(A) The Government owes an interest penalty of $1 or more;

(B) The designated payment office does not pay the interest penalty within 10 days after the date the invoice amount is paid; and

(C) The Contractor makes a written demand to the designated payment office for additional penalty payment, in accordance with paragraph (a)(6)(ii) of this clause, postmarked not later than 40 days after the date the invoice amount is paid.

(ii)(A) The Contractor shall support written demands for additional penalty payments with the following data. The Government will not request any additional data. The Contractor shall--

(1) Specifically assert that late payment interest is due under a specific invoice, and request payment of all overdue late payment interest penalty and such additional penalty as may be required;

(2) Attach a copy of the invoice on which the unpaid late payment interest was due; and

(3) State that payment of the principal has been received, including the date of receipt.

(B) If there is no postmark or the postmark is illegible--

(1) The designated payment office that receives the demand will annotate it with the date of receipt provided the demand is received on or before the 40th day after payment was made; or

(2) If the designated payment office fails to make the required annotation, the Government will determine the demand's validity based on the date the Contractor has placed on the demand, provided such date is no later than the 40th day after payment was made.

(b) Contract financing payments. If this contract provides for contract financing, the Government will make contract financing payments in accordance with the applicable contract financing clause.

(c) Subcontract clause requirements. 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) Prompt payment for subcontractors. A payment clause that 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) Interest for subcontractors. An interest penalty clause that 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) Subcontractor clause flowdown. A clause requiring each subcontractor to use:

(i) Include a payment clause and an interest penalty clause conforming to the standards set forth in paragraphs (c)(1) and (c)(2) of this clause in each of its subcontracts; and

(ii) Require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

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

(1) Retainage permitted. 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) Withholding permitted. 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) Withholding requirements. 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 previously has been furnished to the subcontractor; and

(ii) The Contractor furnishes to the Contracting Officer a copy of any notice issued by a Contractor pursuant to paragraph (d)(3)(i) of this clause.

(e) Subcontractor withholding procedures. 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) Subcontractor notice. 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) Contracting Officer notice. Furnish to the Contracting Officer, as soon as practicable, a copy of the notice furnished to the subcontractor pursuant to paragraph (e)(1) of this clause;

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

(4) Subsequent subcontractor payment. 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 paragraph
(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) Notice to Contracting Officer. 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 paragraph (e)(1) of this clause; and

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

(6) Interest to Government. 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 paragraph (e)(5)(i) of this clause.

(f) Third-party deficiency reports--(1) Withholding from subcontractor. 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, the Contractor may, without incurring an obligation to pay an interest penalty under paragraph (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 paragraph (f)(1)(i) of this clause.

(2) Subsequent payment or interest charge. 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--

(i) Pay the amount withheld under paragraph (f)(1)(ii) of this clause to such first-tier subcontractor; or

(ii) 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 DisputesAct of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(g) Written notice of subcontractor withholding. The Contractor shall issue a written notice of any withholding to a subcontractor (with a copy furnished to the Contracting Officer), 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) Subcontractor payment entitlement. 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) Prime-subcontractor disputes. 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 Government is a party. The Government may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

(j) Preservation of prime-subcontractor rights. 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) Non-recourse for prime contractor interest penalty. 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 Government for such interest penalty. A cost-reimbursement claim may not include any amount for reimbursement of such interest penalty.

(l) Overpayments. If the Contractor becomes aware of a duplicate payment or that the Government has otherwise overpaid on an invoice payment, the Contractor shall immediately notify the Contracting Officer and request instructions for disposition of the overpayment.

(End of clause)

52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER—CENTRAL CONTRACTOR REGISTRATION (MAY 1999)

(a) Method of payment. (1) All payments by the Government under this contract shall be made by electronic funds transfer (EFT), except as provided in paragraph (a)(2) of this clause. As used in this clause, the term “EFT” refers to the funds transfer and may also include the payment information transfer.

(2) In the event the Government is unable to release one or more payments by EFT, the Contractor agrees to either--

(i) Accept payment by check or some other mutually agreeable method of payment; or

(ii) Request the Government to extend the payment due date until such time as the Government can make payment by EFT (but see paragraph (d) of this clause).

(b) Contractor's EFT information. The Government shall make payment to the Contractor using the EFT information contained in the Central Contractor Registration (CCR) database. In the event that the EFT information changes, the Contractor shall be responsible for providing the updated information to the CCR database.

(c) Mechanisms for EFT payment. The Government may make payment by EFT through either the Automated Clearing House (ACH) network, subject to the rules of the National Automated Clearing House Association, or the Fedwire Transfer System. The rules governing Federal payments through the ACH are contained in 31 CFR part 210.

(d) Suspension of payment. If the Contractor's EFT information in the CCR database is incorrect, then the Government need not make payment to the Contractor under this contract until correct EFT information is entered into the CCR database; and any invoice or contract financing request shall be deemed not to be a proper invoice for

the purpose of prompt payment under this contract. The prompt payment terms of the contract regarding notice of an improper invoice and delays in accrual of interest penalties apply.

(e) Contractor EFT arrangements. If the Contractor has identified multiple payment receiving points (i.e., more than one remittance address and/or EFT information set) in the CCR database, and the Contractor has not notified the Government of the payment receiving point applicable to this contract, the Government shall make payment to the first payment receiving point (EFT information set or remittance address as applicable) listed in the CCR database.

(f) Liability for uncompleted or erroneous transfers. (1) If an uncompleted or erroneous transfer occurs because the Government used the Contractor's EFT information incorrectly, the Government remains responsible for--

(i) Making a correct payment;

(ii) Paying any prompt payment penalty due; and

(iii) Recovering any erroneously directed funds.

(2) If an uncompleted or erroneous transfer occurs because the Contractor's EFT information was incorrect, or was revised within 30 days of Government release of the EFT payment transaction instruction to the Federal Reserve System, and--

(i) If the funds are no longer under the control of the payment office, the Government is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds; or

(ii) If the funds remain under the control of the payment office, the Government shall not make payment, and the provisions of paragraph (d) of this clause shall apply.

(g) EFT and prompt payment. A payment shall be deemed to have been made in a timely manner in accordance with the prompt payment terms of this contract if, in the EFT payment transaction instruction released to the Federal Reserve System, the date specified for settlement of the payment is on or before the prompt payment due date, provided the specified payment date is a valid date under the rules of the Federal Reserve System.

(h) EFT and assignment of claims. If the Contractor assigns the proceeds of this contract as provided for in the assignment of claims terms of this contract, the Contractor shall require as a condition of any such assignment, that the assignee shall register in the CCR database and shall be paid by EFT in accordance with the terms of this clause. In all respects, the requirements of this clause shall apply to the assignee as if it were the Contractor. EFT information that shows the ultimate recipient of the transfer to be other than the Contractor, in the absence of a proper assignment of claims acceptable to the Government, is incorrect EFT information within the meaning of paragraph (d) of this clause.

(i) Liability for change of EFT information by financial agent. The Government is not liable for errors resulting from changes to EFT information made by the Contractor's financial agent.

(j) Payment information. The payment or disbursing office shall forward to the Contractor available payment information that is suitable for transmission as of the date of release of the EFT instruction to the Federal Reserve System. The Government may request the Contractor to designate a desired format and method(s) for delivery of payment information from a list of formats and methods the payment office is capable of executing. However, the Government does not guarantee that any particular format or method of delivery is available at any particular payment office and retains the latitude to use the format and delivery method most convenient to the Government. If the Government makes payment by check in accordance with paragraph (a) of this clause, the Government shall mail the payment information to the remittance address contained in the CCR database.

(End of Clause)

52.233-1 DISPUTES. (JUL 2002)

(a) This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613).

(b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) Claim, as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under the Act until certified. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d)(1) A claim by the Contractor shall be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2)(i) The contractors shall provide the certification specified in subparagraph (d)(2)(iii) of this clause when submitting any claim -

(A) Exceeding $100,000; or

(B) Regardless of the amount claimed, when using -

(1) Arbitration conducted pursuant to 5 U.S.C. 575-580; or

(2) Any other alternative means of dispute resolution (ADR) technique that the agency elects to handle in accordance with the Administrative Dispute Resolution Act (ADRA).

(ii) The certification requirement does not apply to issues in controversy that have not been submitted as all or part of a claim.

(iii) The certification shall state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am duly authorized to certify the claim on behalf of the Contractor.

(3) The certification may be executed by any person duly authorized to bind the Contractor with respect to the claim.

(e) For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

(g) If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use alternative disput resolution (ADR). If the

Contractor refuses an offer for ADR, the Contractor shall inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the request.

(h) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (certified, if required); or (2) the date that payment otherwise would be due, if that date is later, until the date of payment. With regard to claims having defective certifications, as defined in (FAR) 48 CFR 33.201, interest shall be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(i) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under the contract, and comply with any decision of the Contracting Officer.

(End of clause)

52.233-3 PROTEST AFTER AWARD (AUG. 1996)

(a) Upon receipt of a notice of protest (as defined in FAR 33.101) or a determination that a protest is likely (see FAR 33.102(d)), the Contracting Officer may, by written order to the Contractor, direct the Contractor to stop performance of the work called for by this contract. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Upon receipt of the final decision in the protest, the Contracting Officer shall either--

(1) Cancel the stop-work order; or

(2) Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the Government, clause of this contract.

(b) If a stop-work order issued under this clause is canceled either before or after a final decision in the protest, the Contractor shall resume work. The Contracting Officer shall make an equitable adjustment in the delivery schedule or contract price, or both, and the contract shall be modified, in writing, accordingly, if--

(1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

(2) The Contractor asserts its right to an adjustment within 30 days after the end of the period of work stoppage; provided, that if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon a proposal at any time before final payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

(d) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

(e) The Government's rights to terminate this contract at any time are not affected by action taken under this clause.

(f) If, as the result of the Contractor's intentional or negligent misstatement, misrepresentation, or miscertification, a

protest related to this contract is sustained, and the Government pays costs, as provided in FAR 33.102(b)(2) or 33.104(h)(1), the Government may require the Contractor to reimburse the Government the amount of such costs. In addition to any other remedy available, and pursuant to the requirements of Subpart 32.6, the Government may collect this debt by offsetting the amount against any payment due the Contractor under any contract between the Contractor and the Government.

(End of clause)

52.236-2 DIFFERING SITE CONDITIONS (APR 1984)

As prescribed in 36.502, insert the following clause in solicitations and contracts when a fixed-price construction contract or a fixed-price dismantling, demolition, or removal of improvements contract is contemplated and the contract amount is expected to exceed the small purchase limitation. The Contracting Officer may insert the clause in solicitations and contracts when a fixed-price construction or a fixed-price contract for dismantling, demolition, or removal of improvements is contemplated and the contract amount is expected to be within the small purchase limitation.

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of

(1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or

(2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

(End of clause)

52.236-3 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984)

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to

(1) conditions bearing upon transportation, disposal, handling, and storage of materials;

(2) the availability of labor, water, electric power, and roads;

(3) uncertainties of weather, river stages, tides, or similar physical conditions at the site;

(4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

(b) The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

(End of clause)

52.236-5 MATERIAL AND WORKMANSHIP (APR 1984)

(a) All equipment, material, and articles incorporated into the work covered by this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

(b) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. When directed to do so, the Contractor shall submit samples for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

(c) All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may require, in writing, that the Contractor remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

(End of clause)

52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the worksite a competent superintendent who is satisfactory to

the Contracting Officer and has authority to act for the Contractor.

(End of clause)

52.236-7 PERMITS AND RESPONSIBILITIES (NOV 1991)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

(End of clause)

52.236-8 OTHER CONTRACTS (APR 1984)

The Government may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with Government employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by Government employees.

(End of clause)

52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS (APR 1984)

(a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(b) The Contractor shall protect from damage all existing improvements and utilities

(1) at or near the work site, and

(2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(End of clause)

52.236-10 OPERATIONS AND STORAGE AREAS (APR 1984)

(a) The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

(b) Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

(c) The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

(End of clause)

52.236-11 USE AND POSSESSION PRIOR TO COMPLETION (APR 1984)

(a) The Government shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use shall not be deemed an acceptance of any work under the contract.

(b) While the Government has such possession or use, the Contractor shall be relieved of the responsibility for the loss of or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities." If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

(End of clause)

52.236-12 CLEANING UP (APR 1984)

The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. Before completing the work, the Contractor shall remove from the work and premises any rubbish, tools, scaffolding, equipment, and materials that are not the property of the Government. Upon completing the work, the Contractor shall leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer.

(End of clause)

52.236-13 ACCIDENT PREVENTION (NOV 1991)

(a) The Contractor shall provide and maintain work environments and procedures which will

(1) safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities;

(2) avoid interruptions of Government operations and delays in project completion dates; and

(3) control costs in the performance of this contract.

(b) For these purposes on contracts for construction or dismantling, demolition, or removal of improvements, the Contractor shall-

(1) Provide appropriate safety barricades, signs, and signal lights;

(2) Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

(3) Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for the purposes are taken.

(c) If this contract is for construction or dismantling, demolition or removal of improvements with any Department of Defense agency or component, the Contractor shall comply with all pertinent provisions of the latest version of U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, in effect on the date of the solicitation.

(d) Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Government personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

(6) The Contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

(End of clause)

52.236-14 AVAILABILITY AND USE OF UTILITY SERVICES (APR 1984)

(a) The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

(b) The Contractor, at its expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

(End of clause)

52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984)

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver three copies of the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

(End of clause)

52.236-17 LAYOUT OF WORK (APR 1984)

The Contractor shall lay out its work from Government established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(End of clause)

52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997)

(a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by," or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown," as indicated", "as detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place," that is "furnished and installed".

(d) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements, and (2) the installation (i.e., fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

(f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(g) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor.

(End of clause)

52.236-26 PRECONSTRUCTION CONFERENCE (FEB 1995)

If the Contracting Officer decides to conduct a preconstruction conference, the successful offeror will be notified and will be required to attend. The Contracting Officer's notification will include specific details regarding the date, time, and location of the conference, any need for attendance by subcontractors, and information regarding the items to be discussed.

(End of clause)

52.237-2 PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT, AND VEGETATION (APR 1984)

The Contractor shall use reasonable care to avoid damaging existing buildings, equipment, and vegetation on the Government installation. If the Contractor's failure to use reasonable care causes damage to any of this property, the Contractor shall replace or repair the damage at no expense to the Government as the Contracting Officer directs. If the Contractor fails or refuses to make such repair or replacement, the Contractor shall be liable for the cost, which may be deducted from the contract price.

(End of clause)

52.237-3 CONTINUITY OF SERVICES (JAN 1991)

(a) The Contractor recognizes that the services under this contract are vital to the Government and must be continued without interruption and that, upon contract expiration, a successor, either the Government or another contractor, may continue them. The Contractor agrees to (1) furnish phase-in training and (2) exercise its best efforts and cooperation to effect an orderly and efficient transition to a successor.

(b) The Contractor shall, upon the Contracting Officer's written notice, (1) furnish phase-in, phase-out services for up to 90 days after this contract expires and (2) negotiate in good faith a plan with a successor to determine the nature and extent of phase-in, phase-out services required. The plan shall specify a training program and a date for transferring responsibilities for each division of work described in the plan, and shall be subject to the Contracting Officer's approval. The Contractor shall provide sufficient experienced personnel during the phase-in, phase-out period to ensure that the services called for by this contract are maintained at the required level of proficiency.

(c) The Contractor shall allow as many personnel as practicable to remain on the job to help the successor maintain the continuity and consistency of the services required by this contract. The Contractor also shall disclose necessary personnel records and allow the successor to conduct onsite interviews with these employees. If selected employees are agreeable to the change, the Contractor shall release them at a mutually agreeable date and negotiate transfer of their earned fringe benefits to the successor.

(d) The Contractor shall be reimbursed for all reasonable phase-in, phase-out costs (i.e., costs incurred within the agreed period after contract expiration that result from phase-in, phase-out operations) and a fee (profit) not to exceed a pro rata portion of the fee (profit) under this contract.

(End of clause)

52.239-1 PRIVACY OR SECURITY SAFEGUARDS (AUG 1996)

(a) The Contractor shall not publish or disclose in any manner, without the Contracting Officer's written consent, the details of any safeguards either designed or developed by the Contractor under this contract or otherwise provided by the Government.-

(b) To the extent required to carry out a program of inspection to safeguard against threats and hazards to the security, integrity, and confidentiality of Government data, the Contractor shall afford the Government access to the Contractor's facilities, installations, technical capabilities, operations, documentation, records, and databases.-

(c) If new or unanticipated threats or hazards are discovered by either the Government or the Contractor, or if existing safeguards have ceased to function, the discoverer shall immediately bring the situation to the attention of the other party.

(End of clause)

52.242-13 BANKRUPTCY (JUL 1995)

In the event the Contractor enters into proceedings relating to bankruptcy, whether voluntary or involuntary, the Contractor agrees to furnish, by certified mail or electronic commerce method authorized by the contract, written notification of the bankruptcy to the Contracting Officer responsible for administering the contract. This notification shall be furnished within five days of the initiation of the proceedings relating to bankruptcy filing. This notification shall include the date on which the bankruptcy petition was filed, the identity of the court in which the bankruptcy petition was filed, and a listing of Government contract numbers and contracting offices for all Government contracts against which final payment has not been made. This obligation remains in effect until final payment under this contract.

(End of clause)

52.242-14 SUSPENSION OF WORK (APR 1984)

(a) The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the Government.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified in this contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption, and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this contract. (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

(End of clause)

52.242-15 STOP-WORK ORDER (AUG 1989)

(a) The Contracting Officer may, at any time, by written order to the Contractor, require the Contractor to stop all, or any part, of the work called for by this contract for a period of 90 days after the order is delivered to the Contractor, and for any further period to which the parties may agree. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the
incurrence of costs allocable to the work covered by the order during the period of work stoppage. Within a period of 90 days after a stop-work is delivered to the Contractor, or within any extension of that period to which the parties shall have agreed, the Contracting Officer shall either--

(1) Cancel the stop-work order; or

(2) Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the Government, clause of this contract.

(b) If a stop-work order issued under this clause is canceled or the period of the order or any extension thereof expires, the Contractor shall resume work. The Contracting Officer shall make an equitable adjustment in the delivery schedule or contract price, or both, and the contract shall be modified, in writing, accordingly, if--

(1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

(2) The Contractor asserts its right to the adjustment within 30 days after the end of the period of work stoppage; provided, that, if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon the claim submitted at any time before final payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

(7) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

(End of clause)

52.242-17 GOVERNMENT DELAY OF WORK (APR 1984)

(a) If the performance of all or any part of the work of this contract is delayed or interrupted (1) by an act of the Contracting Officer in the administration of this contract that is not expressly or impliedly authorized by this contract, or (2) by a failure of the Contracting Officer to act within the time specified in this contract, or within a reasonable time if not specified, an adjustment (excluding profit) shall be made for any increase in the cost of performance of this contract caused by the delay or interruption and the contract shall be modified in writing accordingly. Adjustment shall also be made in the delivery or performance dates and any other contractual term or condition affected by the delay or interruption. However, no adjustment shall be made under this clause for any delay or interruption to the extent that performance would have been delayed or interrupted by any other cause, including the fault or negligence

of the Contractor, or for which an adjustment is provided or excluded under any other term or condition of this contract.

(b) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved, and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the delay or interruption, but not later than the day of final payment under the contract.

(End of clause)

52.243-1 CHANGES--FIXED-PRICE (AUG 1987) - ALTERNATE I (APR 1984)

(a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

(1) Description of services to be performed.

(2) Time of performance (i.e., hours of the day, days of the week, etc.).

(3) Place of performance of the services.

(b) If any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, the Contracting Officer shall make an equitable adjustment in the contract price, the delivery schedule, or both, and shall modify the contract.

(c) The Contractor must assert its right to an adjustment under this clause within 30 days from the date of receipt of the written order. However, if the Contracting Officer decides that the facts justify it, the Contracting Officer may receive and act upon a proposal submitted before final payment of the contract.

(d) If the Contractor's proposal includes the cost of property made obsolete or excess by the change, the Contracting Officer shall have the right to prescribe the manner of the disposition of the property.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.

(End of clause)

52.243-4 CHANGES (AUG 1987)

(a) The Contracting Officer may, at any time, without notice to the sureties, if any, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract, including changes--

(1) In the specifications (including drawings and designs);

(2) In the method or manner of performance of the work;

(3) In the Government-furnished facilities, equipment, materials, services, or site; or

(4) Directing acceleration in the performance of the work.

(b) Any other written or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating

(1) the date, circumstances, and source of the order and

(2) that the Contractor regards the order as a change order.

(c) Except as provided in this clause, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no adjustment for any change under paragraph (b) of this clause shall be made for any costs incurred more than 20 days before the Contractor gives written notice as required. In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

(e) The Contractor must assert its right to an adjustment under this clause within 30 days after

(1) receipt of a written change order under paragraph (a) of this clause or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting to the Contracting Officer a written statement describing the general nature and amount of the proposal, unless this period is extended by the Government. The statement of proposal for adjustment may be included in the notice under paragraph (b) above.

(f) No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

(End of clause)

52.243-5 CHANGES AND CHANGED CONDITIONS (APR 1984)

(a) The Contracting Officer may, in writing, order changes in the drawings and specifications within the general scope of the contract.

(b) The Contractor shall promptly notify the Contracting Officer, in writing, of subsurface or latent physical conditions differing materially from those indicated in this contract or unknown unusual physical conditions at the site before proceeding with the work.

(c) If changes under paragraph (a) or conditions under paragraph (b) increase or decrease the cost of, or time required for performing the work, the Contracting Officer shall make an equitable adjustment (see paragraph (d)) upon submittal of a "proposal for adjustment" (hereafter referred to as proposal) by the Contractor before final payment under the contract.

(d) The Contracting Officer shall not make an equitable adjustment under paragraph (b) unless--

(1) The Contractor has submitted and the Contracting Officer has received the required written notice; or

(2) The Contracting Officer waives the requirement for the written notice.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause.

(End of clause)

52.244-5 COMPETITION IN SUBCONTRACTING (DEC 1996)

(a) The Contractor shall select subcontractors (including suppliers) on a competitive basis to the maximum practical extent consistent with the objectives and requirements of the contract.

(b) If the Contractor is an approved mentor under the Department of Defense Pilot Mentor-Protege Program (Pub. L. 101–510, section 831 as amended), the Contractor may award subcontracts under this contract on a noncompetitive basis to its proteges.

(End of clause)

52.244-6 SUBCONTRACTS FOR COMMERCIAL ITEMS (MAY 2002)

(a) Definitions.

"Commercial item", has the meaning contained in the clause at 52.202-1, Definitions.

"Subcontract", includes a transfer of commercial items between divisions, subsidiaries, or affiliates of the Contractor or subcontractor at any tier.

(b) To the maximum extent practicable, the Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, commercial items or nondevelopmental items as components of items to be supplied under this contract.

(c) (1) The Contractor shall insert the following clauses in subcontracts for commercial items:

(i) 52.219-8, Utilization of Small Business Concerns (OCT 2000) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds $500,000 ($1,000,000 for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(ii) 52.222-26, Equal Opportunity (Apr 2002) (E.O. 11246).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era and Other Eligible Veterans (DEC 2001) (38 U.S.C. 4212(a)).

(iv) 52.222-36, Affirmative Action for Workers with Disabilities (JUN 1998) (29 U.S.C. 793).

(v) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (JUN 2000) (46 U.S.C. Appx 1241) (flowdown not required for subcontracts awarded beginning May 1, 1996).

(2) While not required, the Contractor may flow down to subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(d) The Contractor shall include the terms of this clause, including this paragraph (d), in subcontracts awarded under this contract.

(End of clause)

52.246-4 INSPECTION OF SERVICES--FIXED-PRICE (AUG 1996)

(a) Definitions. "Services," as used in this clause, includes services performed, workmanship, and material furnished or utilized in the performance of services.

(b) The Contractor shall provide and maintain an inspection system acceptable to the Government covering the services under this contract. Complete records of all inspection work performed by the Contractor shall be maintained and made available to the Government during contract performance and for as long afterwards as the contract requires.

(c) The Government has the right to inspect and test all services called for by the contract, to the extent practicable at all times and places during the term of the contract. The Government shall perform inspections and tests in a manner that will not unduly delay the work.

(d) If the Government performs inspections or tests on the premises of the Contractor or a subcontractor, the Contractor shall furnish, and shall require subcontractors to furnish, at no increase in contract price, all reasonable facilities and assistance for the safe and convenient performance of these duties.

(e) If any of the services do not conform with contract requirements, the Government may require the Contractor to perform the services again in conformity with contract requirements, at no increase in contract amount. When the defects in services cannot be corrected by reperformance, the Government may (1) require the Contractor to take necessary action to ensure that future performance conforms to contract requirements and (2) reduce the contract price to reflect the reduced value of the services performed.

(f) If the Contractor fails to promptly perform the services again or to take the necessary action to ensure future performance in conformity with contract requirements, the Government may (1) by contract or otherwise, perform the services and charge to the Contractor any cost incurred by the Government that is directly related to the performance of such service or (2) terminate the contract for default.

(End of clause)

52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996)

(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) of this section.

(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, at no increase in contract price, 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.

(End of clause)

52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.
(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(End of clause)

52.246-25 LIMITATION OF LIABILITY--SERVICES (FEB 1997)

(a) Except as provided in paragraphs (b) and (c) below, and except to the extent that the Contractor is expressly responsible under this contract for deficiencies in the services required to be performed under it (including any materials furnished in conjunction with those services), the Contractor shall not be liable for loss of or damage to property of the Government that (1) occurs after Government acceptance of services performed under this contract,

and (2) results from any defects or deficiencies in the services performed or materials furnished.

(b) The limitation of liability under paragraph (a) above shall not apply when a defect or deficiency in, or the Government's acceptance of, services performed or materials furnished results from willful misconduct or lack of good faith on the part of any of the Contractor's managerial personnel. The term "Contractor's managerial personnel," as used in this clause, means the Contractor's directors, officers, and any of the Contractor's managers, superintendents, or equivalent representatives who have supervision or direction of--

(1) All or substantially all of the Contractor's business;

(2) All or substantially all of the Contractor's operations at any one plant, laboratory, or separate location at which the contract is being performed; or

(3) A separate and complete major industrial operation connected with the performance of this contract.

(c) If the Contractor carries insurance, or has established a reserve for self-insurance, covering liability for loss or damage suffered by the Government through the Contractor's performance of services or furnishing of materials under this contract, the Contractor shall be liable to the Government, to the extent of such insurance or reserve, for loss of or damage to property of the Government occurring after Government acceptance of, and resulting from any defects and deficiencies in, services performed or materials furnished under this contract.

(End of clause)

52.248-3 VALUE ENGINEERING--CONSTRUCTION (FEB 2000)

(a) General. The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECP's) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECP's, in accordance with paragraph (f) below.

(b) Definitions. "Collateral costs," as used in this clause, means agency costs of operation, maintenance, logistic support, or Government-furnished property.

"Collateral savings," as used in this clause, means those measurable net reductions resulting from a VECP in the agency's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

"Contractor's development and implementation costs," as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

"Government costs," as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistic support. The term does not include the normal administrative costs of processing the VECP.

"Instant contract savings," as used in this clause, means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor's development and implementation costs, including subcontractors' development and implementation costs (see paragraph (h) below).

"Value engineering change proposal (VECP)" means a proposal that--

(1) Requires a change to this, the instant contract, to implement; and

(2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; provided, that it does not involve a change--

(i) In deliverable end item quantities only; or

(ii) To the contract type only.

(c) VECP preparation. As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and dis advantages of each, a justification when an item's function or characteristics are being altered, and the effect of the change on the end item's performance.

(2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.

(3) A separate, detailed cost estimate for

(i) the affected portions of the existing contract requirement and

(ii) the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (h) below.

(4) A description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximu m cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) Submission. The Contractor shall submit VECP's to the Resident Engineer at the worksite, with a copy to the Contracting Officer.

(e) Government action.

(1) The Contracting Officer will notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required, the Contracting Officer will notify the Contractor within the 45-day period and provide the reason for the delay and the expected date of the decision. The Government will process VECP's expeditiously; however, it shall not be liable for any delay in acting upon a VECP.

If the VECP is not accepted, the Contracting Officer will notify the Contractor in writing, explaining the reasons for rejection. The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Government. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

Any VECP may be accepted, in whole or in part, by the Contracting Officer's award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The decision to accept or reject all or part of any VECP is a unilateral decision made solely at the discretion of the Contracting Officer.

(f) Sharing.

(1) Rates. The Government's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by

(i) 45 percent for fixed-price contracts or

(ii) 75 percent for cost-reimbursement contracts.

(2) Payment. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to--

(i) Accept the VECP;

(ii) Reduce the contract price or estimated cost by the amount of instant contract savings; and

(iii) Provide the Contractor's share of savings by adding the amount calculated to the contract price or fee.

(g) Collateral savings. If a VECP is accepted, the Contracting Officer will increase the instant contract amount by 20 percent of any projected collateral savings determined to be realized in a typical year of use after subtracting any Government costs not previously offset. However, the Contractor's share of collateral savings will not exceed the contract's firm-fixed-price or estimated cost, at the time the VECP is accepted, or $100,000, whichever is greater. The Contracting Officer is the sole determiner of the amount of collateral savings.

(h) Subcontracts. The Contractor shall include an appropriate value engineering clause in any subcontract of $50,000 or more and may include one in subcontracts of lesser value. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Government under this contract, but shall exclude any value engineering incentive payments to a subcontractor. The Contractor may choose any arrangement for subcontractor value engineering incentive payments; provided, that these payments shall not reduce the Government's share of the savings resulting from the VECP.

(i) Data. The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

"These data, furnished under the Value Engineering-- Construction clause of contract . . . . . , shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations." If a VECP is accepted, the Contractor hereby grants the Government unlimited rights in the VECP and supporting data, except that, with respect to data qualifying and submitted as limited rights technical data, the Government shall have the rights specified in the contract modification implementing the VECP and shall appropriately mark the data. (The terms "unlimited rights" and "limited rights" are defined in Part 27 of the Federal Acquisition Regulation.)

(End of clause)

52.249-2 TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE) (SEP 1996) - ALTERNATE I (SEP 1996)

(a) The Government may terminate performance of work under this contract in whole or, from time to time, in part if the Contracting Officer determines that a termination is in the Government's interest. The Contracting Officer shall terminate by delivering to the Contractor a Notice of Termination specifying the extent of termination and the effective date.

(b) After receipt of a Notice of Termination, and except as directed by the Contracting Officer, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this clause:

(1) Stop work as specified in the notice.

(2) Place no further subcontracts or orders (referred to as subcontracts in this clause) for materials, services, or facilities, except as necessary to complete the continued portion of the contract.

(3) Terminate all subcontracts to the extent they relate to the work terminated.

(4) Assign to the Government, as directed by the Contracting Officer, all right, title, and interest of the Contractor under the subcontracts terminated, in which case the Government shall have the right to settle or to pay any termination settlement proposal arising out of those terminations.

(5) With approval or ratification to the extent required by the Contracting Officer, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this clause.

(6) As directed by the Contracting Officer, transfer title and deliver to the Government (i) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated, and (ii) the completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be required to be furnished to the Government.

(7) Complete performance of the work not terminated.

(8) Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the Government has or may acquire an interest.

(9) Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in subparagraph (b)(6) of this clause; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Government under this contract, credited to the price or cost of the work, or paid in any other manner directed by the Contracting Officer.

(c) The Contractor shall submit complete termination inventory schedules no later than 120 days from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 120-day period.

(d) After expiration of the plant clearance period as defined in Subpart 45.6 of the Federal Acquisition Regulation, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Contracting Officer. The Contractor may request the Government to remove those items or enter into an agreement for their storage. Within 15 days, the Government will accept title to those items and remove them or enter into a storage agreement. The Contracting Officer may verify the list upon removal of the items, or if stored, within 45 days from submission of the list, and shall correct the list, as necessary, before final settlement.

(e) After termination, the Contractor shall submit a final termination settlement proposal to the Contracting Officer in the form and with the certification prescribed by the Contracting Officer. The Contractor shall submit the proposal promptly, but no later than 1 year from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 1-year period. However, if the Contracting Officer determines that the facts justify it, a termination settlement proposal may be received and acted on after 1 year or any extension. If the Contractor fails to submit the proposal within the time allowed, the Contracting Officer may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.

(f) Subject to paragraph (e) of this clause, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount to be paid or remaining to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount, whether under this paragraph (g) or paragraph (g) of this clause, exclusive of costs shown in subparagraph (g)(3) of this clause, may not exceed the total contract price as reduced by (1) the amount of payments previously made and (2) the contract price of work not terminated. The contract shall be modified, and the Contractor paid the agreed amount. Paragraph (g) of this clause shall not limit, restrict, or affect the amount that may be agreed upon to be paid under this paragraph.

(g) If the Contractor and Contracting Officer fail to agree on the whole amount to be paid the Contractor because of the termination of work, the Contracting Officer shall pay the Contractor the amounts determined as follows, but without duplication of any amounts agreed upon under paragraph (f) of this clause:

(1) For contract work performed before the effective date of termination, the total (without duplication of any items) of--

(i) The cost of this work;

(ii) The cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the contract if not included in subdivision (g)(1)(i) of this clause; and

(iii) A sum, as profit on subdivision (g)(1)(i) of this clause, determined by the Contracting Officer under 49.202 of the Federal Acquisition Regulation, in effect on the date of this contract, to be fair and reasonable; however, if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, the Contracting Officer shall allow no profit under this subdivision (iii) and shall reduce the settlement to reflect the indicated rate of loss.

(2) The reasonable costs of settlement of the work terminated, including--

(i) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data;

(ii) The termination and settlement of subcontracts (excluding the amounts of such settlements); and

(iii) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

(h) Except for normal spoilage, and except to the extent that the Government expressly assumed the risk of loss, the Contracting Officer shall exclude from the amounts payable to the Contractor under paragraph (g) of this clause, the fair value, as determined by the Contracting Officer, of property that is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government or to a buyer.

(i) The cost principles and procedures of Part 31 of the Federal Acquisition Regulation, in effect on the date of this contract, shall govern all costs claimed, agreed to, or determined under this clause.

(j) The Contractor shall have the right of appeal, under the Disputes clause, from any determination made by the Contracting Officer under paragraph (e), (g), or (l) of this clause, except that if the Contractor failed to submit the termination settlement proposal or request for equitable adjustment within the time provided in paragraph (e) or (l), respectively, and failed to request a time extension, there is no right of appeal.

(k) In arriving at the amount due the Contractor under this clause, there shall be deducted--

(1) All unliquidated advance or other payments to the Contractor under the terminated portion of this contract;

(2) Any claim which the Government has against the Contractor under this contract; and

(3) The agreed price for, or the proceeds of sale of, materials, supplies, or other things acquired by the Contractor or sold under the provisions of this clause and not recovered by or credited to the Government.

(l) If the termination is partial, the Contractor may file a proposal with the Contracting Officer for an equitable adjustment of the price(s) of the continued portion of the contract. The Contracting Officer shall make any equitable adjustment agreed upon. Any proposal by the Contractor for an equitable adjustment under this clause shall be requested within 90 days from the effective date of termination unless extended in writing by the Contracting Officer.

(m)(1) The Government may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the contract, if the Contracting Officer believes the total of these payments will not exceed the amount to which the Contractor will be entitled.

(2) If the total payments exceed the amount finally determined to be due, the Contractor shall repay the excess to the Government upon demand, together with interest computed at the rate established by the Secretary of the Treasury under 50 U.S.C. App. 1215(b)(2). Interest shall be computed for the period from the date the excess payment is received by the Contractor to the date the excess is repaid. Interest shall not be charged on any excess payment due to a reduction in the Contractor's termination settlement proposal because of retention or other disposition of termination inventory until 10 days after the date of the retention or disposition, or a later date determined by the Contracting Officer because of the circumstances.

(n) Unless otherwise provided in this contract or by statute, the Contractor shall maintain all records and documents relating to the terminated portion of this contract for 3 years after final settlement. This includes all books and other evidence bearing on the Contractor's costs and expenses under this contract. The Contractor shall make these records and documents available to the Government, at the Contractor's office, at all reasonable times, without any direct charge. If approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions may be maintained instead of original records and documents.

(End of clause)

The Contracting Officer, by written notice, may terminate this contract, in whole or in part, when it is in the Government's interest. If this contract is terminated, the Government shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

(End of clause)

52.249-8 DEFAULT (FIXED-PRICE SUPPLY AND SERVICE) (APR 1984)

(a)(1) The Government may, subject to paragraphs (c) and (d) of this clause, by written notice of default to the Contractor, terminate this contract in whole or in part if the Contractor fails to--

(i) Deliver the supplies or to perform the services within the time specified in this contract or any extension;

(ii) Make progress, so as to endanger performance of this contract (but see subparagraph (a)(2) of this clause); or

(iii) Perform any of the other provisions of this contract (but see subparagraph (a)(2) below).

(2) The Government's right to terminate this contract under subdivisions (a)(1)(ii) and (1)(iii) of this clause, may be exercised if the Contractor does not cure such failure within 10 days (or more if authorized in writing by the Contracting Officer) after receipt of the notice from the Contracting Officer specifying the failure.

(b) If the Government terminates this contract in whole or in part, it may acquire, under the terms and in the manner the Contracting Officer considers appropriate, supplies or services similar to those terminated, and the Contractor will be liable to the Government for any excess costs for those supplies or services. However, the Contractor shall continue the work not terminated.

(c) Except for defaults of subcontractors at any tier, the Contractor shall not be liable for any excess costs if the failure to perform the contract arises from causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include (1) acts of God or of the public enemy, (2) acts of the Government in either its sovereign or contractual capacity, (3) fires, (4) floods, (5) epidemics, (6) quarantine restrictions, (7) strikes, (8) freight embargoes, and (9) unusually severe weather. In each instance the failure to perform must be beyond the control and without the fault or negligence of the Contractor.

(d) If the failure to perform is caused by the default of a subcontractor at any tier, and if the cause of the default is beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either, the Contractor shall not be liable for any excess costs for failure to perform, unless the subcontracted supplies or services were obtainable from other sources in sufficient time for the Contractor to meet the required delivery schedule.

(e) If this contract is terminated for default, the Government may require the Contractor to transfer title and deliver to the Government, as directed by the Contracting Officer, any (1) completed supplies, and (2) partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (collectively referred to as "manufacturing materials" in this clause) that the Contractor has specifically produced or acquired for the terminated portion of this contract. Upon direction of the Contracting Officer, the Contractor shall also protect and preserve property in its possession in which the Government has an interest.

(f) The Government shall pay contract price for completed supplies delivered and accepted. The Contractor and Contracting Officer shall agree on the amount of payment for manufacturing materials delivered and accepted and for the protection and preservation of the property. Failure to agree will be a dispute under the Disputes clause. The Government may withhold from these amounts any sum the Contracting Officer determines to be necessary to protect the Government against loss because of outstanding liens or claims of former lien holders.

(g) If, after termination, it is determined that the Contractor was not in default, or that the default was excusable, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Government.

(h) The rights and remedies of the Government in this clause are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.249-10 DEFAULT (FIXED-PRICE CONSTRUCTION) (APR 1984)

(a) If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract including any extension, or fails to complete the work within this time, the Government may, by written notice to the Contractor, terminate the right to proceed with the work (or the separable part of the work) that has been delayed. In this event, the Government may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Government resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Government in completing the work.

(b) The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause, if--

(1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include

(i) acts of God or of the public enemy,

(ii) acts of the Government in either its sovereign or contractual capacity,

(iii) acts of another Contractor in the performance of a contract with the Government,

(iv) fires,

(v) floods,

(vi) epidemics,

(vii) quarantine restrictions,

(viii) strikes,

(ix) freight embargoes,

(x) unusually severe weather, or delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any delay (unless extended by the Contracting Officer),

notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, the time for completing the work shall be extended. The findings of the Contracting Officer shall be final and conclusive on the parties, but subject to appeal under the Disputes clause.

(c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Government.

The rights and remedies of the Government in this clause are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.252-4 ALTERATIONS IN CONTRACT (APR 1984)

Portions of this contract are altered as follows:

(End of clause)

52.253-1 COMPUTER GENERATED FORMS (JAN 1991)

(a) Any data required to be submitted on a Standard or Optional Form prescribed by the Federal Acquisition Regulation (FAR) may be submitted on a computer generated version of the form, provided there is no change to the name, content, or sequence of the data elements on the form, and provided the form carries the Standard or Optional Form number and edition date.

(b) Unless prohibited by agency regulations, any data required to be submitted on an agency unique form prescribed by an agency supplement to the FAR may be submitted on a computer generated version of the form provided there is no change to the name, content, or sequence of the data elements on the form and provided the form carries the agency form number and edition date.

(8) If the Contractor submits a computer generated version of a form that is different than the required form, then the rights and obligations of the parties will be determined based on the content of the required form.

(End of clause)

252.201-7000 CONTRACTING OFFICER'S REPRESENTATIVE (DEC 1991)

(a) "Definition. Contracting officer's representative" means an individual designated in accordance with subsection 201.602-2 of the Defense Federal Acquisition Regulation Supplement and authorized in writing by the contracting officer to perform specific technical or administrative functions.

(b) If the Contracting Officer designates a contracting officer's representative (COR), the Contractor will receive a copy of the written designation. It will specify the extent of the COR's authority to act on behalf of the contracting

officer. The COR is not authorized to make any commitments or changes that will affect price, quality, quantity, delivery, or any other term or condition of the contract.

(End of clause)

252.203-7001 PROHIBITION ON PERSONS CONVICTED OF FRAUD OR OTHER DEFENSE-CONTRACT-RELATED FELONIES (MAR 1999)

(a) Definitions. As used in this clause—

(1) "Arising out of a contract with the DoD" means any act in connection with—

(i) Attempting to obtain;

(ii) Obtaining, or

(iii) Performing a contract or first-tier subcontract of any agency, department, or component of the Department of Defense (DoD).

(2) "Conviction of fraud or any other felony" means any conviction for fraud or a felony in violation of state or Federal criminal statutes, whether entered on a verdict or plea, including a plea of *nolo contendere*, for which sentence has been imposed.

(3) "Date of conviction" means the date judgment was entered against the individual.

(b) Any individual who is convicted after September 29, 1988, of fraud or any other felony arising out of a contract with the DoD is prohibited from serving--

(1) In a management or supervisory capacity on any DoD contract or first-tier subcontract;

(2) On the board of directors of any DoD contractor or first-tier subcontractor;

(3) As a consultant, agent, or representative for any DoD contractor or first-tier subcontractor; or

(4) In any other capacity with the authority to influence, advise, or control the decisions of any DoD contractor or subcontractor with regard to any DoD contract or first-tier subcontract.

(c) Unless waived, the prohibition in paragraph (b) of this clause applies for not less than 5 years from the date of conviction.

(d) 10 U.S.C. 2408 provides that a defense contractor or first-tier subcontractor shall be subject to a criminal penalty of not more than $500,000 if convicted of knowingly—

(1) Employing a person under a prohibition specified in paragraph (b) of this clause; or

(2) Allowing such a person to serve on the board of directors of the contractor or first-tier subcontractor.

(e) In addition to the criminal penalties contained in 10 U.S.C. 2408, the Government may consider other available remedies, such as—

(1) Suspension or debarment;

(2) Cancellation of the contract at no cost to the Government; or

(3) Termination of the contract for default.

(f) The Contractor may submit written requests for waiver of the prohibition in paragraph (b) of this clause to the Contracting Officer. Requests shall clearly identify—

(1) The person involved;

(2) The nature of the conviction and resultant sentence or punishment imposed;

(3) The reasons for the requested waiver; and

(4) An explanation of why a waiver is in the interest of national security.

(g) The Contractor agrees to include the substance of this clause, appropriately modified to reflect the identity and relationship of the parties, in all first-tier subcontracts exceeding the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation, except those for commercial items or components.

(h) Pursuant to 10 U.S.C. 2408(c), defense contractors and subcontractors may obtain information as to whether a particular person has been convicted of fraud or any other felony arising out of a contract with the DoD by contacting The Office of Justice Programs, The Denial of Federal Benefits Office, U.S. Department of Justice, telephone (202) 616-3507.

(End of clause)

252.203-7002 DISPLAY OF DOD HOTLINE POSTER (DEC 1991)

(a) The Contractor shall display prominently in common work areas within business segments performing work under Department of Defense (DoD) contracts, DoD Hotline Posters prepared by the DoD Office of the Inspector General.

(b) DoD Hotline Posters may be obtained from the DoD Inspector General, ATTN: Defense Hotline, 400 Army Navy Drive, Washington, DC 22202-2884.

(9) The Contractor need not comply with paragraph (a) of this clause if it has established a mechanism, such as a hotline, by which employees may report suspected instances of improper conduct, and instructions that encourage employees to make such reports.

(End of clause)

252.204-7000 DISCLOSURE OF INFORMATION (DEC 1991)

(a) The Contractor shall not release to anyone outside the Contractor's organization any unclassified information, regardless of medium (e.g., film, tape, document), pertaining to any part of this contract or any program related to this contract, unless--

(1) The Contracting Officer has given prior written approval; or

(2) The information is otherwise in the public domain before the date of release.

(b) Requests for approval shall identify the specific information to be released, the medium to be used, and the purpose for the release. The Contractor shall submit its request to the Contracting Officer at least 45 days before the proposed date for release.

(c) The Contractor agrees to include a similar requirement in each subcontract under this contract. Subcontractors shall submit requests for authorization to release through the prime contractor to the Contracting Officer.

(End of clause)

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.

(End of clause)

252.209-7004 SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) Unless the Government determines that there is a compelling reason to do so, the Contractor shall not enter into any subcontract in excess of $25,000 with a firm, or subsidiary of a firm, that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country.

(b) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country. The notice must include the name of the proposed subcontractor notwithstanding its inclusion on the List of Parties Excluded From Federal Procurement and Nonprocurement Programs.

(End of clause)

252.215-7000 PRICING ADJUSTMENTS (DEC 1991)

The term "pricing adjustment," as used in paragraph (a) of the clauses entitled "Price Reduction for Defective Cost or Pricing Data - Modifications," "Subcontractor Cost or Pricing Data," and "Subcontractor Cost or Pricing Data - Modifications," means the aggregate increases and/or decreases in cost plus applicable profits.

(End of clause)

252.219-7003 SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS) (APR. 1996)

This clause supplements the Federal Acquisition Regulation 52.219-9, Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, clause of this contract.

(a) *Definitions. Historically black colleges and universities,* as used in this clause, means institutions determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. The term also means any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institutions, as used in this clause, means institutions meeting the requirements of section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)). The term also includes Hispanic-serving institutions as defined in section 316(b)(1) of such Act (20 U.S.C. 1059c(b)(1)).

(b) Except for company or division-wide commercial items subcontracting plans, the term *small disadvantaged business,* when used in the FAR 52.219-9 clause, includes historically black colleges and universities and minority institutions, in addition to small disadvantaged business concerns.

(c) Work under the contract or its subcontracts shall be credited toward meeting the small disadvantaged business concern goal required by paragraph (d) of the FAR 52.219-9 clause when:

(1) It is performed on Indian lands or in joint venture with an Indian tribe or a tribally-owned corporation, and

(2) It meets the requirements of 10 U.S.C. 2323a.

(d) Subcontracts awarded to workshops approved by the Committee for Purchase from People Who are Blind or Severely Disabled (41 U.S.C. 46-48), may be counted toward the Contractor's small business subcontracting goal.

(e) A mentor firm, under the Pilot Mentor-Protege Program established under Section 831 of Pub. L. 101-510, as amended, may count toward its small disadvantaged business goal, subcontracts awarded--

(f) The master plan approval referred to in paragraph (f) of the FAR 52.219-9 clause is approval by the Contractor's cognizant contract administration activity.

(g) In those subcontracting plans which specifically identify small, small disadvantaged, and women-owned small businesses, the Contractor shall notify the Administrative Contracting Officer of any substitutions of firms that are not small, small disadvantaged, or women-owned small businesses for the firms listed in the subcontracting plan. Notifications shall be in writing and shall occur within a reasonable period of time after award of the subcontract. Contractor-specified formats shall be acceptable.

(End of clause)

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.

(End of clause)

252.226-7001 Utilization of Indian Organizations and Indian-Owned Economic Enterprises-DoD Contracts (Sep 2001)

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

“Indian” means any person who is a member of any Indian tribe, band, group, pueblo, or community that is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs (BIA) in accordance with 25 U.S.C. 1452(c) and any “Native” as defined in the Alaska Native Claims Settlement Act (43 U.S.C. 1601).

“Indian organization” means the governing body of any Indian tribe or entity established or recognized by the governing body of an Indian tribe for the purposes of 25 U.S.C. Chapter 17.

“Indian-owned economic enterprise” means any Indian-owned (as determined by the Secretary of the Interior) commercial, industrial, or business activity established or organized for the purpose of profit, provided that Indian ownership constitutes not less than 51 percent of the enterprise.

“Indian tribe” means any Indian tribe, band, group, pueblo, or community, including native villages and native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, that is recognized by the Federal Government as eligible for services from BIA in accordance with 25 U.S.C. 1452 (c).

“Interested party” means a contractor or an actual or prospective offeror whose direct economic interest would be affected by the award of a subcontract or by the failure to award a subcontract.

(b) The Contract shall use its best efforts to give Indian organizations and Indian-owned economic enterprises the maximum practicable opportunity to participate in the subcontracts it awards, to the fullest extent consistent with efficient performance of the contract.

(c) The Contracting Officer and the Contractor, acting in good faith, may rely on the representation of an Indian organization or Indian-owned economic enterprise as to its eligibility, unless and interested party challenges its status or the Contracting Officer has independent reason to question that status.

(d) In the event of a challenge to the representation of a subcontractor, the Contracting Officer will refer the matter to the U.S. Department of the Interior, Bureau of Indian Affairs, Attn: Chief, Division of Contracting and Grants Administration, 1849 C Street NW, MS-2626-MIB, Washington, DC 20240-4000. The BIA will determine the eligibility and will notify the Contracting Officer. No incentive payment will be made--

(1) Within 59 working days of subcontract award;

(2) While a challenge is pending; or

(3) If a subcontractor is determined to be an ineligible participant.

(e)(1) The Contractor, on its own behalf or on behalf of a subcontractor at any tier, may request an adjustment under the Indian Incentive Program to the following:

(i) The estimated cost of cost-type contract.

(ii) The target cost of a cost-plus-incentive-fee contract.

(iii) The target cost and ceiling price of a fixed-price incentive contract.

(iv) The price of a firm-fixed-price contract.

(2) The amount of the adjustment that may be made to the contract is 5 percent of the estimated cost, target cost, or firm-fixed price included in the subcontract initially awarded to the Indian organization or Indian-owned economic enterprise.

(3) The Contractor has the burden of proving the amount claimed and must assert its request for an adjustment prior to completion of contract performance.

(4) The Contracting Officer, subject to the terms and conditions of the contract and the availability of funds, will authorize an incentive payment of 5 percent of the amount paid to the subcontractor.

(5) If the Contractor requests and receives an adjustment on behalf of a subcontractor, the Contractor is obligated to pay the subcontractor the adjustment.

(f) The Contractor shall insert the substance of this clause, including this paragraph (f), in all subcontracts that--

(1) Are for other than commercial items; and

(2) Are expected to exceed the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation.

(End of clause)

252.227-7023 DRAWINGS AND OTHER DATA TO BECOME PROPERTY OF GOVERNMENT. (MAR 1979)

All designs, drawings, specifications, notes and other works developed in the performance of this contract shall become the sole property of the Government and may be used on any other design or construction without additional compensation to the Contractor. The Government shall be considered the "person for whom the work was prepared" for the purpose of authorship in any copyrightable work under 17 U.S.C. 201(b). With respect thereto, the Contractor agrees not to assert or authorize others to assert any rights nor establish any claim under the design patent or copyright laws. The Contractor for a period of three (3) years after completion of the project agrees to furnish all retained works on the request of the Contracting Officer. Unless otherwise provided in this contract, the Contractor shall have the right to retain copies of all works beyond such period.

(End of clause)

252.227-7033 RIGHTS IN SHOP DRAWINGS (APR 1966)

(a) Shop drawings for construction means drawings, submitted to the Government by the Construction Contractor, subcontractor or any lower-tier subcontractor pursuant to a construction contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or equipment. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(b) This clause, including this paragraph (b), shall be included in all subcontracts hereunder at any tier.

252.231-7000 SUPPLEMENTAL COST PRINCIPLES (DEC 1991)

When the allowability of costs under this contract is determined in accordance with part 31 of the Federal Acquisition Regulation (FAR), allowability shall also be determined in accordance with part 231 of the Defense FAR Supplement, in effect on the date of this contract.

(End of clause)

252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991)

(a) The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Contracting Officer, with any proposal for a contract modification.

(b) The price breakdown --

(1) Must include sufficient detail to permit an analysis of profit, and of all costs for --

(i) Material;

(ii) Labor;

(iii) Equipment;

(iv) Subcontracts; and

(v) Overhead; and

(2) Must cover all work involved in the modification, whether the work was deleted, added, or changed.

(c) The Contractor shall provide similar price breakdowns to support any amounts claimed for subcontracts.

(d) The Contractor's proposal shall include a justification for any time extension proposed.

252.242-7000 POSTAWARD CONFERENCE (DEC 1991)

The Contractor agrees to attend any postaward conference convened by the contracting activity or contract administration office in accordance with Federal Acquisition Regulation subpart 42.5.

(End of clause)

252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991)

When costs are a factor in any price adjustment under this contract, the contract cost principles and procedures in FAR part 31 and DFARS part 231, in effect on the date of this contract, apply.

252.243-7002 REQUESTS FOR EQUITABLE ADJUSTMENT (MAR 1998)

(a) The amount of any request for equitable adjustment to contract terms shall accurately reflect the contract adjustment for which the Contractor believes the Government is liable. The request shall include only costs for performing the change, and shall not include any costs that already have been reimbursed or that have been separately claimed. All indirect costs included in the request shall be properly allocable to the change in accordance with applicable acquisition regulations.

(b) In accordance with 10 U.S.C. 2410(a), any request for equitable adjustment to contract terms that exceeds the simplified acquisition threshold shall bear, at the time of submission, the following certificate executed by an individual authorized to certify the request on behalf of the Contractor:

I certify that the request is made in good faith, and that the supporting data are accurate and complete to the best of my knowledge and belief.

(Official's Name)

(Title)

(c) The certification in paragraph (b) of this clause requires full disclosure of all relevant facts, including--

(1) Cost or pricing data if required in accordance with subsection 15.403-4 of the Federal Acquisition Regulation (FAR); and

(2) Information other than cost or pricing data, in accordance with subsection 15.403-3 of the FAR, including actual cost data and data to support any estimated costs, even if cost or pricing data are not required.

(d) The certification requirement in paragraph (b) of this clause does not apply to----

(1) Requests for routine contract payments; for example, requests for payment for accepted supplies and services, routine vouchers under a cost-reimbursement type contract, or progress payment invoices; or

(2) Final adjustment under an incentive provision of the contract.

252.244-7000 SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS (DOD) (MAR 2000)

In addition to the clauses listed in paragraph (c) of the Subcontracts for Commercial Items and Commercial Components clause of this contract (Federal Acquisition Regulation 52.244-6), the Contractor shall include the terms of the following clauses, if applicable, in subcontracts for commercial items or commercial components, awarded at any tier under this contract:

252.225-7014 Preference for Domestic Specialty Metals, Alternate I (10 U.S.C. 2241 note).

252.247-7023 Transportation of Supplies by Sea (10 U.S.C. 2631).

252.247-7024 Notification of Transportation of Supplies by Sea (10 U.S.C. 2631).

(End of clause)

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002)

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

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Maritime Administration, Office of Cargo Preference, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information:

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor shall provide with its final invoice under this contract a representation that to the best of its knowledge and belief--

(1) No ocean transportation was used in the performance of this contract;

(2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

ITEM DESCRIPTION	CONTRACT LINE ITEMS	QUANTITY
TOTAL		

(g) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(h) In the award of subcontracts for the types of supplies described in paragraph (b)(2) of this clause, the Contractor shall flow down the requirements of this clause as follows:

(1) The Contractor shall insert the substance of this clause, including this paragraph (h), in subcontracts that exceed the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(2) The Contractor shall insert the substance of paragraphs (a) through (e) of this clause, and this paragraph (h), in subcontracts that are at or below the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(End of clause)

252.247-7024 NOTIFICATION OF TRANSPORTATION OF SUPPLIES BY SEA (MAR 2000)

(a) The Contractor has indicated by the response to the solicitation provision, Representation of Extent of Transportation by Sea, that it did not anticipate transporting by sea any supplies. If, however, after the award of this contract, the Contractor learns that supplies, as defined in the Transportation of Supplies by Sea clause of this contract, will be transported by sea, the Contractor --

(1) Shall notify the Contracting Officer of that fact; and

(2) Hereby agrees to comply with all the terms and conditions of the Transportation of Supplies by Sea clause of this contract.

(b) The Contractor shall include this clause; including this paragraph (b), revised as necessary to reflect the relationship of the contracting parties--

(1) In all subcontracts under this contract, if this contract is a construction contract; or

(2) If this contract is not a construction contract, in all subcontracts under this contract that are for--

(i) Noncommercial items; or

(ii) Commercial items that--

(A) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it subcontracts for f.o.b. destination shipment);

(B) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(C) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(End of clause)

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SPECIAL CLAUSES - CONSTRUCTION

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SECTION 00800

SPECIAL CLAUSES - CONSTRUCTION

SC-1. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984) (FAR 52.211-10).

The Contractor will be required to (a) commence work under this Contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) to prosecute the work diligently, and (c) to complete the entire work ready for use no later than 570 calendar days after date of receipt by Contractor of notice to proceed. The time stated for completion shall include final cleanup of the premises.

SC-1.1 OPTION FOR INCREASED QUANTITY

a. The Government may increase the quantity of work awarded by exercising one or more of the Optional Bid Items 0007 through ~~0019~~ 0015 at any time, or not at all, but no later than 90 calendar days after receipt by Contractor of notice to proceed. Notice to proceed on work Item(s) added by exercise of the option(s) will be given upon execution of consent of surety.

b. The parties hereto further agree that any option herein shall be considered to have been exercised at the time the Government deposits written notification to the Contractor in the mails.

c. The time allowed for completion of any optional items awarded under this contract will be the same as that for the base item(s), and will be measured from the date of receipt of the notice to proceed for the base item(s).

SC-1.2 Exception to Completion Period(s): In case the Contracting Officer determines that completion of seeding, sodding, and planting, and establishment of same is not feasible within the completion period(s) stated above, the Contractor shall accomplish such work in the first planting period following the contract completion period and shall complete such work as specified, unless other planting periods are directed or approved by the Contracting Officer.

SC-2. LIQUIDATED DAMAGES - CONSTRUCTION (SEP 2000) (FAR 52.211-12)

(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 $1,742.00 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.

(d) Exception to Liquidated Damage: In case the Contracting Officer determines that completion of work stated above in paragraph Exception to Completion Period(s) is not feasible during the completion period(s) stated in SC-1, such work will be exempted from liquidated damages.

SC-3 AND SC-4 DELETED.

SC-5. INSURANCE - WORK ON A GOVERNMENT INSTALLATION (JAN 1997) (FAR 52.228-5)

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance period of this Contract at least the kinds and minimum amounts of insurance required in the Insurance Liability 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.

(d) Insurance Liability Schedule (FAR 28.307-2)

(1) Workers' compensation and employer's liability. Contractors are required to comply with applicable Federal and State workers' compensation and occupational disease statutes. If occupational diseases are not compensable under those statutes, they shall be covered under the employer's liability section of the insurance policy, except when Contract operations are so commingled with a Contractor's commercial operation that it would not be practical to require this coverage. Employer's liability coverage of at least $100,000 shall be required, except in states with exclusive or monopolistic funds that do not permit workers' compensation to be written by private carriers.

(2) General Liability.

(a) The Contracting Officer shall require bodily injury liability insurance coverage written on the comprehensive form of policy of at least $500,000 per occurrence.

(b) Property damage liability insurance shall be required only in special circumstances as determined by the agency.

(3) Automobile liability. The Contracting Officer shall require automobile liability insurance written on the comprehensive form of policy. The policy shall provide for bodily injury and property damage liability covering the operation of all automobiles used in connection with performing the Contract. Policies covering automobiles operated in the United States shall provide coverage of at least $200,000 per person and $500,000 per occurrence for bodily injury

and $20,000 per occurrence for property damage. The amount of liability coverage on other policies shall be commensurate with any legal requirements of the locality and sufficient to meet normal and customary claims.

(4) Aircraft public and passenger liability. When aircraft are used in connection with performing the Contract, the Contracting Officer shall require aircraft public and passenger liability insurance. Coverage shall be at least $200,000 per person and $500,000 per occurrence for bodily injury, other than passenger liability, and $200,000 per occurrence for property damage. Coverage for passenger liability bodily injury shall be at least $200,000 multiplied by the number of seats or passengers, whichever is greater.

(5) Environmental Liability If this contract includes the transport, treatment, storage, or disposal of hazardous material waste the following coverage is required.

The Contractor shall ensure the transporter and disposal facility have liability insurance if effect for claims arising out of the death or bodily injury and property damage from hazardous material/waste transport, treatment, storage and disposal, including vehicle liability and legal defense costs in the amount of $1,000,000.00 as evidenced by a certificate of insurance for General, Automobile, and Environmental Liability Coverage. Proof of this insurance shall be provided to the Contracting Officer.

SC-6 DELETED.

SC-7. PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984) (FAR 52.236-1): The Contractor shall perform on the site, and with its own organization, work equivalent to at least fifteen percent (15%) of the total amount of work to be performed under the Contract. The 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.

SC-8. PHYSICAL DATA (APR 1984) (FAR 52.236-4): Data and information furnished or referred to below is for the Contractor's information. The Government will not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) Physical Conditions: The indications of physical conditions on the drawings and in the specifications are the result of site investigations by test holes shown on the drawings.

(b) Weather Conditions: Each bidder shall be satisfied before submitting his bid as to the hazards likely to arise from weather conditions. Complete weather records and reports may be obtained from any National Weather Service Office.

(c) Transportation Facilities: Each bidder, before submitting his bid, shall make an 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 jobsite. The unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of the work.

SC-9 DELETED.

SC-10. LAYOUT OF WORK (APR 1984) (FAR 52.236-17): The Contractor shall lay out its work from Government-established base lines and bench marks indicated on the drawings, and

shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due, or to become due, to the Contractor.

SC-11. RESERVED

SC-12 AND SC-13 DELETED.

SC-14. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAY 1999)-(EFARS 52.231-5000)

(a) 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 VIII. 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.

(e) Copies of EP1110-1-8 “Construction Equipment Ownership and Operating Expense Schedule” Volumes 1 through 12 are available in Portable Document Format (PDF) and can be viewed or downloaded at http://www.usace.army.mil/inet/usace-docs/eng-pamplets/cecw.htm. A CD-ROM containing (Volumes 1-12) is available through either the Superintendent of

Documents or Government bookstores. For additional information telephone 202-512-2250, or access on the Internet at http://www.access.gpo.gov/su_docs.

SC-15. PAYMENT FOR MATERIALS DELIVERED OFF-SITE (MAY 1999)-(EFARS 52.232-5000)

(a) Pursuant to FAR clause 52.232-5, Payments Under Fixed Priced Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site will be limited to: (1) materials required by the technical provisions; or (2) materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

(b) Such payment will be made only after receipt of paid or receipted invoices or invoices with canceled check showing title to the items in the prime contractor and including the value of material and labor incorporated into the item. In addition to petroleum products, payment for materials delivered off-site is limited to the following items: Any other construction material stored offsite may be considered in determining the amount of a progress payment.

SC-16 AND SC-17 DELETED

SC-18. CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)(DOD FAR SUPP 252.236-7001)

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

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

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

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

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

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

(c) In general—

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

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

(d) Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or that

are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified in the index of drawings attached at the end of the Special Clauses.

SC-19 THROUGH SC-21 DELETED.

SC-22. EPA ENERGY STAR: The Government requires that certain equipment be Energy Star compliant. Initially, the sole Energy Star requirement shall be the self certification by the bidder that the specified equipment is Energy Star compliant. Within 3 months of the availability of an EPA sanctioned test for Energy Star compliance, the Contractor shall submit all equipment upgrades and additions for testing and provide proof of compliance to the Government upon completion of testing. Testing shall be at the Contractor's expense.

SC-23. RECOVERED MATERIALS: The Corps of Engineers encourages all bidders to utilize recovered materials to the maximum extent practicable. The attached APPENDIX R contains procurement guidelines for products containing recovered materials.

APPENDIX R

PART 247 - COMPREHENSIVE PROCUREMENT GUIDELINE FOR PRODUCTS CONTAINING RECOVERED MATERIALS

40 CFR Ch. 1 (9-1-99 Edition)

Subpart B-Item Designations

§ 247.10 Paper and paper products.

Paper and paper products, excluding building and construction paper grades.

§ 247.11 Vehicular products.

(a) Lubricating oils containing re-refined oil, including engine lubricating oils, hydraulic fluids, and gear oils, excluding marine and aviation oils.
(b) Tires, excluding airplane tire
(e) Reclaimed engine coolants, excluding coolants used in non-vehicular applications.

247.12 Construction products.

(a) Building insulation product including the following items:
(1) Loose-fill insulation, including but not limited to cellulose fiber, mineral fibers (fiberglass and rock vermiculite, and perlite;
(2) Blanket and batt insulation, including but not limited to mineral fibers (fiberglass and rock wool).
(3) Board (sheathing, roof decking wall panel) insulation, including but not limited to structural fiberboard and laminated paperboard products perlite composite board, polyurethane, polyisocyanurate, polystyrene, phenolics, and composites; and
(4) Spray-in-place insulation, including but not limited to foam-in-place polyurethane and polyisocyanurate and spray-on cellulose.
(b) Structural fiberboard and laminated paperboard products for applications other than building insulation, including building board, sheathing shingle backer, sound deadening board, roof insulating board, insulating wallboard, acoustical and non-acoustical ceiling tile, acoustical and non-acoustical lay-in panels, floor underlayments, and roof overlay (cover board).
(c) Cement and concrete, including concrete products such as pipe and block, containing coal fly as ground granulated blast furnace (GGBF) slag.
(d) Carpet made of polyester fiber use in low- and medium-wear applications.
(e) Floor tiles and patio block containing recovered rubber or plastic.
(f) Shower and restroom dividers/partitions containing recovered plastic or steel.
(g) (1) Consolidated latex paint used for covering graffiti; and
(2) Reprocessed latex paint used for interior and exterior architectural applications such as wallboard, ceilings, and trim; gutter boards; and concrete, stucco, masonry, wood and metal surfaces.

§247.13 Transportation products.

(a) Traffic barricades and traffic cones used in controlling or restricting vehicular traffic.
(b) Parking stops made from concrete or containing recovered plastic or rubber.
(c) Channelizers containing recovered plastic or rubber.
(d) Delineators containing recovered plastic, rubber, or steel.
(e) Flexible delineators containing recovered plastic.

§ 247.14 Park and recreation products

(a) Playground surfaces and running tracks containing recovered rubber or plastic.
(b) Plastic fencing containing recovered plastic for use in controlling snow or sand drifting and as a warning/safety barrier in construction or other applications.

247.15 Landscaping products.

(a) Hydraulic mulch products containing recovered paper or recovered wood used for hydroseeding and as an over-spray for straw mulch in landscaping, erosion control, and soil reclamation.
(b) Compost made from yard trimmings, leaves, and/or grass clippings for use in landscaping, seeding of grass or other plants on roadsides and embankments, as a nutritious mulch under trees and shrubs, and in erosion control and soil reclamation.
(c) Garden and soaker hoses containing recovered plastic or rubber.
(d) Lawn and garden edging containing recovered plastic or rubber.

§ 247.16 Non-paper office product.

(a) Office recycling containers and office waste receptacles.
(b) Plastic desktop accessories.
(c) Toner cartridges.
(d) Binders.
(e) Plastic trash bags.
(f) Printer ribbons.
(g) Plastic envelopes.

§ 247.17 Miscellaneous products.

Pallets containing recovered wood, plastic, or paperboard.

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FORT LEWIS, WASHINGTON
Project Number: 25057
22s/191-90-12

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274J	T-400	Telecommunications Security Plan	2	03MAY16
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276	T-501	Telecommunications DOIM/DSN/NIPR Room Detail		03APR11
277	T-501A	Telecommunications DOIM/DSN/NIPR Rack Detail		03APR11
278	T-501B	Telecommunications DOIM HOMACO Frame Details		03APR11
279	T-502	Telecommunications LH/Reach Room Detail		03APR11
280	T-503	Telecommunications SIPR RPPM Detail		03APR11
281	T-504	Telecommunications SIM/STIM Room Detail		03APR11
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DRAWING REVISIONS BY NOTATION

Floor Plan Northeast Quadrant, Sheet 104, Plate A-103

Add wall type “10C” between rooms “Mechanical 115A” and “Electrical 115B”.

Window Types Window Schedules, Sheet 158, Plate A-603

Note: The following windows repeat themselves in the schedule, and need only appear once.

Room Finish Schedule, Sheet 161, Plate A-606

Room 104A, Ceiling Assembly should be “O.T.S”, in lieu of “CA-3”

Civil Layout Plan, Sheet 19, Plate C-101

(a) Add the following to the plan of this Sheet:

Expand the amount of the concrete pad at the northeast side of the building, as shown on the revised detail of Plate S-403. (For the diesel engine-generator.)

Composite Foundation/Floor Plan, Sheet 51, Plate S-100

(a) For modifications (not shown) to electrical transformer and generator enclosure located near Grid H-3.1, see revised plan on Sheet 75, Plate S-403.

Foundation/Flr Plan NE Quadrant, Sheet 54, Plate S-103

(a) Revise note callout located near Grid H.7-3 to read “Elec Transformer & Generator Enclosure, see Sheet S-403” to reflect addition of electrical generator equipment; for enclosure modifications not shown, see revised plan on Sheet 75, Plate S-403.

Elec Transformer & Generator Enclosure Plan and Section, Sheet 75, Plate S-403

(a) Revised overall sheet title to read “Elec Transformer & Generator Enclosure Plan and Section” to reflect addition of electrical generator equipment.

Elec Transformer & Generator Enclosure Plan and Section, Sheet 75, Plate S-403

(a) Modified and revised PLAN to accommodate new electrical generator equipment. Modifications included eastward extension of thickened concrete slab-on-grade, extension

of enclosure wall system (CMU wall with exterior brick veneer), addition of Notes 5 & 6, and modification of the title to reflect the electrical generator equipment addition.

(b) See attached sheet **SD-1** (Elec Transformer & Generator Enclosure Plan, Plate S-403).

Elec Transformer & Generator Enclosure Plan and Section, Section A, Sheet 75, Plate S-403

(a) Modified slab thickness callout to reflect increased thickness at slab extension required for new electrical generator equipment.

(b) See attached sheet **SD-2** (Section A, Plate S-403).

HVAC and Plumbing Schedules, Sheet 191, Plate M-602

(a) AIR HANDLING UNIT SCHEDULE
For AHU-3 Supply Fan ESP IN WG shall be revised to 1.75”

(b) AIR HANDLING UNIT SCHEDULE
Revise NOTE 2 to read as follows: Provide for single point electrical connection including transformers, breakers for controls, lights, etc. All supply and return fans shall be furnished with a factory mounted and wired VFD except AHU-2. AHU-2 shall only have a VFD associated with the return fan.

HVAC Control Diagram, Sheet 193, Plate M-604

(a) AHU-1, 3, 4, 5 shall have a return duct CO2 sensor. Sensor to be located in an accessible location.

(b) AHU-2 shall have a wall mounted CO2 sensor. Locate sensor near thermostat.

(c) Provide a CO2 sensor to read the CO2 level of the outdoor air in each air handler. Locate sensors in the outside air plenum of the air handler. Install so the sensor is reading only the outside air stream.

(d) Sequence of operation for CO2 sensor:
CO2 sensors for inside the building shall compare the CO2 levels against the outside air CO2 sensors and shall maintain the inside air CO2 levels to not greater than 530 PPM greater than the CO2 levels of the outside air. CO2 sensors shall override mixed air sensors/outside air dampers to not exceed the maximum indoor CO2 levels. Outside air dampers shall modulate from full open to full closed. Dampers shall maintain minimum outside air position as required maintain building pressure.

Electrical General Notes, Sheet 215, Plate E-001

(a) Add the following to the end of Telecommunication Requirements box of this Sheet:

Contact information for Spider Manufacturing:
Telephone: (250) 765-2616
Fax: (250) 765-2614

website address: www.spidermfg.com
mailing address: #5-364 Lougheed Rd., Kelowna, BC, Canada V1X 7R8

Electrical Area Plan, Sheet 217, Plate E-100

(a) Replace the last two lines of Note 1 of this Sheet with the following:

"…data cables provided by Communications Subcontractor; cable TV – coaxial (Commcast) cable provided by vendor through contract with the General Contractor."

(b) Replace the last sentence of Note 15 of this Sheet with the following:

"Remove cable at a minimum to the point of pole (S3)36, as shown on the Drawing; the cut end of any remaining portion of abandoned cable shall be encapsulated and sealed to achieve a permanent watertight condition. All lead-sheath cable which is removed shall be disposed of in accordance with Section 02220 DEMOLITION. The cable shall be replaced with a new cable, as shown on the T-series (Telecommunications) drawings/addendum."

Electrical Site Plan, Sheet 218, Plate E-101

(a) Add the following to the plan of this Sheet:

Locate the diesel engine-generator at the east end of the unit substation (Note 3). The expanded pad is shown on the revised detail of Plate S-403.

Electrical Room and Substation Plan and Details, Sheet 231, Plate E-400

(a) Add the following to Detail 3 of this Sheet:

Add (2) additional ground rods beyond the east end of the expanded pad / enclosure (to accommodate the engine-generator, as shown on the revised detail of Plate S-403) and connect to the ground ring with #3/0 bare copper ground conductor. Provide (2) connections from the buried ground conductor to the engine-generator frame and ground bus, in accordance with the manufacturer's instructions.

Distribution Panel Schedules, Sheet 239, Plate E-603

(a) Add the following to the schedule for Panel SNK:

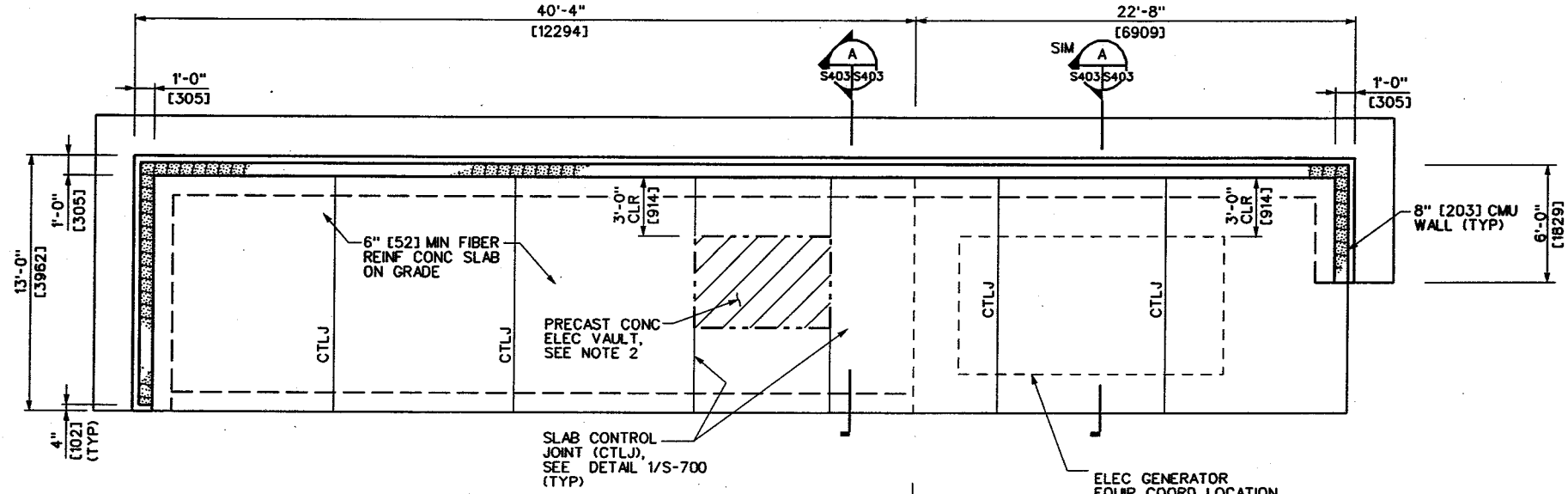
Add a 3-pole, 60A circuit breaker at pole positions 37, 39, 41 for the generator panel; 3000 va load on each of the phases.

STANDARD DETAILS BOUND IN THE SPECIFICATIONS

DRAWING NUMBER	SHEET NUMBER	TITLE	DATE
SECTION 01501 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS			
49s/40-05-15	1 & 2	U.S. Army Project Construction Sign	84JUN20
	1	Hard Hat Sign	10SEP90

~~END OF SECTION~~

Attachment follows.



N

4' 2' 0 4'

SCALE: 1/4" = 1'-0"

NOTES:

1. FOR FINISH GRADE AND SITE SURFACE TREATMENT NOT SHOWN, SEE SITE CIVIL PLAN.
2. FOR SIZE AND LOCATION OF PRECAST CONC ELEC VAULT, SEE ELEC DWGS AND SPECS.
3. FOR EXTER BRICK VENEER AND PRECAST CONC WALL CAP NOT SHOWN, SEE ARCH.
4. FOR ADDT REINF AT CMU WALL CORNERS/INTERSECTIONS AND WALL OPNGS, SEE DETAILS 1/S-701 AND 2/S-701 RESPECTIVELY.
5. PROVIDE #5@12" REINF EW, T&B IN 12-INCH THICK CONC SLAB ON GRADE, EXTEND REINF 3'-0" INTO 6-INCH CONC SLAB ON GRADE.
6. COORD LOCATION OF ELEC GENERATOR EQUIP WITH ELEC AND EQUIP MFR. EQUIP SHALL BE ANCHORED IN ACCORDANCE WITH EQUIP MFR RECOMMENDATIONS (MIN OF 3/4" DIA CONC ANCHOR AT EA CORNER AND AT 4FT [1219] O.C. ALONG PERIM).

ELEC TRANSFORMER & GENERATOR ENCLOSURE PLAN

1/4"=1'-0"

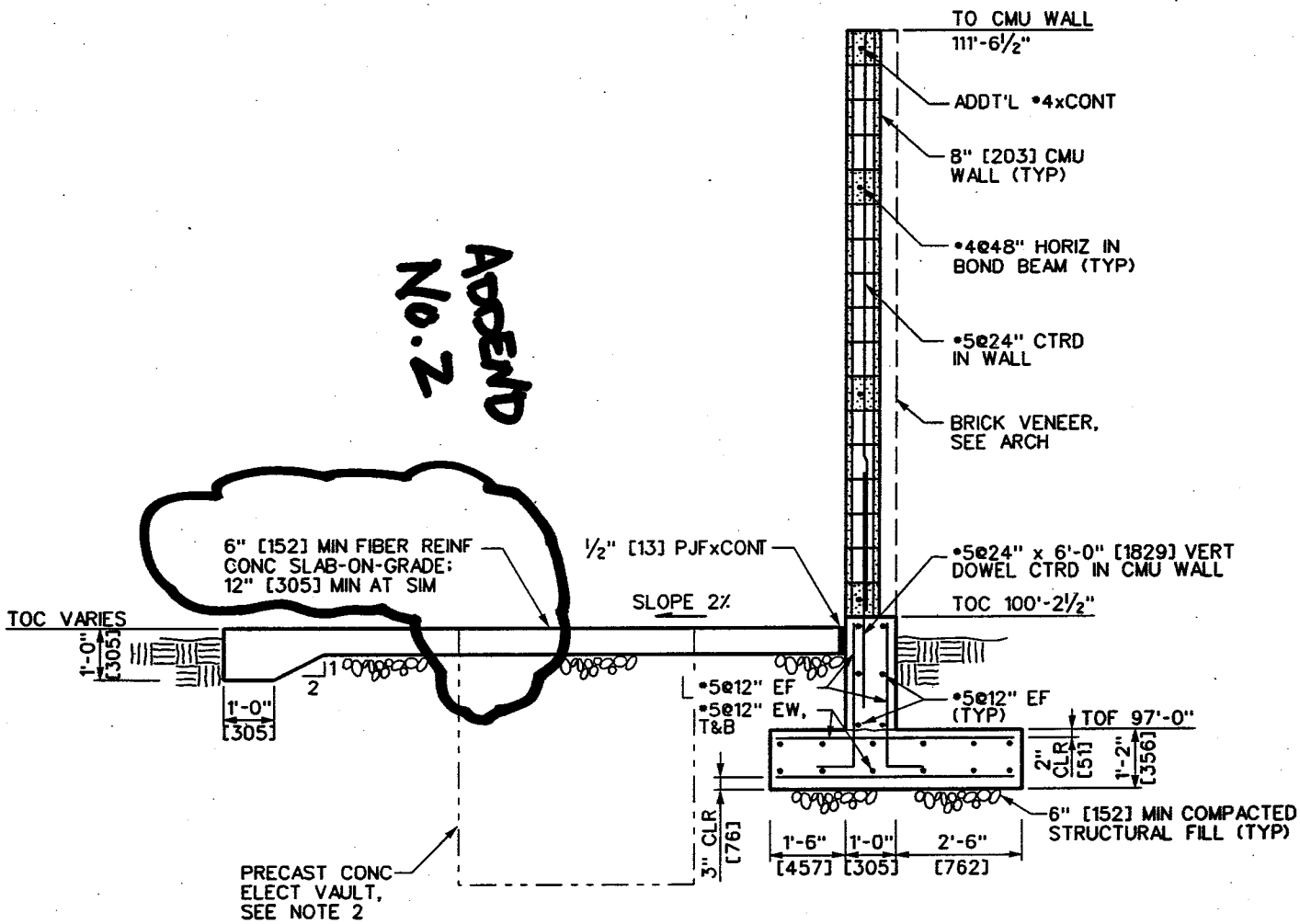
REVISED ADDENDUM NO. 2

SD-1

00800-21

S-403

R0002



ADDEND No. 2

1. NOTES:
   FOR BRICK VENEER AND ARCH PRECAST CONC WALL CAP NOT SHOWN, SEE ARCH.
2. FOR PRECAST CONC ELEC VAULT SIZE AND DETAILS NOT SHOWN, SEE ELEC DWGS AND SPECS.
3. FOR TOP OF CONC SLAB ELEVATIONS NOT SHOWN, SEE CONC CIVIL SITE PLAN.

A SECTION
S403 S403 1/2"=1'-0"

END OF SECTION

SD-2

008000-22

S-403

R0002

SECTION 00801 – SPECIAL CLAUSES – O&M PHASE

SC-A1. INTRODUCTION. This section contains special contract requirements related to the Operation and Maintenance (O&M) phase of this contract that are not provided in Section 01830 or elsewhere in the contract. After completing construction of the Battle Simulation Center at Fort Lewis, WA, the Contractor shall provide supervision, personnel, equipment, transportation, material, and other items necessary to operate, service and maintain the facility, except as provided in Section 01830 or elsewhere in the contract. During this portion of this contract, professional and non-professional non-personal services will be performed. This is a non-personal services contract, which means that the personnel rendering the services are not subject, either by the contract's terms or by the manner of its administration, to the supervision and control usually prevailing in relationships between the Government and its employees.

SC-A2. PERIOD OF SERVICE. The Contractor shall commence the operations and maintenance (O&M) phase of performance under this contract on the beneficial occupancy date (BOD). The O&M phase of this contract O&M portion of this contract will consist of a base period not-to-exceed (NTE) one year (365 days or 366 in the case of a leap year) after the BOD, and four option periods NTE one year each.. The total O&M performance period shall not exceed five years. The four optional periods may be exercised at time of award or in accordance with clause 52.217-9, Option to Extend the Term of the Contract, in Section 00700 of this contract. Each extension shall be evidenced by modification to this contract, which may include revisions necessitated by statute, executive order, and applicable regulations.

SC-A3. OPTIONAL SERVICES. Clause 52.217-9, Option to Extend the Term of the Contract, will govern exercise of any optional periods that are not part of the initial contract award. During the last option period, if it is necessary to extend the contract, clause 52.217-8, Option to Extend Services, will govern exercise of any extension of services. Both of these clauses are provided in Section 00700 of this contract.

SC-A4. SERVICE CONTRACT ACT (SCA) AND PRICING CHANGES FOR OPTION PERIODS. The SCA applies to all non-professional positions either shown in the SCA wage determination provided in this document or included as additional classification categories requested by the Contractor after award. The SCA wage rates provided during the solicitation phase of the procurement are for pricing purposes. They will also serve as the basis for future adjustments required when revisions to the wage determination are accomplished.

A4.1 Within the six-month period preceding the beginning of the first and each subsequent year of O&M service, the Seattle District Contracting Office will request and obtain from the Department of Labor any updates to the SCA wage determination. If there has been an increase from the rates used at the time of award or in the previous year of service, the Contractor will be provided with the new rates and requested to submit a proposal to reflect any revisions to the item pricing for the applicable O&M line item

based upon the new rates. The Contractor's requested revisions shall only reflect changes resulting from the current contract rates, and must not reflect proposed increases to other cost elements that make up the price for the applicable year of service. New rates for the succeeding 365-day period will be incorporated via modification when required.

SC-A5. INSURANCE - WORK ON A GOVERNMENT INSTALLATION – O&M PHASE. In accordance with FAR 52.228-5 (JAN 1997) in Section 007000, the Contractor shall, at its own expense, provide and maintain during the entire performance period of this Contract the kinds and minimum amounts of insurance stated in Section 00800 – Construction Phase, SC-5.

SC-A6. SUBSTITUTE PERSONNEL AND SUBCONTRACTORS. The Contractor shall hire personnel to serve as the Contractor Facility Manager (CFM) and Alternate CFM for the O&M phase with at least the minimum qualifications and experience stated in the sample resumes provided with the firm's proposal.

A6.1 No later than 30 calendar days prior to the beginning of the O&M phase of this contract, the Contractor shall provide to the Contracting Officer, in writing, the qualifications and experience of the individual who will serve as the CFM and the Alternate CFM. The submission should discuss how the qualifications and experience those of the individuals who will actually perform the work meet and/or exceed those standards identified in the sample resumes.

A6.2 Should the CFM or Alternate CFM leave the project for any reason, the Contractor shall submit for approval the qualifications of replacements. Substitution of these personnel shall require the approval of the Contracting Officer. In the event a personnel change is needed, the replacement shall be equal in qualification and experience.

SC-A7. INVOICING. Within the 30 days prior to the date that begins the O&M phase, the Contractor will be notified of the person and address for submission of invoices. See Specification Section 01270, Payment, and Section 00700, Contract Clauses, for further information on payment for services.

SC-A8. PERFORMANCE EVALUATION OF CONTRACTOR. As a minimum, the Contractor's performance at the end of the construction portion of the contract will be rated in the Corps of Engineers Construction Contract Administration Support System (CCASS). This will be an interim evaluation. At the end of the entire contract, a final overall performance rating will be entered into CCASS. Other interim evaluations may be prepared at any time during contract performance when determined to be in the best interest of the Government.

SC-A9. GOVERNMENT-FURNISHED PROPERTY.

A9.1 No later than the BOD, the Government will furnish the Contractor with the property identified in Section 01830 to be used for performing the O&M phase of the contract (e.g., desk, chair, file storage, etc.). The Government will retain title to the government-furnished property and maintain the Government's official property records in connection with this property.

A9.2 The government property shall be used only for performing this contract. The Contractor shall be responsible and accountable for all government property provided under this contract, and shall use, maintain, protect, and preserve this property with reasonable care. The Contractor is not responsible for reasonable wear and tear to government property or for government property that is properly consumed in performing this contract. However, the Contractor is responsible for loss or destruction of, or damage to, the government property provided under this contract that results from misconduct or lack of good faith on the part of the Contractor's managerial personnel. If damage occurs to the property, the Government will replace the items or the Contractor shall make such repairs as the Government directs.

A9.3 If the Contractor transfers the government property to the possession and control of a subcontractor, the transfer shall not affect the liability of the Contractor for loss or destruction of, or damage to, the property.

A9.4 The Government and all its designees shall have access at all reasonable times to the premises in which any government property is located for the purpose of inspecting the government property.

A9.5 The Contractor shall leave any government property in place at the completion of contract performance.

SC-A10. BONDING REQUIREMENTS.

A10.1 Performance and payment bonds are required for the construction line items awarded in this contract. No performance or payment bonds are required for the operation and maintenance line items awarded in this contract.

END OF SECTION 00801

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FACILITY MAINTENANCE PROGRAM

SECTION 01830

FACILITY MAINTENANCE PROGRAM

1 PERFORMANCE REQUIREMENTS:

1.1 Overview. Reference National Defense Authorization Act for Fiscal year 2002, Section 2813 and as modified by Section 2813 in the 2003 Act for "Demonstration Program on Reduction in Long Term Facility Operating, Maintenance and Energy Costs. The Battle Simulation Center project is one of the Army projects under the referenced DoD pilot program to be used to investigate extending the life cycle of government facilities by having the construction contractor responsible for maintaining the facilities for a five-year period immediately following construction. During and at conclusion of the pilot initiatives, the DoD construction agencies are to report back to Congress regarding lessons learned that could be applied in the future.

1.1.1 One of the driving features on this pilot program is the notion that the construction contractor will place greater emphasis during construction on equipment selection, installation, and overall craftsmanship knowing that it will be responsible for maintaining the facilities for 5 years after the Beneficial Occupancy Date (BOD).

1.1.2 During the Operations and Maintenance (O & M) phase of the contract, the Contractor shall maintain the facilities systems of the Battle Simulation Center Ft. Lewis, WA; perform systematic preventive maintenance (PM); provide for continuous maintenance evaluation of critical systems; and perform unscheduled maintenance as necessary to:

- Assure continuous facility operations and prevent disruptions that could adversely affect the mission of the Battle Simulation Center and,
- Prevent premature failure or deterioration of the facility, facility systems, and equipment constructed or installed under the construction phase of the contract.
- Be responsible for the repair or replacement on all aspects of the building **NOT** defined under 1.1.3.2.

1.1.3 In order for the contract to be bid in a fixed-price environment, important aspects must be delineated with regard to what is, and what is not, covered by the Contractor during the 5-year maintenance period. In an attempt to provide a general direction, the following items outlined in 1.1.3.1 and 1.1.3.2 although not totally inclusive, represents suitable information for pricing a fixed price contract over the 5-year pilot period. In addition to information outlined within paragraphs 1.1, the Contractor is expected to draw on their past experience and consider the normal routine maintenance expectations for a building of similar size and function in determining the maintenance cost over the life of the 5-year pilot program in order to adequately define associated risks and costs in preparing an offer for a firm fixed price contract. The O & M manuals provided as a part of the construction phase of the project will form the basis of the preventative maintenance program.

1.1.3.1 Items Included as Contractor's Responsibility: In addition to the Contractor providing preventive maintenance and repairs or replacement of all contractor supplied and installed materials, systems, and equipment, the following are included as additional contractor responsibilities:

Architectural:	Repair or replacement of doors, hardware, windows, floor covering, ceiling tiles, and etc. damaged as a result of normal wear and tear or failure of building systems (i.e. water damage caused by plumbing or roofing leakage) Patching and painting wall surfaces damaged during normal usage. Repair of masonry walls that show signs of failure during normal usage and weather conditions
Plumbing:	Unclogging stopped up drains (interior and exterior) Repair and/or replacement of leaking pipes, valves, drains (interior and exterior)
Mechanical:	Replacement of filters, belts, motors, control system components
Electrical:	Replacement of burned out light bulbs (interior and exterior) Replacement of switches and receptacles
Site Work:	Sidewalks, curbs and gutters and pavements: Patch and repair areas that show signs of failure during normal usage and weather conditions

1.1.3.2 Items Not Included as Contractors Responsibility:

Repair or maintenance of non-contractor supplied materials and equipment (furniture, office equipment, shop equipment, computers, military equipment, etc)
Government security systems
Landscape Maintenance (pruning, fertilizing, and etc.)
Grass cutting
Janitorial services (cleaning, trash removal, maintaining consumable supplies, window washing)

1.1.4 Battle Simulation Center Operations: In order for the Contractor to assemble a fixed price proposal, it is important to delineate how the facility will function and operate. The purpose of the facility is to support all types of Battle Simulation exercises including but not limited to the following:

a. Administrative Areas (Rooms 101A through 101T and 102A) - These spaces are occupied during normal business hours Monday through Friday, 8 hours a day. On occasion limited numbers of staff will be present at nights and on weekends. The approximate number of permanent staff is 15 to 18 persons.

b. Classroom spaces (Rooms 122A through 122H) and Multi-Purpose space (Room 104A) - During normal operations these areas are used intermittently to support training exercises and non-simulation training events. They are used several times per week for periods of up to 8 hours. These spaces can also function as full simulation bays, during expanded exercises as described herein. These areas have no permanent staff.

c. Library (Rooms 111A and 111B) – During normal business hours, this space is used to house both electronic and non-electronic reference materials, for personnel throughout the facility. There is 1 permanent staff in this area.

d. Conference Room (Room 112A) - During normal operations this area is used intermittently to support training exercises and non-simulation training events. It is used several times per week for periods of up to 8 hours. This area has no permanent staff.

e. SCIF Area (Rooms 105A through 105E) - These spaces are occupied during normal business hours Monday through Friday, 8 hours a day, by the TACSIM Support Team. In addition to administrative uses during normal duty hours the TACSIM Team conducts exercise support from this location. They normally conduct training exercises 14-21 days per month, with 7-10 days of exercises requiring 24 hour operations. The approximate number of permanent staff is 12 to 15. Access to this space is restricted.

f. Central Control (Room 119A and 119B) – These control areas are occupied during normal business hours Monday through Friday, 8 hours a day, to support exercise planning and preparation. The approximate number of permanent staff is 14 to 17. The team controls 12-15 exercises per year. Each exercise is 3-4 days in duration and on occasion requires 24 hour operations. Visiting participants for a regular exercise can range between 20 and 100 operating inside the facility, and between 35 and 150 operating on the buildings perimeter. The team also controls 3-4 expanded exercises per year. Each expanded exercise is 3-7 days in duration and on occasion requires 24 hour operations. Visiting participants for an expanded exercise can range between 45 and 150 operating inside the facility, and between 75 and 400 operating on the buildings' perimeter.

g. Central Control (Room 118A, 118B) and AAR space (Room 108A) – These control and planning areas are occupied during normal business hours Monday through Friday, 8 hours a day, to support exercise planning and preparation. The approximate number of permanent staff is 20 to 23. The control area supports large-scale major exercises. Every 24 months a Corps Warfighter exercise is conducted. This exercise also includes several ramp-up exercises. Almost all exercises are conducted over extended periods (10-12 days) with 24 hour operations. During this time frame, other operations would be limited. Visiting participants for a major Corps Warfighter exercise can range between 750 and 1000 operating inside the facility, and between 750 and 1500 operating on the buildings perimeter.

h. Central Control (Room 117A and 117B) – These control areas are occupied during normal business hours Monday through Friday, 9 hours a day, to support exercise planning and preparation. The approximate number of permanent staff is 10 to 13. The team controls, on average, 75 exercises per year and is fully operational 250-280 days per year. Each of these exercises is 2-4 days in duration and periodically requires 24 hour operations. It is not uncommon for them to be conducting 2-3 exercises simultaneously. Visiting participants for an average exercise can range between 20 and 150 operating inside the facility, and between 50 and 400 operating on the buildings' perimeter.

i. Maintenance Supply Area (Rooms 116A – 116D) – During regular exercises, this area will be occupied Monday through Friday, 8 hours a day. During expanded and major exercises limited forces will be active in their spaces nights and on weekends. The approximate number of permanent staff is 5 to 8.

j. Occupied Communications Rooms (Rooms 120A – 120F and 121A). During some expanded and all major exercises, the 120 series rooms will be manned with approximately 1 visiting staff member per room. During normal operation these areas are not staffed. Room 121A has a permanent staff of 2. All other communication rooms are typically not permanently staffed.

k. Common areas such as the Break Area (Room 113A) and all toilet facilities – The occupancy and usage for these spaces ranges based on the type of exercise being run at the time.

l. Simulation Bays (Rooms 123A, 123B, 124A – 124D, 125A – 125D, 126A and 126D), HICON space (Room 107A) and OPFOR space (Room 109A) – These bays are used in varying degree for all regular, expanded and major exercises based on the number of visiting participants in the aforementioned paragraphs. The spaces are frequently reconfigured by means of operable partitions, movable furnishings and screening walls to serve the various types of exercises and groupings.

1.2 Contract Scope. The Contractor shall provide all labor, tools, equipment, staff and management required to perform the duties included in the Statement of Work (SOW) for the maintenance phase of this contract to be accomplished at the Battle Simulation Center facilities located at Ft. Lewis, WA.

1.2.1 The Contractor shall provide a management plan to the Contracting Officer within 90 days of notice to proceed for construction. The plan will provide all elements of the requirements of section 01830. See paragraph 5 for further details.

1.3 Performance Period. The Contractor shall operate the facilities systems of the Battle Simulation Center for a five-year period beginning at the BOD.

1.4 Specific Requirements. The Contractor shall provide the following:

1.4.1 Management Plan paragraph 1.2.1.

1.4.2 Operation and Preventive Maintenance (paragraph 1.5).

1.4.3 Continuous Operational/Functional Evaluation of Critical Systems (paragraph 1.6).

1.4.4 Unscheduled Maintenance (paragraph 1.7).

1.4.5 Alterations and New Construction (paragraph 1.8).

1.4.6 A Contract Facility Manager (CFM) and appropriate supporting maintenance staff. (paragraph 2).

1.4.7 A computer-based Facility Management System (FMS)(paragraph 3).

1.4.8 Systems O & M Manuals (paragraph 4).

1.4.9 Comprehensive Facility Management Plan (CFMP)(paragraph 5).

1.4.10 A plan for and implementation of a transition to another organization for O & M of the facility after the initial 5 year O&M phase (O&M Successor) (paragraph 6).

1.5 Operation and Preven~~ta~~tive Maintenance (PM):

1.5.1 Operate the facility systems of the Battle Simulation Center to ensure optimal efficiency.

1.5.2 Manage the operation of the facility maintenance program, including the implementation and maintenance of a computerized Facilities Management System (FMS) (See Section 3).

1.5.3 Provide systematic PM and unscheduled/corrective maintenance as necessary in order to assure continuous facility operation and to prevent disruptions that could adversely affect the mission of the Battle Simulation Center.

1.5.4 Perform necessary actions to preserve warranties (during warranty periods).

1.5.5 Take all reasonable measures to prevent premature failure/deterioration of facilities and facility systems/equipment constructed/installed under the construction portion of this contract.

1.5.6 The Contractor shall provide storage bins and cabinets with the minimum emergency stock of replacement equipment, supplies and spare parts in a place designated by the Government. At the conclusion of the contract period, the Contractor shall provide a complete inventory list along with projected stock to last one full year from the point of contract completion.

1.6 Continuous Operational/Functional Evaluation (OFE) of Critical Systems: ~~A commissioning is a one time event that ensures the system is operational.~~

1.6.1 Continuous evaluation~~s~~ provides for maintaining critical systems and critical facility components to assure that a system reaches its expected life expectancy and that efficiency of operations is maintained throughout a system's life. Continuous evaluation not only assures that the equipment is operating at peak efficiency at start-up, but that adjustment, for environmental and operational conditions, would keep the equipment and systems performing at maximum efficiency.

1.6.2 The following have been identified as critical systems for the Battle Simulation Center:

Division 2 - Site
Sections (All) Complete asphalt and concrete pavements, sidewalks, curbs and gutters, and the optional underground sprinkler system (if awarded)

Division 4 - Masonry
Section 04810 - Non-Bearing Masonry Veneer/Steel Stud Walls

Division 7 - Roofing Systems
Section 07412 - Non-Structural Metal Roofing System
Section 07413 - Metal-Siding
Section 07530 - Elastomeric Roofing (EDPM)

Division 8 – Doors and Windows
All doors, hardware, windows, and skylights

Division 9 – Finishes
All floor and wall tile, ceilings tiles, floor tiles and carpets

Division 10 - Specialties
Section 10100 - Visual Communications Specialties
Section 10270 - Raised Floor System
Section 10650 – Operable Partitions

Division 11 - Equipment
Section 11020 – Security Vault Door

Division 12 - Furnishings
Section 12705 - Furniture Systems

Division 13 – Special Construction
Section 13851 – Fire Detection and Alarm System
Section 13930 – Wet Pipe Sprinkler System, Fire Protection
Section 13945 – Pre Action Sprinkler Systems, Fire Protection

Division 14 – (Not Applicable)

Division 15 – Mechanical
Section 15181 – Chilled and Condenser Water Piping and Accessories
Section 15185 – Low Temperature Water Heating System
Section 15515 – Low Pressure Water Heating Boilers
Section 15620 – Liquid Chillers
Section 15700 - Unitary Heating and Cooling Equipment
Section 15895 – Air Supply, Distribution, Ventilation and Exhaust System Custom Air Handling Equipment
Section 15910 – Direct Digital Control Systems
Section 15950 – Testing/Adjusting/Balancing of HVAC Systems

Division 16 – Electrical
Section 16415 – Electrical Work, Interior
Section 16528 – Exterior Lighting
Section 16710 – Premises Distribution System

1.6.3 Critical Systems are outlined in an effort by the Government to highlight those areas of the facility that are perceived as a high threat to the overall facility short and long term operations and/or overall the life cycle of the facility. As such, the Contractor is encouraged to take extreme care in equipment selection, installation, and craftsmanship related to these items during construction as well as Preventive Maintenance during the 5-year maintenance period.

1.6.4 The Contractor shall implement a Continuous Operational/Functional Evaluation(OFE) that measures and compares the condition and performance of each of the critical systems against the condition and performance at the time of the BOD. The Contractor shall submit for the Contracting Officer's (CO) approval the conditions to be evaluated and the performance criteria to be measured 90 days prior to BOD. Upon acceptance of the facility the conditions and performance data shall be documented and will serve as the baseline criteria for future comparison.

1.6.5 NOT USED. ~~Formal assessments will be conductedduring the sixth month of the O&M phase of this contract, after the 10th month, and annually thereafter.~~

1.6.6 As a part of the OFE, the Contractor shall take whatever actions are necessary to bring the critical systems back into the conditions and within the operating performance parameters that were identified in the baseline criteria. ~~The Contractor shall be compensated for these actions including all necessary labor, materials and services according to the compensation provisions set forth in paragraph 1.7.~~

1.6.7 The OFE shall not be construed to be a substitute for PM and Unscheduled Maintenance specified elsewhere in the O&M Statement of Work.

1.7 Unscheduled Maintenance and General Services:

1.7.1 General. Unscheduled maintenance is corrective maintenance that involves repair or replacement for any building system or equipment. The Contractor shall perform unscheduled maintenance within the site boundaries of the Battle Simulation Center. All unscheduled maintenance events and general services will be carried out by the Contractor and documented in the FMS.

1.7.2 NOT USED. ~~Cost. The cost for unscheduled maintenance and general service includes all elements of expense to the Contractor including labor, materials, overhead, and profit to complete the specific maintenance event.~~

1.7.3 Service Orders. SO's will be created in the FMS database to provide direct feedback and data in the FMS for future reference and to establish a baseline for follow-on maintenance at the conclusion of this pilot maintenance contract.

1.7.3.1 The Service Orders are to include the expected time to complete the action, a schedule of cost to include labor categories and labor hours, and materials necessary to complete the work.

1.7.4 Response Requirements. Unscheduled maintenance requirements may be of an emergency, or urgent nature on critical and non-critical systems. Services may be required outside normal duty hours and must be performed immediately to prevent loss of life, injury, loss

or damage to property, or serious damage. Emergency services may also be required to eliminate or deal with hazardous conditions such as floods or power outages and sub-freezing building temperatures.

1.7.4.1 The Contractor shall take the necessary actions to protect life, safety, health and property based on the following priorities:

Priority 1 – Emergency response is required to correct conditions that impact life, safety and health of personnel or destruction of Government property. An order received during normal working hours requires a response within 45 minutes and 2 hours other than the Contractor's normal work hours except gas leaks which shall be 45 minutes at all times. Work shall be continuous until safe and secure and completed within two working days.

Priority 2 – Urgent matter is defined as failures or deficiencies which do not immediately endanger the occupants or threaten damage to property, but would soon inconvenience and affect the health and well being of the occupants. Response is required within 24 working hours and will be completed within 2 working days.

Priority 3 – Routine response is required to correct conditions that do not constitute an emergency or urgent need. Response is required within 3 working days and completed within 15 working days or as agreed to by the Government.

1.7.4.2 The Contractor shall respond per the priority timing requirement, when the Government or the Contractor identifies a requirement for unscheduled emergency or urgent or routine maintenance. The Contractor shall respond independently for priority 1 and 2 level responses and document the response in the FMS. Documentation shall include all elements as defined in the following for priority 3 response. For priority 3 level responses, the Contractor shall document the FMS with the problem, the expected time to complete the action, a schedule of cost to include labor categories and labor hours, and materials necessary to complete the work.

1.8 Alterations and New Construction:

1.8.1 The Government reserves the right to alter the buildings without affecting the intent of the work under this contract, to include Contractor and manufacturer warranties. As soon as practicable or no later than 30 calendar days prior to any projected change, the Contractor will be notified and requested to assess any impacts to the existing systems and this portion of the contract.

1.9 Hours of Operation:

1.9.1 Normal Hours. The Contractor shall perform routine repairs and maintenance between the hours of 0730 – 1600, Monday through Friday, except for observed federal holidays.

1.9.2 Priority One and Two Response. (See 1.7.4.1) The Contractor shall respond to Priority One and Two SO's on a 24 hours per day, 7 days per week basis. The CFM or a designated alternate should be on site during normal duty hours, and available to respond to emergencies as needed during non-duty hours. The CFM and any resources that need to be dispatched as required to meet the situation shall answer the call. In accordance with the Staffing Plan, the Contractor shall provide the CO with the names and telephone numbers (home and cell phone) of the individual.

1.10 Performance Requirements Summary. The Contractor's service delivery requirements are summarized into performance objectives that relate directly to standards of performance required to meet mission essential needs. The performance threshold briefly describes the minimum acceptable overall levels of service required for each required service. These thresholds are critical to mission success.

PERFORMANCE REQUIREMENTS SUMMARY

Performance Objective	SOW Para.	Performance Threshold
Operation and Preventive Maintenance. Operate facility systems, manage the operation of facility maintenance program, provide preventive maintenance and unscheduled/corrective maintenance, and maintain storage bins and cabinets with emergency stock of replacement equipment, supplies and spare parts.	1.5	95 % of the time
Continuous operational/functional evaluation of critical systems. Maintain critical systems and components to reach each system's life expectancy.	1.6	95 % of the time
Unscheduled Maintenance and General Services. Perform unscheduled maintenance on all building systems and equipment.	1.7	95 % of the time
Service Orders. Issue service orders for all scheduled and unscheduled maintenance.	1.7.3	95 % of the time
Emergency or Urgent Requirements. Perform emergency and urgent requirements within the time frames in Section 01830.	1.7.4	95 % of the time

2 CONTRACTOR PERSONNEL QUALIFICATIONS, DUTIES, AND TRAINING:

2.1 Contractor Staffing. The Contractor shall provide the management needed to satisfy the specified O&M requirements. These requirements will vary during the contract execution period and the Contractor shall ensure that adequate manpower and expertise is made available to satisfy all the varying requirements of this work description. Contract craft persons, such as painters, carpenters, masons, sheet metal workers, electricians, and HVAC mechanics will be needed periodically for PM, unscheduled maintenance, and the continuous OFE. The Contractor's plan for meeting the manpower requirements of the O&M period will be outlined in the Organizational and Staffing Plan (paragraph 5.4).

2.2 Contract Facility Manager (CFM):

2.2.1 The Contractor shall provide two employees who shall be responsible for the performance of the O&M work. One will be the CFM and the other as the alternate CFM. The name of the person and an alternate who shall act for the Contractor when the CFM is absent shall be designated in writing to the Contracting Officer.

2.2.2 The Contractor shall provide to the Contracting Officer, before commencing work, the names, addresses, business, home and/or cell phone numbers of the CFM and the alternate CFM.

2.2.3 The CFM and/or any alternative designated to act for the CFM, shall have full authority (through the contract execution period) to commit the Contractor to action on matters pertaining to Contractor's administration of this contract.

2.2.4 The Government will provide facilities for the CFM as specified in paragraph 7.

2.3 Qualifications of the CFM: The CFM must have experience in operation and maintenance or closely related field, including the supervision of a subcontracted work-force responsible for maintenance and repair of site and building systems including architectural, electrical, plumbing, mechanical, structural, heating, cooling, power generation and energy monitoring control systems.

2.3.2 The alternate CFM shall have comparable experience.

2.3.3 The CFM and alternate must be able to read, write, speak and understand English, fluently.

2.4 Duties of the CFM:

2.4.1 The CFM shall conduct overall management coordination and shall be the central point of contact with the Contracting Officer for performance of all work under this contract.

2.4.2 Monitor systems performance against desired benchmarks and proactively identify corrective actions as required.

2.4.3 Maintain manuals and publications as part of a reference library and maintain maintenance records and files.

2.4.4 Operate designated terminals of the computerized FMS and input data into that system.

2.4.5 Prepare and submit to the Contracting Officer the reports, and records as specified herein. In addition, an annual report is required of the Contractor to provide a formal assessment pertaining to this pilot O&M program. This report may include strong and weak points of the procedures and processes, lessons learned, cost efficiencies, suggested improvements, etc.

2.4.6 Implement subcontracts, if required, and maintain records of those subcontracts within the FMS data base.

2.4.7 Provide training to successor Contractor and/or Government personnel on the O&M of the facilities and the facilities' systems/equipment.

2.4.8 The Contractor shall submit monthly reports of all activities completed for the preceding month and projected for the upcoming month. The following will be addressed at a minimum:

For the month completed, a summary including but not limited to the following:

- Operational Issues.
- PM completed.
- Continuous OFE of Critical Systems completed.
- Unscheduled Maintenance completed including cost data.
- Any building alterations completed including cost.
- Any changes to the CFM or supporting maintenance staff.
- Deficiency Reports issued and resolution.

For the month ahead, summarize the following:

- PM scheduled.
- Continuous OFE of Critical Systems scheduled.
- Any other issues that require Government action to assure efficient operation of the Battle Simulation Center and maintenance of the facility.

The report shall be presented as an executive summary and provided in three hard copies and one electronic copy three work days prior to the scheduled monthly review.

2.5 Professional Qualifications. The Contractor shall ensure that employees and subcontractors have all applicable current and valid professional certifications (i.e. welding certificates, electrician licenses, etc.) before starting work.

2.6 Contract Maintenance Personnel. All planned contract/subcontractor maintenance personnel will have the same security and screening requirements as personnel employed directly by the Contractor. A plan with the following information shall be submitted to the CO: Full identification information for each individual and resumes of companies and personnel.

2.7 Approvals of Personnel. Employees of the Contractor/subcontractor shall be approved prior to occupancy of the facility by the Contracting Officer.

2.7.1 The Government has the right to restrict the employment under the contract of any Contractor employee or prospective Contractor employee who is identified as a threat to the health, safety, security, general well being or operational mission of the installation and its population. No convicted felons will be allowed to work at the site.

2.7.2 The Contractor shall not employ any person who is an employee of the United States Government if the employment of that person would create a conflict of interest nor shall the Contractor employ any person who is an employee of the Department of the Army, either military or civilian, unless such person seeks and receives approval in accordance with Department of Defense (DoD) Directive 5500.7-R (Standards of Conduct).

2.7.3 The Contractor is cautioned that off-duty active military personnel hired under this contract may be subject to permanent change of station (PCS), change in duty hours or deployment. Military reservists and National Guard members may be subject to recall to active duty. Their absence at any time shall not constitute an excuse for nonperformance under this contract.

2.8 Appearance of Personnel. Contractor personnel shall maintain a neat appearance and be easily recognized. This may be accomplished by wearing distinctive clothing.

2.9 Personnel Identification. The Contractor shall furnish and wear identification badges displayed at all times with a current picture, company name, employee name and description. Badges shall be numbered consecutively and each badge shall be accounted for. A list of issued badge numbers and the corresponding names shall be submitted to the CO at contract start date and shall be updated as changes occur.

3 FACILITIES MANAGEMENT SYSTEM (FMS):

3.1 Software and Hardware requirements:

3.1.1 The Contractor's intended FMS software shall be nonproprietary and be submitted to the CO for Government approval prior to receipt of Notice to Proceed with the O & M portion of the contract. The Contractor shall purchase, install, and operate the FMS and shall enter into the FMS all data required to establish records for the facilities, systems, and equipment. The Contractor will be supplied (by the Government) and responsible for installing, operating and maintaining ~~RISER~~ MAXIMO (~~RISER~~ MAXIMO is a facility management software / data system, used to track various maintenance components).

3.1.2 All computer hardware, software, historical data and systems under this section shall become the property of the Government at the conclusion of the contract period.

3.1.3 The Contractor shall protect the FMS data from loss and shall routinely back up all data to a storage medium protected against fire.

3.1.4 The Contractor shall not install any unauthorized copies of the FMS Software.

3.1.5 The Contractor may be required to house the FMS and CFM in the Contractor's construction trailer until the facility is ready for occupancy. Upon BOD, the FMS shall be relocated in the facility (see paragraph 7).

3.1.6 The Contractor will be trained in ~~RISER~~ MAXIMO by the Government and shall be required to track service orders.

3.2 Management Systems and Record Keeping:

3.2.1 Management of all PM shall be incorporated into the database, including all PM tasks with appropriate frequencies for each item listed in the Master Equipment List (MEL).

3.2.2 All management plans, schedules, reports and other data deriving from the development of the Management plan shall be developed and recorded in the database.

3.2.3 To enhance Government future forecasting of requirements, all unscheduled maintenance, including proposal and service order management provisions, shall be incorporated into the database.

3.2.4 All basic accounting shall be performed in the system, e.g. budget vs. actual, purchase order tracking, etc.

3.2.5 All cumulative historical records shall be maintained in the system.

3.2.6 All parts, supplies, and inventories used for PM and unscheduled maintenance shall be included in the database so as to allow inventory accounting, forecasting, and procurement efficiency.

3.3 Operating Logs: -Maintaining the facility system/equipment operating logs. All critical and non-critical system data shall be maintained.

3.4 Inspection Reports-: The Contractor shall maintain records of building inspections which assess unscheduled maintenance to include:

- The dates of such inspections
- Results of inspections
- Corrections required
- Corrections made

If corrections have not been made, the file shall include:

- A schedule for completion of required work
- A note explaining why corrections have not been made
- A backlog of scheduled and unscheduled maintenance requirements.

3.5 Standard Reports: Generation of standard FMS reports shall be provided upon request to the Contracting Officer.

3.6 Records and Data: - All records and data maintained in the FMS are the property of the Government and shall be made available to the CO upon request. A complete copy of all records and data shall be provided to the CO (in electronic format) upon completion or termination of this contract.

3.6.1.7 Contractor personnel who will operate the FMS shall have appropriate computer skills to operate the system. The Contractor shall assure that building occupants have access to the system for data query purposes only. The Contractor shall conduct training of key Government and Contractor personnel to assure proficiency in the FMS.

3.7-8 Equipment Maintenance and Operation. The Contractor shall provide routine maintenance and shall provide all manufacturer software upgrades as made available by the manufacturer for the duration of the contract and ensure data integrity after upgrade is made. If FMS equipment is damaged by Contractor abuse or misuse, the Contractor shall be responsible for the resulting repair and/or replacement costs. The Contractor shall operate the system in accordance with the manufacturer's instructions and shall make data backups to assure continuing operations. The failure of the computer system shall not be a basis for work stoppages or claims by the Contractor.

4 SYSTEMS OPERATION AND MAINTENANCE MANUALS (SOMM)

4.1 Preparation of SOMM: Using the Management Plan and System Operation and Maintenance Manual (MP & SOMM) Templates as a guide, the Contractor shall prepare the final SOMM to be used during the O & M phase of this contract. See Exhibit SOW-2 for the format of the SOMM.

4.1.2 The SOMM shall be organized by building systems as defined in Exhibit SOW-3, Index of Volumes.

4.1.3 The Contractor shall organize each volume's contents using the O&M SOW for guidance. The Contractor shall revise all volumes, sections, chapters, etc. to provide a comprehensive and up-to-date manual incorporating as-built conditions, as-maintained and current manufacturer's data.

4.1.4 Each volume is designed to 'stand alone' – providing sufficient guidance and supporting material to allow a properly trained, journeyman technician to perform proper services.

4.1.5 Preparation of the SOMM shall be under the direction of an individual or organization that has demonstrated expertise in the preparation of comprehensive and complete O&M instructions for similarly complex systems. The final SOMM shall be submitted for CO review and approval.

4.1.6 The Government-approved SOMM shall be in place no later than 30 days prior to the BOD.

4.1.7 One (1) copy of the Comprehensive Facilities Management Plan shall be in editable Microsoft Word format & the SOMM furnished on electronic media in a searchable .pdf format and four (4) hard copies delivered to the Contracting Officer.

5. COMPREHENSIVE FACILITY MANAGEMENT PLAN (CFMP):

5.1 General. The Contractor shall prepare a CFMP that integrates all the management activities required for the O&M phase of the contract.

5.2. Submittal. The CFMP shall be submitted in conjunction with the SOMM, in accordance with submittal requirements of the Construction contract.

5.3 Minimum Requirements. The following are the minimum components of the comprehensive management plan:

5.3.1 Organization and Staffing Plan

5.3.2 Security Plan

5.3.3 Safety Program Plan

5.3.4 Training Plan

5.3.5 Warranty Plan

5.3.6 Contract Maintenance Plan

5.3.7 Continuous OFE Plan

5.3.8 Preventive Maintenance Plan

5.3.9 Quality Control (QC) Plan

5.4 Organization and Staffing Plan:

5.4.1 The Contractor shall prepare and maintain a written, current organizational plan. The plan shall indicate all categories of personnel employed by the Contractor and subcontractors as listed by system and the reporting relationships established therein.

5.4.2 This plan shall be posted in an accessible location in the Government furnished space provided to the Contractor.

5.4.3 The manpower and staff needed to satisfy the specified O&M requirements will vary during the contract execution period. The Contractor shall employ adequate manpower in order to satisfy all requirements of this work description. Craft persons, such as painters, carpenters, masons, and sheet metal workers, will be needed periodically for unscheduled maintenance.

5.5 Security Plan:

5.5.1 The Contractor shall develop and submit to the CO for review a comprehensive Security Plan based on the Department of Defense Industrial Security Program (reference DOD 5220.22-R).

5.5.2 Security and fire alarm for the Battle Simulation Center is monitored by a centralized security system monitored by Fort Lewis, Washington. The Government Security Manager and Safety Officer will screen and train personnel to familiarize them with the Security Control Operations.

5.5.3 The Contractor shall be responsible for safeguarding all Government property provided for Contractor use. At the close of each work period, Government facilities equipment and materials shall be secured.

5.5.4 NOT USED.

5.5.5 Key Control.

5.5.5.1 The CFM shall maintain key control of keys issued to the Contractor work force.

5.5.5.2 The Contractor shall establish and implement methods of ensuring that all keys issued to the Contractor by the Government are not lost or misplaced and are not used by unauthorized persons. No keys issued the Contractor by the Government shall be duplicated.

5.5.5.3 The Contractor shall immediately report the occurrences of a lost or duplicated key to the CO and the Government Security Manager and Safety Officer.

5.5.5.4 In the event keys, other than master keys, are lost or duplicated, the Contractor shall be required, upon direction of the CO, to re-key or replace the affected lock or locks. The Contractor, at its option, may replace the affected lock or locks or perform re-keying at no cost to the Government. In the event a master key is lost or duplicated, the Government shall replace all locks and keys for that system, and new keys issued to the Contractor. The total replacement cost shall be deducted from the monthly payment due to the Contractor.

5.5.5.5 The Contractor shall prohibit the use of keys issued by the Government by any persons other than the Contractor's employees engaged in the performance of assigned work. The Contractor shall prohibit the opening of locked areas by the Contractor's employees to permit entrance of persons other than the Contractor's employees engaged in the performance of assigned work in those areas.

5.5.5.6 The Contractor shall establish and implement methods of ensuring that all lock combinations are not revealed to unauthorized persons. These procedures shall be included in the Contractor's Security Plan.

5.5.5.7 The Contractor will not be allocated any keys to the facility exterior entrances. The Contractor must coordinate with the building personnel for access to the facility or any secured room or area. Once duties are complete, the Contractor shall ensure the space is secure and notify building owner they have completed the work within the secured area.

5.6 Safety Program Plan:

5.6.1 The Contractor shall develop and submit to the CO for review and approval a comprehensive safety program describing procedures and plans for preventing accidents and for preserving the life and health of Contractor and Government personnel in any way involved with the performance of this contract. The safety program, upon beneficial occupancy, shall comply with regulations as specified by the Occupational Safety and Health Administration (OSHA).

5.6.2 The safety program section of the management plan shall, as a minimum, address responsibilities and procedures that all Contractor personnel must follow. The safety program shall address, as a minimum:

5.6.2.1 Fire safety (hazard prevention, reporting, evacuation layouts, and extinguishers)

5.6.2.2 Maintenance shop safety (protective clothing, protective equipment, storage of oils and lubricants, disposal of waste and contaminated oil, and use of acetylene torches, electric welders, and power equipment)

5.6.2.3 All other devices and procedures necessary to protect the employee and occupants.

5.6.3 The Contractor shall ensure that all employees and occupants know, receive instruction on, and comply with all appropriate safety requirements.

5.6.4 The Contractor shall prepare a plan to ensure that all hazardous material/waste used or generated by any Contractor personnel is properly inventoried, stored, handled, packaged, and disposed of in an appropriate manner. The Contractor's planned procedures for hazardous material and waste disposal shall be submitted to the CO for review and approval 10 days prior to the assumption of the maintenance mission. The Contractor's responsibilities include:

5.6.4.1 Inspecting all shops, maintenance facilities, storage areas, and other facilities under Contractor control where hazardous substances, materials, and/or wastes are either generated or stored, thereby ensuring adequate handling, generation, and storage procedures and identifying any violations of the fire code ,National Fire Protection Association (NFPA), (NFPA 30, Flammable and Combustible Liquid) hazardous material/waste laws and/or regulations.

5.6.4.2 Recording all violations and corrective actions taken; transporting, storing, and handling hazardous substances in a safe and environmentally acceptable manner; and instituting a responsive alert and reporting procedure for use when a spill occurs.

5.6.4.3 Cooperating with Government agencies in order to ensure that the public health and welfare is adequately protected from discharge of oils and hazardous materials/waste.

5.6.4.4 The general guidance for disposal of waste is as follows:
Hazardous waste – Turned in to the installation designated points of reception.
Non-hazardous waste – Properly placed in the dumpster provided.

5.7 Training Plan. The Contractor shall develop a written Training Plan for approval of the CO 60 days prior to acceptance of the facility (BOD). Training Plan shall include lesson plans/lesson outlines, expected duration of each session, who will receive the training, and frequency of instruction if training is of a recurring nature or identified as refresher training. The following types of training shall be provided to all Contractor O&M personnel performing under this contract. The O&M maintenance supervisor or his alternate shall be present for all training sessions with the building operating staff for the equipment being installed by the Contractor.

5.7.1 Orientation. The Contractor shall provide sufficient training for all employees performing duties under this contract. The training shall be provided as soon as practical after employees begin work. As a minimum, however, the initial orientation training shall be completed prior to the date an employee begins work. Orientation training shall include the following topics:

- Appropriate interactions with staff.
- Familiarization with applicable local base regulations and policies (including fire prevention, ground safety, and natural disaster plan).
- Familiarization with technical manuals.
- The duties of each employee.
- The proper collection, handling, storage, transportation, and disposal of Contractor-generated waste.
- Employee personal hygiene and appearance (Proper dress and work attire).
- Adherence to work schedules.
- Documentation or completion of scheduled work assignments.
- Safety orientation briefing

5.8 Warranty Plan:

5.8.1 Warranty plan identifies any existing and/or replacement equipment warranties, specifying the vendor offering the warranty, the length of the warranty and any special O&M requirements that must be met in order to preserve the warranty.

5.8.2 A schedule shall be prepared for each system and summarized in a comprehensive schedule and located in the Comprehensive Management Plan Volume.

5.8.3 All maintenance work during the first year shall be done by or coordinated with the Contractor and the manufacturer holding the warranty. The personnel shall meet the minimum service requirements and/or certifications recommended for that system or piece of equipment.

5.8.4 Any warranties that have effective durations that extend beyond the combination of the construction period and the period of O&M shall be accrued to the Government.

5.9 Sub-Contract Maintenance Plan:

5.9.1 The sub-contract maintenance plan outlines procedures and methodologies for accomplishing the maintenance of various systems and items of equipment by maintenance contracts.

5.9.2 The sub-contract maintenance plan also includes technical specifications/statements of work for those systems and equipment to be maintained by the Contractor, and a detailed cost estimate for the work described in the technical specifications.

5.9.3 If required, just-in-time or on-call contracting methods may be utilized with respect to complex systems and equipment that require special skills or certifications to maintain i.e. (paved areas, fire alarm systems, etc.).

5.10 Anti-Terrorism Force Protection:

5.10.1 The Contractor shall become familiar with and follow all requirements of the Department of Defense Minimum Antiterrorism Standards for Buildings while at the facility.

5.10.2 At no time shall exterior equipment have panels or louvers removed and left without personnel working on the unit so that something could be hidden out of view inside the equipment.

5.10.3 At no time shall trash containers be moved closer to the building than 10Meters.

5.10.4 At no time shall locked exterior doors be held open, while personnel are not present.

5.10.5 Parking of Contractor vehicles shall only be in the designated parking area, Contractor shall not leave any vehicles unattended out of parking area.

5.11 Preventive Maintenance Plan:

5.11.1 The Preventive Maintenance Plan (PMP) identifies the various types/levels of preventive maintenance that will be accomplished by the maintenance staff. The plan must reflect response times/categories for the various items of equipment and identify a generic procedure for the management of service orders.

5.11.2 The PMP shall identify the PM tasks and frequencies for each item listed in the Master Equipment List (MEL). This plan also identifies the skills (trades) required and man-hour estimates for performing the PM tasks.

5.11.3 Facility Systems/Equipment Assessments requirements shall be incorporated within the PMP. These shall include at a minimum:

5.11.4 Life Safety Assessments and Tabulation - This assessment identifies life safety/fire protection code issues and stipulates corrective actions needed to meet NFPA where applicable.

5.11.5 Continuous assessments will be used to compare actual building systems performance against design parameters.

5.11.6 O&M Equipment Operational Assessment - This assessment identifies systems and equipment issues, identifies corrective actions (replacement, upgrade, or renovation), and provides cost estimates.

5.11.7 The Contractor shall prepare, submit and comply with a written yearly master PM schedule. The Contractor shall research equipment manufacturer's and industry recommendations for preventive maintenance requirements and ensure these requirements are included in the Master PM Schedule.

5.12 Quality Control Plan:

5.12.1 The Contractor shall establish and maintain a complete QC Plan to ensure the requirements of the contract are provided as specified. The QC Plan shall outline the process that the Contractor will use to manage the level of performance.

5.12.2 The QC Plan shall include an inspection system covering all the services listed on the O&M SOW. It must specify the areas to be inspected, and the individual(s) who will perform the inspection.

5.12.3 System performance benchmarking shall define methods for identifying and preventing deficiencies in the quality of service before the level of performance becomes unacceptable.

5.12.4 The Contractor shall review systems performance annually by analyzing on-site records of all inspections conducted by the Contractor and necessary corrective action taken. This documentation shall be made available to the CO during the term of the contract and used to benchmark the productivity of the maintenance effort.

6 O&M SUCCESSOR:

6.1 Transition: The last three months of the contract execution period shall be used for an orderly transition of responsibility to the successor that will execute the follow-on O&M program.

6.1.1 An initial meeting between the CO and the CFM for both outgoing and incoming Contractors, shall be held to address phase-out requirements and responsibilities no later than three to six months prior to the end of the current O&M phase. Subsequent meetings will be held as determined by the CO, but not less than weekly thereafter.

6.1.2 When the incumbent Contractor is also the successor Contractor, these required meetings shall not be waived; since orderly transition from one work specification to another will also require significant management involvement in the transition process.

6.1.3 The successor Contractor shall perform all start-up procedures.

6.1.4 The successor for the follow-on O&M program may be Government personnel.

6.2 Successor Observation: During the final three months of this contract, if the incumbent Contractor is not awarded the subsequent contract, the Contractor shall permit his successor and the successor's key personnel to observe and become familiar with any and all operations under this contract.

6.3 Successor Training:

6.3.1 The Contractor shall schedule and provide training for the new personnel that will be assuming the operation and maintenance of the facility. All training will be videotaped by the Contractor giving the training.

6.3.2 The Contractor shall provide on-the-job training (OJT) to each of the O&M successor personnel to ensure sufficient familiarity to take over the O&M responsibilities.

6.3.3 The training objective is to enhance technical skills so that transfer of O&M responsibility for Battle Simulation Center's unique systems/equipment will be efficient.

6.3.4 Verification of training shall be provided to the CO within 3 days after the completion of training. Verification shall include information such as name of craftsperson trained, system trained on, type of training, number of hours trained, etc.

6.3.5 Training shall cover features unique to complex electrical and mechanical systems installed at Battle Simulation Center and FMS features such as hardware and software.

7 GOVERNMENT PROVIDED FACILITIES AND SERVICES. The Government shall provide without cost to the Contractor, during the performance of the O&M portion of the contract, the facilities and services listed below:

7.1 Government-Furnished Facilities. Maintenance support space furnished to the Contractor by the Government shall be in the following designated areas:

7.1.1 The Government shall furnish the Contractor with a designated area for office, equipment and storage.

7.1.2 The Government shall provide office furnishings (desk, chair, file storage, etc). All other Contractor supplied furnishings and shop equipment (except specialized equipment necessary for the operation of the facility) will remain the property of the Contractor at the expiration or termination of this contract. All storage bins and cabinets with the minimum emergency stock of replacement equipment, supplies and spare parts inventory, to last one year, shall become the property of the Government at the conclusion of this contract.

7.2 Government-Furnished Services:

7.2.1 The Government will provide to the Contractor all water, sewage, custodial, electrical and data services required for the performance of this contract.

7.2.2 Commercial telephone service acquired by the Contractor for Contractor use shall be paid for by the Contractor.

7.2.3 Failure of the Government to furnish utilities at any time during the performance of the contract because of outages or other interruptions in service shall not be considered by the Contractor as a basis for a claim against the Government.

8. GOVERNMENT QUALITY ASSURANCE (QA):

8.1 Government Surveillance: The Government will evaluate the Contractor's performance under this contract in accordance with the Federal Acquisition Regulation (FAR) Inspection of Services clause.

8.1.2 The Government will record all surveillance observations and inspection results. When an observation or inspection indicates deficient performance, the COR will prepare a Deficiency Report (DR).

8.1.3 The Contractor will accompany the Government and User on walk-through inspections of Battle Simulation Center and document in the data base the results of the walk-through. Upon request, an electronic copy shall be provided to the contracting officer within 10 work days after completion of the walk-through.

8.2~~4~~ Deficiency Reports:

8.2~~4~~.1 If the Contractor's performance is found to be unsatisfactory and not in compliance with the requirements specified in this contract, the Government will issue a DR within 3 work days.

8.2~~4~~.2 Upon presentation of a DR by the Government, the Contractor shall immediately sign the DR, acknowledging its receipt. Within 3 working days of receipt of a DR, the Contractor shall explain in writing to the Government:

- How performance does conform to the requirements of the contract;
- How performance will be returned to conformity;
- How reoccurrence of the problem will be prevented in the future.

8.3~~5~~ Meetings:

8.3~~5~~.1 The CFM shall attend monthly reviews with the CO and User.

8.3~~5~~.2 Additionally, the Contractor shall be required to attend the monthly review meetings until the CO deems that satisfactory performance of the O&M phase of the contract and full and acceptable performance are achieved.

8.3~~5~~.3 The CO may require additional meetings whenever a DR is issued.

9 CONTRACTOR CLEAN-UP:

9.1 The Contractor shall, at all times, keep the work areas free from accumulation of waste material, rubbish, tools, scaffolding, equipment, and materials. Upon completion of the task, or nightly, the Contractor shall leave the work area and premises in a clean, neat, safe and workmanlike condition. The Contractor is responsible for disposing of both hazardous and non-hazardous job-related waste material in accordance with the local installation procedures.

Exhibit SOW-1—~~Abbreviations and~~ Definitions and Abbreviations

ABBREVIATIONS

BOD.....Beneficial Occupancy Date

CFM.....Contract Facility Manager
CFMP .....Comprehensive Facilities Management Plan
CO.....Contracting Officer
COR .....Contracting Officer's Representatives

DoD .....Department of Defense
DR .....Deficiency Report

FAR .....Federal Acquisition Regulation
FMS .....Facilities Management System

HVAC .....Heating, Ventilation, and Air Conditioning

MEL .....Master Equipment List
MP&SOMM ....Management Plan & Systems Operation Maintenance Manual

NFPA.....National Fire Protection Association

O&M .....Operation and Maintenance
OFE.....Continuous Operational/Functional Evaluation
OJT.....On-the-Job Training

PCS.....Permanent Change of Station
PM .....Preventive Maintenance
PMP .....Preventive Maintenance Plan

QA .....Quality Assurance
QAR.....Quality Assurance Representative
QASP .....Quality Assurance Surveillance Plan
QC.....Quality Control

SO .....Service Order
SOMM .....System Operation and Maintenance Manual
SOW .....Statement of Work

Definitions

Beneficial Occupancy Date (BOD)

Date of final acceptance of facility by the Government.

Breakdown

The stoppage or collapse of equipment or a facility, or a component thereof, that requires corrective action to restore to an operation condition.

Building Exterior

The exterior surface of a building, including all walks, roofs, attached patios, overhangs, and entranceways.

Deficiency Report (DR)

Formal, written documentation of Contractor non-performance or lack of performance for contract work.

Contracting Officer (CO)

A person duly appointed with the authority to enter into and administer contracts on behalf of the Government.

Contracting Officer Representative (COR)

An individual designated in accordance with subsection 201.602-2 of the Defense Federal Acquisition Regulation Supplement and authorized in writing by the Contracting Officer to perform specific technical or administrative functions.

Defective Service

Poor performance or nonperformance as specified by Contractor requirements.

End Item

The individual component part listed in the manufacturer's parts listing. End items, component parts and/or individual items are used interchangeably.

Government Property

All property owned or leased to the Government or acquired by the Government under terms of the contract. Government property includes
Both Government furnished property and Contractor acquired property as defined in FAR 45.101.

Government Property Administrator

An authorized representative of the Contracting Officer appointed in writing to administer contract requirements and obligations relative to Government property (FAR 45.101.)

Maintenance Backlog

Equipment repair that has not been completed in the specified time

Maintenance

The routine recurring work required to keep the facility and its systems in such a condition that it can be used continuously at its designated capacity and efficiency.

Materials

Materials, parts, and supplies necessary for the maintenance and repair of facilities and equipment.

National Fire Protection Association (NFPA)

An organization that published pamphlets on fire protection and safety, which are accepted by local, State and Federal Governments and considered directive in nature for this statement of work.

O&M Equipment and Facilities

Equipment and construction normally used to maintain general building environment and services (heating, ventilating, and air-conditioning (HVAC); electrical distribution systems; lighting; plumbing; building hardware and furnishings; etc.), except those items intended to perform a specific function not related to maintaining the building environment.

Preventive Maintenance (PM)

The systematic planned care, servicing, and inspection of equipment, utility plants and systems, buildings and structures, and ground facilities for the purpose of detecting and correcting incipient failures, preventing failures, and making minor repairs. Manufacturer's product literature/data sheets are to be used as principal guidance for determining minimal/recommended periodic maintenance missions.

Quality Assurance (QA)

Those actions taken by the Government to assure services meet the requirements of the Statement of Work (SOW) and all other service outputs.

Quality Assurance Review

Periodic examinations to ensure compliance with the Contractor's procedures, plans, schedules, and contract requirements (includes the recording of narrative audit results).

Quality Assurance Representative (QAR)

A Government person responsible for surveillance of Contractor performance

Quality Assurance Surveillance Plan (QASP)

An organized written document used for quality assurance surveillance. The document contains specific methods to perform surveillance of the Contractor.

Quality Control

Those actions taken by a Contractor to control the performance of services so that they meet the requirements of the SOW

Random Sampling

A sampling method in which each service output in a lot has an equal chance of being selected.

Repair

The restoration of a real property asset to its originally constructed or installed condition, or if that restoration is not practical, to a condition that satisfactorily meets the intended purpose. Repair means the application of maintenance services in order to restore serviceability of an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

Sample

A sample consists of one or more service outputs drawn from a lot. The number of outputs in the sample is the sample size.

Sampling Guide

The part of the surveillance plan, which contains all the information, needed to perform surveillance of the service output(s) by the random sampling method of surveillance.

Scheduled Maintenance

Systematic and periodic servicing and inspection of equipment and components to maintain operational efficiency and replace worn or failed parts.

Service Order (SO)

Used to authorize and manage scheduled and unscheduled repair jobs.

Shall

This word is used in conjunction with the contract and specifies that a provision is binding.

Unscheduled Maintenance

Corrective Maintenance that involves repair or replacement for any building system or equipment not included in the Continuous Commissioning Program.

Will

This word is used to express a declaration of purpose on the part of the Government.

Exhibit SOW–2
Organization of SOMM

General Information

1. The following paragraphs provide guidance for the overall intent and structure for completion of a Systems Operation Maintenance Manual.

2. It is the intent that the Contractor will continuously build a SOMM. As a pilot operational program, it is understood that standard industry formats can be substituted, provided the party's intent is to compile all such data in a useable manner.

3. It is the intent that the SOMM should complement the FMS and be jointly used in this operation. Redundancy of requirements shall revert to the FMS system.

4. Where possible a standardized industry format may be substituted.

5. A standardized form format should be followed which makes it easy to review.

6. It is not the intent to duplicate operations and/or data retention. Where possible, all data should be consolidated for ease of use, updates and retrieval.

SOMM sections include:

A. Specific System Description

1. This section identifies examples of building systems and/or major subsystems that comprise the critical functional areas of the building infrastructure.

2. For systems consisting of more than one unit or item of equipment, or where complexity must be explained, an illustration or flow diagram may be included. If one system interfaces with another system or subsystem, this section shall define how they interface.

3. Safety and security topics shall be covered and referenced to the operating procedures, if applicable.

4. A table of capabilities and limitations shall be prepared for the systems, if applicable. The table will include data such as gallons per minute, transfers per hour, , rated ranges, resolution, accuracy, data-handling capability, etc. Additional tables shall be provided as needed to clearly illustrate the capabilities required of a given system or item of equipment that differ because of its configuration within the system. The word "differ", as used above, refers to capabilities other than normal or standard. The fact that the input, output, feedback, or control levels required are within the design specifications of the system or item of equipment is not a sufficient reason for omitting the system or item of equipment from the table.

5. Major equipment components shall be identified and located by describing each component that is significant to O&M, logistics, and safety.

B. Theory of Operation

1. This section addresses how the specific systems and/or major subsystems function to meet the design specifications.

2. The final manual shall contain a brief discussion of the theory of operation and a listing of all the functions of the system and shall show how the various facility subsystem functions are tied together to accomplish the overall system function. The description shall include an overall analysis of the principles of operation of the system equipment and its functions, such as control interlocks, where such principles would not be obvious to a journeyman technician. Particular attention shall be paid to the interface between facility systems and other systems. The descriptions shall be sufficiently detailed to provide O&M personnel with the understanding necessary to adequately perform the system activities and to correctly interpret the results of these activities.

3. An introduction to each specific system has been made by the design team with pertinent data given for the Contractor's use.

C. Operations

1. The final manual shall include equipment and/or system layouts as required for clarity. Information to be provided or identified for reference, includes all piping, wiring, breakers, valves, dampers, controls, etc., complete with functional diagrams, schematics, isometrics, and data to explain the detailed operation and control of each individual piece of equipment and/or system components.

2. Layouts should show the location within the facility of controls, valves, switches, dampers, etc., by reference to site location, wing designation, floor, room number, or other clear and concise directions for locating the item.

3. Operator data may be identical to posted data and framed instructions, and may be included as part of the O&M manuals. The instructions will include:

   a. Initial adjustments and control settings.

   b. Precautions and pre-checks to be executed prior to startup of equipment and/or system, including safety devices, monitoring devices, and control sequence.

   c. Step-by-step sequential procedures for startup and normal operation checks for optimal performance. Safety precautions and instructions that should be incorporated into the operating instructions and flagged for the attention of the operator. Procedures shall include test, normal, and automatic modes.

   d. Procedures for normal and emergency shutdown of equipment and/or systems. The instructions shall include any procedures necessary for placing the equipment and/or system on standby or preparing the equipment and/or system for startup at a later time. Procedures shall include test, normal, and automatic modes.

e. Procedures for isolating individual equipment from the system and bringing individual equipment online once the system is operating.

f. Operational logs and records requirements.

D. Preventative Maintenance

1. Recommended procedures shall indicate preventative maintenance (i.e. lubrications, checks, adjustments, etc.) and good housekeeping practices which should be performed by operating personnel.

2. More complex maintenance procedures that would normally be performed only by trained maintenance personnel; will also be provided.

3. Schedules indicating timeframes or operating hours for initiating operator maintenance and adjustments and including manufacturer's recommended major maintenance requirements will be provided.

4. Safety precautions and instructions that should be followed during these procedures shall be incorporated into the maintenance procedures and flagged for the attention of personnel.

5. The procedures shall include necessary operating instructions for taking equipment offline, online, and putting equipment on standby.

6. The instructions shall address all material, equipment, and system data needed to perform maintenance work and shall include, but not be limited to the following: (as applicable)

a. Manufacturers' bulletins, catalogs, and descriptive data.
b. Certified performance curves.
c. Copies of approved test plans, including logs and records of performance acceptance test results and actual adjustments made during final acceptance and inspections.
d. System layouts, including block, wiring, control, and isometric diagrams.
e. Schematic items within the facility.
f. Interrelationships with other items of the system

7. Emergency adjustments shall be included and flagged for the operator's attention

8. The instructions shall also include procedures for emergency repairs that could be performed by operating personnel.

E. Trouble Analysis (TA)

1. Trouble Analysis procedures for locating and correcting trouble shall be presented in a step-by-step format.

2. Repair procedures may be keyed to a troubleshooting guide outlined as shown in three columns with the following headings:

Trouble/Symptom	Probable Cause(s)	Corrective Action
The indication or symptom of trouble	The instructions, including test hookups, necessary to determine the cause(s)	Procedures for restoring the system to operating condition, or cross reference to where the procedure is written in SOMM

3. Information may also be in logic tree form, or in another clear tabular format with appropriate headings.

4. Trouble analysis shall be documented to the extent necessary to locate the faulty piece of equipment within the system.

5. The procedures shall clearly indicate a major repair activity, which should be performed only in a shop or factory, as opposed to normal repair work, which may be performed onsite or with equipment online.

6. The procedures shall also clearly indicate the limit of repair work that may be performed by Government personnel during the warranty period without voiding the warranty provisions.

7. Safety precautions and instructions that should be followed during these procedures shall be incorporated into the repair documentation and flagged for the attention of personnel.

8. The Trouble Analysis section shall be cross-referenced to the appropriate Exhibits and other documents in the MP&SOMM.

F. Unscheduled Maintenance

1. Cross Referenced to Trouble Analysis and to applicable Exhibits, this section provides documentation on the procedures for isolation, replacement, checkout, and integration of the equipment within the system shall be provided.

2. Test, adjustment, and checkout data, required after replacement will be included.

G. Repair Parts and Special Tools and Equipment

1. Repair Parts

   a. The Contractor is to identify and provide all required repair parts. Just in time delivery shall be used where possible. Repair parts shall be stored on site, in designated areas, as defined in the O&M SOW.

   b. A complete list of repair parts and supplies shall be maintained. The list shall include all parts and components of individual pieces of equipment and all parts and components of each system and shall identify such items as nomenclature of part, model number, circuit or component identification, etc. as applicable.

c. Parts and supplies lists shall be included within each volume of maintenance instructions.

d. A master list of repair parts and supplies recommended and or required by contract, from each manufacturer for one year of operation, including source of supply, shall be listed with each instruction.

e. The Contractor shall list the sources of supply for all parts and supplies, including name of supplier/manufacturer, address, and telephone number.

f. If the parts and suppliers are not normally stocked locally, necessary procurement lead-time shall also be a part of the listing.

H. Vendor Data and Acceptance Tests

1. Vendor Data

a. A complete set of data, provided by the equipment manufacturer, required for operation, maintenance and checkout will be included and referenced to the appropriate specification's number.

b. Data may consist of manufacturer's brochures, O&M manuals, catalogs, drawings, service bulletins, and illustrated parts lists necessary to support the O&M of the end item of equipment and assemblies. This reprinted data shall be edited as necessary to make material project specific.

2. Acceptance Tests

a. A record of all System's Acceptance Tests shall be included in this section.

b. Any pertinent information relating to problems during testing shall be noted.

I. Special Tools and Equipment List

1. The Contractor is to identify and provide all special tools and test equipment.

2. A list of all special tools and test, diagnostic measurement, and equipment for system level maintenance in this appendix.

3. For the purpose of this specification, the phrase "special tools and test, measurement, and diagnostic equipment" is used to identify all nonstandard tools and equipment designed and developed by the manufacturer and others to perform maintenance, test/calibration, diagnostic/prognostic analysis, and other acceptance testing, and successful O&M.

4. Frequency and method of calibration shall be indicated for all special tools, equipment, and test equipment items that require calibration. Necessary standards shall be listed immediately after each item that requires calibration.

J. Warranty Information

1. The Contractor shall incorporate warranty information for each system as identified.

2. In addition to the general warranty required by the contract, the Systems Operation and Maintenance Manual shall include any specific warranties required by other sections of the Technical Specifications and other warranties normally provided with the particular piece of equipment or system.

3. Warranties that are normally provided by manufacturers and which are beyond the warranty for construction shall be specifically noted.

4. A summary of all warranties shall be available either in the FMS or the SOMM, and include, but not be limited to the following information:

   a. Specification Section

   b. System identification

   c. Subsystem or equipment identification

   d. Term of warranty

   e. Anticipated warranty inspection date with room for actual date.

   f. Problems during the warranty period. Latent defects if they present themselves.

   g. Copy of warranty or warranty data in the absence of an explicit warranty.

5. A master list of all warranties shall be included as defined under the O&M SOW.

K. Master Equipment List

1. The MEL identifies each major system, subsystem, and equipment item in generation breakdown order to the purchase end item level. The completed MEL shall contain as a minimum the following information:

   a. Item nomenclature

   b. Functional characteristics

   c. Item identifier (tag number)

   d. Specification number

   e. Design/construction drawing number. (File number when available)

   f. Manufacturer's name

g. Manufacturer's part number

h. Manufacturer's model/serial number

i. Location Plan

j. Current Warranty Status

2. The Contractor shall develop a projected and as-built Master Equipment List. Refer to Submittal Requirements of the Management Plan & Systems Operation and Maintenance Manual.

3. The Contractor shall develop and maintain a master O&M manual list identifying all of the equipment for which O&M manuals will be furnished under this contract.

4. Following setup of the O&M manual list, this master listing shall be updated monthly to reflect equipment additions, deletions, changes and alterations.

5. The submittals shall be arranged in alphabetical order according to the type of equipment covered and by manufacturer's equipment noun name; and shall be cross-referenced to the systems involved. Each data submittal shall be dated and shall show the target or actual submittal date for O&M manuals for each item of equipment. For identical pieces of equipment within one system, only one set of O&M data for that equipment item will be required.

6. The Contracting Officer and Contractor will work together to determine whether the above specified information as furnished by the Contractor is adequate and complete and to require such additional submittals by the Contractor as may be necessary to insure that adequate information has been furnished to provide the satisfactory operation and maintenance of the various items of equipment and fulfill the intent of the specifications.

7. Additional submittals or re-submittals supplementing incorrect or incomplete data shall be made within 30 calendar days after receiving notice by the Contracting Officer. All cost arising from these resubmissions shall be borne by the Contractor.

8. All system MELs will be incorporated by system and combined into a comprehensive list to be included in Volume 1, Comprehensive Management Plan of Appendix A - MP&SOMM.

9. Posted Data

a. The Contractor shall post data for equipment or systems, in addition to O&M manuals and as required by other Technical Specifications sections.

b. The data shall consist of as-built schematics of all wiring, controls, piping, etc., as necessary for the operation of the equipment or system, and a condensed typewritten description of the system. The data may include approved shop drawings, layout drawings, riser, and block diagrams and

shall indicate all necessary interrelation with other equipment and systems.

c. The data shall be presented in appropriate sized drawing sheets sealed with clear plastic laminate, collated and bound for clarity and convenience of locations. The framed data presentation and outline shall be acceptable to and provided at locations designated by the Contracting Officer.

10. Instructions may be presented in one or several binders for clarity and convenience of location. The instruction presentation and outline shall be acceptable to the Contracting Officer prior to posting, and shall be provided at locations designated by the Contracting Officer.

L. Training Requirements

1. The Contractor is required to present a training plan for approval. Four (4) copies of the training plans for all required formal training shall be submitted to the Contracting Officer in draft form in one submittal. The Contractor shall provide training, printed instruction material, and training aids, in accordance with the approved plan.

2. The training plan will identify the number of man-hours of instruction required for each system following the guidelines listed in the MP&SOMM templates. The training plan will also specify the proportions of the instruction time to be used for onsite classroom instruction and for onsite instruction which will be performed utilizing the installed equipment or systems.

3. All systems and subsystems requiring training of qualified personnel to properly operate and maintain those systems shall be identified. A task and skills analysis shall be documented to identify special skills required to operate and/or maintain critical, complex or specialized systems. After the skill requirements are approved, the actual training program shall be defined.

4. The Contracting Officer will review the Contractor's proposed training plan, and the Contracting Officer's approval of the plan shall be obtained by the Contractor prior to the start of any training. The Contracting Officer will require 30 days for review and approval of the plan or for disapproval and return to the Contractor for resubmission. The Contractor needs to provide sufficient float time for any necessary resubmissions to preclude possible delays to the scheduled training.

5. The Contractor will provide a draft and final training plan and schedule. The plan shall provide the following information at a minimum:

a. Trades to be trained and skills required.

b. Instructional methods

c. Materials

d. Special training devices needed to support the program of instruction.

e. Attendees - planned and actual

f. A weekly outline of all scheduled training

g. A day-to-day schedule showing time intervals, the major and subordinate subjects to be covered in each session, with location of training.

h. Identification and qualifications of proposed instructors.

i. A list of reference material to be provided by the Contractor to the trainees and a list of training materials such as operation and maintenance instructions, other written and visual aids, mockups, tools, etc.

6. The MP&SOMM will be used as the primary training document for the training instructions.

7. Informal maintenance information shall be provided. General on-the-job training shall be provided by Contractor/subcontractor/Supplier personnel knowledgeable of the materials, finishes, equipment or systems, if determined necessary the Contracting Officer, for general knowledge, equipment orientation, installation observation, etc.

M. Exhibits

1. Illustrations shall be incorporated to identify schematic drawings, riser diagrams, wiring requirements, etc., as required to provide a stand-alone comprehensive O&M manual.

2. The as-built drawings are to be kept on site for reference. All changes or additional information that arise during construction and during the five year O&M period shall be recorded and kept as a part of the manual. All detailed information shall be presented in a clear, concise and comprehensive manner to fully explain the as-built conditions. The Contractor shall provide changes to the as-built drawings to the CO of any work performed by contractor personnel which cause changes including, but not limited to, plant layout, piping or equipment design or detection of an error within 90 days of change.

3. An index of all illustrations and data shall be developed and presented in draft and for final approval in the submittal process.

Exhibit SOW-3
Index of Volumes

Volume	Description
1	Comprehensive Management Plan
2	Site Systems
3	Architectural Systems
4	Security Systems
5	Fire Protection Systems
6	Plumbing Systems
7	Mechanical Systems
8	Electrical Systems
9	Specialty Systems

The Design, Construct, Commission Pilot Program consists of a two phased program during which the Contractor of Record provides continuous service. This pilot program streamlines the transition from construction into the operating phase of the building. Continuity will be provided by including the design team, construction Contractor and the owner/user in the critical initial phases of occupancy, through the warranty periods of systems and equipment and into the first five years of occupancy. (Will this actually happen? Will the design team be funded to be involved?) Further enhancement is achieved by insuring continuity of knowledge and professionalism remains consistent during the first five years of operation at the facility. Preventive and Corrective/Unscheduled Maintenance will be provided under this program. Minor repairs will be accomplished as part an organized approach. The building systems will be monitored and benchmarked throughout the life cycles of the system. Emergency responses will be provided using a priority matrix.

Phase 1 of the pilot project spans the routine construction services through the Beneficial Occupancy Date of the Battle Simulation Center. Phase 2 spans the first five years of use, concerning the operation and maintenance of the Battle Simulation Center. The intention of the pilot program is to design, construct, and maintain the facility such that all building systems and equipment perform within the performance guidelines throughout the life cycle of the facility.

This comprehensive approach will create seamless O&M support service from design, construction, move-in and through the first five years of occupancy. The following documents guide the execution of the operation and maintenance mission:

- Construction Documents – Drawings and Specifications
- Operation and Maintenance Statement of Work
- Index of Volumes
- Equipment Manufacturers' Instructions

The Construction Documents, comprised of Drawings and Specifications, serve as means for constructing the facility and bringing the systems and equipment into an integrated whole allowing the facility to function as designed. These documents serve as the basis for establishing performance criteria for each building system.

The Operation and Maintenance Statement of Work defines the requirements of the Contractor during the operation and maintenance phase of the contract.

The Index of Volumes is intended to serve as an outline for the systems to be maintained by the Contractor.

Equipment Manufacturers' Instructions are specification and support documents provided by the manufacturers of the equipment and systems installed in the Battle Simulation Center.

Using the outline provided in Exhibit SOW-3 as a guide, the Contractor shall derive three major deliverables to support the O&M phase of the contract:

- A comprehensive management plan that aggregates and integrates all supporting actions required to deliver an effective preventive maintenance program.

- A comprehensive series of operation and maintenance manuals, updated annually, for each of the building systems that serve as guidance documents for the various journeyman-level tradespersons; and

- The execution of an effective maintenance program that meets the objective of the O&M program.

END OF SECTION

SECTION 04200

MASONRY

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 530.1	(1999) Specifications for Masonry Structures and Related Commentaries

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	(2001) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 153/A 153M	(2001a) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 167	1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B 370	(1998) Copper Sheet and Strip for Building Construction
ASTM C 62	(2001) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 67	(2002) Sampling and Testing Brick and Structural Clay Tile
ASTM C 90	(2002) Loadbearing Concrete Masonry Units
ASTM C 91	(2001) Masonry Cement
ASTM C 144	(1999) Aggregate for Masonry Mortar
ASTM C 150	(2002) Portland Cement
ASTM C 207	(1991; R 1997) Hydrated Lime for Masonry Purposes
ASTM C 270	(2001a) Mortar for Unit Masonry
ASTM C 404	(1997) Aggregates in Masonry Grout
ASTM C 476	(2001) Grout for Masonry
ASTM C 494/C 494M	(1999ae1) Chemical Admixtures for Concrete

ASTM C 652	(2001a) Hollow Brick (Hollow Masonry Units Made From Clay or Shale)
ASTM C 744	(1999) Prefaced Concrete and Calcium Silicate Masonry Units
ASTM C 780	(2000) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 1072	(2000a) Measurement of Masonry Flexural Bond Strength
ASTM D 2000	(2001) Rubber Products in Automotive Applications
ASTM D 2240	(2002) Rubber Property - Durometer Hardness
ASTM D 2287	(1996; R 2001) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM E 447	(1997) Compressive Strength of Masonry Prisms
ASTM E 514	(1990; R 1996e1) Water Penetration and Leakage Through Masonry

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Admixtures for Masonry Mortar; G
Concrete Masonry Units (CMU); G
Clay or Shale Brick; G
Water-Repellant Admixture; G
Flashing; G

Manufacturer's descriptive data.

Cold Weather Installation; G

Cold weather construction procedures.

SD-04 Samples

Concrete Masonry Units (CMU); G
Clay or Shale Brick; G

Color samples of three stretcher units and one unit for each type of special shape. Units shall show the full range of color and texture.

Anchors, Ties, and Bar Positioners; G

One of each type used.

Expansion-Joint Materials; G

One piece of each type used.

Reinforcement; G

One piece of each type used, including corner and wall intersecting pieces.

SD-06 Test Reports

Special Inspection; G

Copies of masonry inspection reports.

SD-07 Certificates

Clay or Shale Brick; G
Concrete Masonry Units (CMU); G
Control Joint Keys; G
Anchors, Ties, and Bar Positioners; G
Expansion-Joint Materials; G
Mortar Coloring; G
Admixtures for Masonry Mortar; G

Certificates of compliance stating that the materials meet the specified requirements.

1.3 SAMPLE MASONRY PANELS

After material samples are approved and prior to starting masonry work, sample masonry panels shall be constructed for each type and color of masonry required. At least 48 hours prior to constructing the sample panel or panels, the Contractor shall submit written notification to the Contracting Officer's Representative. Sample panels shall not be built in, or as part of the structure, but shall be located where directed unless otherwise approved by the Contracting Officer.

1.3.1 Configuration

Panels shall be L-shaped or otherwise configured to represent all of the wall elements. Panels shall be of the size necessary to demonstrate the acceptable level of workmanship for each type of masonry represented on the project. The minimum size of a straight panel or a leg of an L-shaped panel shall be 6 feet (1.83 m) long by 4 feet (1.22 m) high.

1.3.2 Composition

Panels shall show full color range, texture, and bond pattern of the masonry work. The Contractor's method for mortar joint tooling; grouting of reinforced vertical cores, collar joints, bond beams, and lintels; positioning, securing, and lapping of reinforcing steel; positioning and lapping of joint reinforcement (including prefabricated corners); and cleaning of masonry work shall be demonstrated during the construction of the panels. Installation or application procedures for anchors, wall ties, brick expansion joints, insulation, flashing, brick soldier, row lock courses and weep holes shall be shown in the sample panels. The panels shall contain a masonry bonded corner that includes a bond beam corner. Panels shall show parging. Panels that represent reinforced masonry shall contain a 2 by 2 foot (600 by 600 mm) opening placed at least 2 feet (600 mm) above the panel base and 2 feet (600 mm) away from all free edges, corners, and control joints. Required reinforcing shall be provided around this opening as well as at wall corners and control joints.

1.3.3 Construction Method

Where anchored veneer walls are required, the Contractor shall demonstrate and receive approval for the method of construction, with the insulation and appropriate ties placed within the specified tolerances across the cavity. Temporary provisions shall be demonstrated to preclude mortar or grout droppings in the cavity and to provide a clear open air space of the dimensions shown on the drawings. If sealer is specified to be applied to the masonry units, sealer shall be applied to the sample panels. Panels shall be built on a properly designed concrete foundation.

1.3.4 Usage

The completed panels shall be used as the standard of workmanship for the type of masonry represented. Masonry work shall not commence until the sample panel for that type of masonry construction has been completed and approved. Panels shall be protected from the weather and construction operations until the masonry work has been completed and approved. After completion of the work, the sample panels, including all foundation concrete, shall become the property of the Contractor and shall be removed from the construction site.

1.4 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.4.1 Concrete Masonry Units (CMU)

Concrete masonry units (CMU) shall be covered or protected from inclement weather. Store Type II, concrete masonry units at the site for a minimum of 28 days for air cured units, 10 days for atmospheric steam or water cured units, and 3 days for units cured with steam at a pressure of 120 to 150 psi (800 to 1000 kPa) and at a temperature of 350 to 365 degrees F (180 to 185 degrees C) for at least 5 hours. Protect moisture controlled units (Type I) from rain and ground water. Prefabricated lintels shall be marked on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.4.2 Reinforcement, Anchors, and Ties

Steel reinforcing bars, coated anchors, ties, and joint reinforcement shall be stored above the ground. Steel reinforcing bars and uncoated ties shall be free of loose mill scale and rust.

1.4.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Sand and aggregates shall be stored in a manner to prevent contamination or segregation.

1.5 QUALITY ASSURANCE

1.5.1 Appearance

Bricks shall be manufactured at one time and from the same batch. Blend all brick to produce a uniform appearance when installed. An observable "banding" or "layering" of colors or textures caused by improperly mixed brick is unacceptable.

1.5.2 Testing

Masonry strength shall be determined in accordance with ACI 530.1; submit test reports on three prisms in accordance with ASTM E 447, Method B modified as specified in ACI 530.1. The cost of testing shall be paid by the Contractor.

1.5.3 Spare Vibrator

Maintain at least one spare vibrator on site at all times.

1.5.4 Bracing and Scaffolding

Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by local code.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval. The Contractor has the option to use substitute hard metric CMU products. If the Contractor decides to substitute hard metric CMU products, the following additional requirements shall be met:

a. The dimensions indicated on the drawings shall not be altered to accommodate hard metric CMU products either horizontally or vertically. The standard building module shall be maintained, except for the CMU products themselves.

b. Mortar joint widths shall be maintained as specified.

c. Rebars shall not be cut, bent or eliminated to fit into the hard metric CMU products module.

d. Brick and hard metric CMU products shall not be reduced in size by more than one-third (1/3) in height and one-half (1/2) in length. Cut CMU products shall not be located at ends of walls, corners, and other openings.

e. Cut, exposed brick and CMU products shall be held to a minimum and located where they would have the least impact on the architectural aesthetic goals of the facility.

2.2 CONCRETE MASONRY UNITS (CMU)

2.2.1 General Requirements

a. Hollow and solid concrete masonry units shall be as follows:

a. Furnished from a single manufacturer.

b. Conform to ASTM C 90 Normal weight.

c. Nominal size of units shall be 16 inches long (406 mm) by 8 inches high (203 mm) by thickness shown on Drawings.

d. Compressive Strength: 1,900 psi (13.1 MPa) minimum in accordance with ASTM C 90, Table 3.

e. Color of Units: As shown on the Drawings, and as indicated in Section 09915 COLOR SCHEDULE.

f. Surface Texture of Units: As shown on the Drawings, and as indicated in Section 09915 COLOR SCHEDULE.

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2.2.2 Mortar and Grout Materials

a. Cement: ASTM C 150, Type 1 or Type II, portland cement.

b. Lime: ASTM C 207, Type S hydrated.

c. Aggregates: Mortar, ASTM C 144.

d. Aggregates: Grout, ASTM C 404.

e. Water: Fresh, clean, and potable.

2.2.3 Reinforcement

a. Horizontal Joint Reinforcement:

1. Two parallel No. 9 wires, uncoated, welded to No. 9 perpendicular cross wire at 15 inches (380 mm) on center; furnish special manufactured corner and wall intersection pieces.

2. Deformed bars shall be provided as specified in Section 03200, CONCRETE REINFORCEMENT, and as shown on the Drawings.

2.2.4 Preformed Control Joints

Solid rubber cross-shape extrusion provided by single manufacturer, see Section Control Joints Keys specified herein.

2.2.5 Mortar Mix

a. Compressive Strength: 1,800 psi (12.4 MPa) minimum 28-day strength.

b. ASTM C 270: Type S.

2.2.6 Grout Mix

a. Compressive Strength: 2,000 psi (13.8 MPa) minimum 28-day strength.

b. For Pouring: Fluid consistency (suitable for pouring without segregation) conforming to ASTM C 476.

c. For Pumping: Fluid consistency with minimum seven sacks of cement per cubic yard (0.76 cubic meter).

2.3 CLAY OR SHALE BRICK

Color range and texture of clay or shale brick shall be as indicated and shall conform to the approved sample. Brick shall conform to ASTM C 62; Grade SW shall be used for brick in contact with earth or grade and for the first six exterior courses above grade. Grade SW or MW shall be used in other brickwork. Average nominal dimensions of brick shall be 3-5/8 inches wide , 2-1/4 inches high, and 8 inches long (90 mm wide, 57 mm high, and 190 mm long), subject to the tolerances specified in ASTM C 62. Brick shall be tested for efflorescence. Clay or shale brick units shall be delivered factory-blended to provide a uniform appearance and color range in the completed wall.

2.3.1 Hollow Clay or Shale Brick

Hollow clay or shale brick shall conform to ASTM C 652, Type HBS. Brick size shall be modular and the nominal size of the brick used shall be 3-5/8 inches (92 mm) wide, 2-1/4 inches (57 mm) high, and 8 inches (200 mm) long (nominal). Minimum compressive strength of the brick shall be 3,000 psi (20.7 MPa).

2.4 MASONRY MORTAR

Mortar Type S shall conform to the proportion specification of ASTM C 270 except Type S cement-lime mortar proportions shall be 1 part cement, 1/2 part lime and 4-1/2 parts aggregate. Type S mortar shall be used for non-load-bearing, non-shear-wall interior masonry and for remaining masonry work; except where higher compressive strength is indicated on structural drawings. When masonry cement ASTM C 91 is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Verification of masonry cement performance shall be based on ASTM C 780 and ASTM C 1072. Pointing mortar in showers and kitchens shall contain ammonium stearate, or aluminum tri-stearate, or calcium stearate in an amount equal to 3 percent by weight of cement used.

Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.4.1 Admixtures for Masonry Mortar

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C.

2.4.2 Colored Mortar

Mortar coloring shall be added to the mortar used for exposed masonry surfaces to produce a uniform color as indicated on Drawings. Quantity of pigment to cementitious content of the masonry cement shall not exceed 5 by weight; carbon black shall not exceed 1 percent by weight. Quantity of pigment to cementitious content of cement-lime mix shall not exceed 10 percent by weight, carbon black no more than 2 percent by weight. Mortar coloring shall be chemically inert, of finely ground limeproof pigment, and furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement. Compressive strength of colored mortar shall equal 1,800 psi (12.4 MPa) minimum 28-day strength.

2.4.3 Hydrated Lime and Alternates

Hydrated lime shall conform to ASTM C 207, Type S. Lime alternates which have a current ICBO, ICBO Building Code, Evaluation Report number whose findings state it may be used as an alternate to lime for Type M, S, N, and O mortars will be deemed acceptable provided the user follows the manufacturer's proportions and mixing instructions as set forth in ICBO report.

2.4.4 Cement

Portland cement shall conform to ASTM C 150, Type I or Type II. Containers shall bear complete instructions for proportioning and mixing to obtain the required types of mortar.

2.4.5 Sand and Water

Sand shall conform to ASTM C 144. Water shall be clean, potable, and free from substances which could adversely affect the mortar.

2.5 WATER-REPELLANT ADMIXTURE

Polymeric type formulated to reduce porosity and water transmission. Construct panels of masonry units conforming to ASTM C 744 and mortar which contain the water-repellant admixture. When tested in accordance with ASTM C 1072, such panels shall have flexural strength not less than that specified or indicated. When tested in accordance with ASTM E 514, panels shall exhibit no water visible on back of test panel and no leaks through the panel after 24 hours, and not more than 25 percent of wall area shall be damp after 72 hours.

2.6 ANCHORS, TIES, AND BAR POSITIONERS

Exposure	Finish	Wt. of Coating in Oz. Per Sq. Foot for 9 ga wire
Joint reinforcement, interior walls	ASTM A 641/A 641M Class 1	.35
Wire ties or anchors in exterior, completely embedded in mortar or grout	ASTM A 641/A 641M Class 3	.90
Wire ties or anchors in exterior walls not completely embedded in mortar or grout	ASTM A 153/A 153M Class B	1.80
Joint reinforcement in exterior walls or interior walls exposed to moist environments (e.g. natatoria and food processing)	ASTM A 641/A 641M Class B	1.80

	Finish	Wt. of Coating (sheets) Oz. Per Sq. Foot
Sheet metal ties or anchors exposed to weather	ASTM A 153/A 153M Class B-2	1.50
[Sheet metal ties or anchors completely embedded in mortar	ASTM A 653/A 653M Class G60	.60

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153/A 153M, Class B-2. Steel wire used for anchors and ties shall be fabricated from steel wire conforming to ASTM A 82. Anchors and ties shall be sized to provide a minimum of 5/8 inch (16 mm) mortar cover from either face.

2.6.1 Wall Ties

Wall ties shall be rectangular-shaped or Z-shaped fabricated of 3/16 inch (5 mm) diameter zinc-coated steel wire. Rectangular wall ties shall be no less than 4 inches (100 mm) wide. Wall ties may also be of a continuous type conforming to paragraph JOINT REINFORCEMENT. Adjustable type wall ties, if approved for use, shall consist of two essentially U-shaped elements fabricated of 3/16 inch (5 mm) diameter zinc-coated steel wire. Adjustable ties shall be of the double pintle to eye type and shall allow a maximum of 1/2 inch (13 mm) eccentricity between each element of the tie. Play between pintle and eye opening shall be not more than 1/16 inch (2 mm). The pintle and eye elements shall be formed so that both can be in the same plane.

2.7 CONTROL JOINT KEYS

Control joint keys shall be a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D 2000or polyvinyl chloride conforming to ASTM D 2287. The material shall be resistant to oils and solvents. The control joint key shall be provided with a solid shear section not less than 5/8 inch (16 mm)thick and 3/8 inch (10 mm) thick flanges, with a tolerance of plus or minus 1/16 inch (2 mm). The control joint key shall fit neatly, but without forcing, in masonry unit jamb sash grooves. The control joint key shall be flexible at a temperature of minus 30 degrees F (minus 34 degrees C) after five hours exposure, and shall have a durometer hardness of not less than 70 when tested in accordance with ASTM D 2240.

2.8 EXPANSION-JOINT MATERIALS

Backer rod and sealant shall be adequate to accommodate joint compression equal to 50 percent of the width of the joint. The backer rod shall be compressible rod stock of polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Sealant shall conform to Section 07900, JOINT SEALING.

2.9 FLASHING

Flashing shall be as specified in Section 07600 SHEET METALWORK, GENERAL. Provide one of the following types except that flashing indicated to terminate in reglets shall be metal or coated-metal flashing and except that the material shall be one which is not adversely affected by dampproofing material.

a. Coated-Copper Flashing: 7 ounce (0.2 kg), electrolytic copper sheet, uniformly coated on both sides with acidproof, alkaliproof, elastic bituminous compound. Factory apply coating to a weight of not less than 6 ounces per square foot (1.8 kg per square meter) (approximately 3 ounces per square foot (0.9 kg per square meter) on each side).

b. Copper or Stainless Steel Flashing: Copper, ASTM B 370, minimum 16 ounce (450 g) weight; stainless steel, ASTM A 167, Type 301, 302, 304, or 316, 0.015 inch (4 mm) thick, No. 2D finish. Provide with factory-fabricated deformations that mechanically bond flashing against horizontal movement in all directions. Deformations shall consist of dimples, diagonal corrugations, or a combination of dimples and transverse corrugations.

2.10 WEEP HOLE VENTILATORS

Weephole ventilators shall be prefabricated aluminum or plastic sized to form the proper size opening in head joints. Provide aluminum and plastic inserts with grill or screen-type openings designed to allow the passage of moisture from cavities and to prevent the entrance or insects. Ventilators shall be sized to match modular construction with a standard 3/8 inch (10 mm) mortar joint.

PART 3 EXECUTION

3.1 PREPARATION

Prior to start of work, masonry inspector shall verify the applicable conditions as set forth in ACI 530.1, inspection. The Contracting Officer will serve as inspector or will select a masonry inspector.

3.1.1 Hot Weather Installation

The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 99 degrees F (37 degrees C) in the shade and the relative humidity is less than 50 percent or the ambient air temperature exceeds 90 degrees F (32 degrees C) and the wind velocity is more than 8 mph (13 km/h). All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 4 feet (1.2 m) ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

3.1.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F (4 degrees C) or temperature of masonry units is below 40 degrees F (4 degrees C), a written statement of proposed cold weather construction procedures shall be submitted for approval. The following precautions shall be taken during all cold weather erection.

3.1.2.1 Protection

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

a. Air Temperature 40 to 32 Degrees F (4 to 0 degrees C). Sand or mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F (4 and 49 degrees C).

b. Air Temperature 32 to 25 Degrees F (0 to minus 4 degrees C). Sand and mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F (4 and 49 degrees C). Temperature of mortar on boards shall be maintained above freezing.

c. Air Temperature 25 to 20 Degrees F (minus 4 to minus 7 degrees C). Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F (4 and 49 degrees C). Temperature of mortar on boards shall be maintained above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 mph (24 km/hour).

d. Air Temperature 20 Degrees F (minus 7 degrees C) and below. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F (4 and 49 degrees C). Enclosure and auxiliary heat shall be provided to maintain air temperature above

32 degrees F (0 degrees C). Temperature of units when laid shall not be less than 20 degrees F (minus 7 degrees C).

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 40 to 32 degrees F (4 to 0 degrees C). Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 32 to 25 degrees F (0 to minus 4 degrees C). Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature 25 to 20 degrees F (minus 4 to minus 7 degrees C). Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature 20 degrees F (minus 7 degrees C) and Below. Masonry temperature shall be maintained above 32 degrees F (0 degrees C) for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.1.3 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.1.4 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.1.5 Surfaces

Surfaces on which masonry is to be placed shall be cleaned of laitance, dust, dirt, oil, organic matter, or other foreign materials and shall be slightly roughened to provide a surface texture with a depth of at least 1/8 inch (3 mm). Sandblasting shall be used, if necessary, to remove laitance from pores and to expose the aggregate.

3.2 LAYING MASONRY UNITS

Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Masonry units shall be laid in running bond pattern or as shown on the Drawings. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch (13 mm). Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped

edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 1/2 inch (13 mm) into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below. In double wythe construction, the inner wythe may be brought up not more than 16 inches (400 mm) ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches (200 mm).

3.2.1 Forms and Shores

Provide bracing and scaffolding as required. Design bracing to resist wind pressure as required by local codes. Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.2 Clay or Shale Brick Units

Brick facing shall be laid with the better face exposed. Brick shall be laid in running bond with each course bonded at corners, unless otherwise indicated. Molded brick shall be laid with the frog side down. Brick that is cored, recessed, or has other deformations may be used in sills, treads, soldier courses, except where deformations will be exposed to view.

3.2.2.1 Wetting of Units

Wetting of clay, shale brick, or hollow brick units having an initial rate of absorption of more than 1 gram per minute per square inch (0.155 gm per minute per square cm) of bed surface shall be in conformance with ASTM C 67. The method of wetting shall ensure that each unit is nearly saturated but surface dry when laid. Test clay or shale brick daily on the job, prior to laying, as follows: Using a wax pencil, draw a circle the size of a quarter on five randomly selected bricks. Apply 20 drops of water with a medicine dropper to the surface within the circle on each brick. If the average time that the water is completely absorbed in the five bricks is less than 1-1/2 minutes, wet bricks represented by the five bricks tested.

3.2.2.2 Solid Units

Bed, head, and collar joints shall be completely filled with mortar.

3.2.2.3 Brick-Faced Walls

For brick-faced walls bond brick in the pattern as indicated on the drawings. Provide additional bonding ties spaced not more than 3 feet (one meter) apart around the perimeter of and within 12 inches (300 mm) of all openings.

a. Collar Joints: Fill collar joints solid with mortar as each course of brick is laid. Do not disturb units in place.

b. Brick Sills: Lay brick on edge, slope, and project not less than 1/2 inch (10 mm) beyond the face of the wall to form a wash and drip. Fill all joints solidly with mortar and tool.

3.2.2.4 Brick Veneer

Provide a continuous cavity as indicated. Install brick veneer after sheathing, masonry anchors, and flashing have been installed to the cold-formed steel framing system. Care shall be provided to avoid damaging the moisture barrier. Damaged moisture barrier and flashing shall be repaired or replaced before brick veneer is installed. Means shall be provided to keep cavities clean and clear of mortar droppings.

3.2.3 Tolerances

Masonry shall be laid plumb, true to line, with courses level. Bond pattern shall be kept plumb throughout. Corners shall be square unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TABLE II

TOLERANCES

Variation from the plumb in the lines and surfaces of columns, walls and arises	
In adjacent masonry units	1/8 inch (3 mm)
In 10 feet (3 m)	1/4 inch (6 mm)
In 20 feet (6 m)	3/8 inch (10 mm)
In 40 feet (12 m) or more	1/2 inch (13 mm)
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 20 feet (6 m)	1/4 inch (6 mm)
In 40 feet (12 m) or more	1/2 inch (13 mm)
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 20 feet (6 m)	1/4 inch (6 mm)
In 40 feet (12 m) or more	1/2 inch (13 mm)
Variation from level for bed joints and top surfaces of bearing walls	

In 10 feet (3 m)	1/4 inch (6 mm)
In 40 feet (12 m) or more	1/2 inch (13 mm)

Variations from horizontal lines

In 10 feet (3 m)	1/4 inch (6 mm)
In 20 feet (6 m)	3/8 inch (10 mm)
In 40 feet (12 m) or more	1/2 inch (13 mm)

Variations in cross sectional dimensions of columns and in thickness of walls

Minus	1/4 inch (6 mm)
Plus	1/2 inch (13 mm)

3.2.4 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 12 inches (300 mm) wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.5 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.5.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparged masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

3.2.5.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave unless indicated otherwise. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.5.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch (10 mm). On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch (10 mm).

3.2.6 Joint Widths

Joint widths shall be as follows:

3.2.6.1 Concrete Masonry Units

Concrete masonry units shall have 3/8 inch (10 mm) joints, except for prefaced concrete masonry units.

3.2.6.2 Brick

Brick joint widths shall be the difference between the actual and nominal dimensions of the brick in either height or length. Brick expansion joint widths shall be as shown.

3.2.7 Embedded Items

Spaces around built-in items shall be filled with mortar. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in shall be embedded as the masonry work progresses. Anchors, ties and joint reinforcement shall be fully embedded in the mortar. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout.

3.2.8 Unfinished Work

Unfinished work shall be stepped back for joining with new work. Toothing may be resorted to only when specifically approved. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.2.9 Masonry Wall Intersections

Each course shall be masonry bonded at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement and prefabricated corner or tee pieces of joint reinforcement as shown.

3.2.10 Partitions

Partitions shall be continuous from floor to underside of floor or roof deck unless indicated otherwise. Openings in firewalls around joists or other structural members shall be filled unless otherwise approved. An isolation joint shall be placed in the intersection between partitions and structural or exterior walls as shown. Interior partitions having 4 inch (100 mm) nominal thick units shall be tied to intersecting partitions of 4 inch (100 mm) units, 5 inches (125 mm) into partitions of 6 inch (150 mm) units, and 7 inches (175 mm) into partitions of 8 inch (200 mm) or thicker units. Cells within vertical plane of ties shall be filled solid with grout for full

height of partition or solid masonry units may be used. Interior partitions having masonry walls over 4 inches (100 mm) thick shall be tied together with joint reinforcement. Partitions containing joint reinforcement shall be provided with prefabricated pieces at corners and intersections or partitions.

3.3 ANCHORED VENEER CONSTRUCTION

The inner and outer wythes shall be completely separated by a continuous airspace as shown on the drawings. Both the inner and the outer wythes shall be laid up together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, through-wall flashings shall be protected from damage until they are fully enclosed in the wall. The airspace between the wythes shall be kept clear and free of mortar droppings by temporary wood strips laid on the wall ties and carefully lifted out before placing the next row of ties. A coarse gravel or drainage material shall be placed behind the weep holes in the cavity to a minimum depth of 4 inches (100 mm) of coarse aggregate or 10 inches (250 mm) of drainage material to keep mortar droppings from plugging the weep holes.

3.4 WEEP HOLES

Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior. Weep holes shall be clear round holes not less than 1/4 inch (6 mm) in diameter at 24 inches (600 mm) o.c. Weep holes shall be provided not more than 24 inches (600 mm) on centers in mortar joints of the exterior wythe above wall flashing, over foundations, bond beams, and any other horizontal interruptions of the cavity. Weep holes shall be constructed using weep hole ventilators. Other approved methods may be used for providing weep holes. Weep holes shall be kept free of mortar and other obstructions.

3.5 COMPOSITE WALLS

Masonry wythes shall be tied together with joint reinforcement or with unit wall ties. Facing shall be anchored to concrete backing with wire dovetail anchors set in slots built in the face of the concrete as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. The facing wythe shall be anchored or tied to the backup at a maximum spacing of 16 inches (400 mm) on center vertically and 24 inches (600 mm) on center horizontally. Unit ties shall be spaced not over 24 inches (600 mm) on centers horizontally, in courses not over 16 inches (400 mm) apart vertically, staggered in alternate courses. Ties shall be laid not closer than 5/8 inch (16 mm) to either masonry face. Ties shall not extend through control joints. Collar joints between masonry facing and masonry backup shall be filled solidly with grout.

3.6 MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be

retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within 2-1/2 hours after mixing shall be discarded.

3.7 PLACING GROUT

3.7.1 Grout Holes

3.7.1.1 Cleanouts for Solid Unit Masonry Construction

Cleanouts for construction of walls consisting of a grout filled cavity between solid masonry wythes shall be provided at the bottom of every pour by omitting every other masonry unit from one wythe. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanout holes shall not be plugged until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.8 CONTROL JOINTS

Control joints shall be provided as indicated and shall be constructed by using mortar to fill the head joint in accordance with the details shown on the drawings. Sash jamb units shall have a 3/4 by 3/4 inch (19 by 19 mm) groove near the center at end of each unit. The vertical mortar joint at control joint locations shall be continuous, including through all bond beams. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint. The control joint key shall be interrupted in courses containing continuous bond beam steel. In single wythe exterior masonry walls, the exterior control joints shall be raked to a depth of 3/4 inch (20 mm); backer rod and sealant shall be installed in accordance with Section 07900 JOINT SEALING. Exposed interior control joints shall be raked to a depth of 1/4 inch (6 mm). Concealed control joints shall be flush cut.

3.9 BRICK EXPANSION JOINTS AND CONCRETE MASONRY VENEER JOINTS

Brick expansion joints and concrete masonry veneer joints shall be provided and constructed as shown on the drawings. Joints shall be kept free of mortar and other debris.

3.10 STEEL LEDGER ANGLES

Steel ledger angles shall be adjusted as required to keep the masonry level and at the proper elevation. Steel ledger angles shall be galvanized. Steel ledger angles shall be provided in sections not longer than 10 feet (3 m) and installed with a 1/4 inch (6 mm) gap between sections. Steel ledger angles shall be mitered and welded at building corners with each angle not shorter than 4 feet (1.2 m), unless limited by wall configuration.

3.11 LINTELS

3.11.1 Masonry Lintels

Masonry lintels shall be constructed with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated on the drawings. Lintel

reinforcement shall extend beyond each side of masonry opening 40 bar diameters or 24 inches (600 mm), whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 1/2 inch (13 mm) above the bottom inside surface of the lintel unit.

3.11.2 Precast Concrete and Steel Lintels

Precast concrete and steel lintels shall be as shown on the drawings. Lintels shall be set in a full bed of mortar with faces plumb and true. Steel and precast lintels shall have a minimum bearing length of 8 inches (200 mm) unless otherwise indicated on the drawings.

3.12 SILLS AND COPINGS

Sills and copings shall be set in a full bed of mortar with faces plumb and true.

3.13 INSULATION

Anchored veneer walls shall be insulated, where shown, by installing board-type insulation on the cavity side of the inner wythe. Board type insulation shall be applied directly to the masonry or thru-wall flashing with adhesive. Insulation shall be neatly fitted between obstructions without impaling of insulation on ties or anchors. The insulation shall be applied in parallel courses with vertical joints breaking midway over the course below and shall be applied in moderate contact with adjoining units without forcing, and shall be cut to fit neatly against adjoining surfaces.

3.14 SPLASH BLOCKS

Splash blocks shall be located as shown.

3.15 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.15.1 Clay or Shale Brick Surfaces

Exposed clay or shale brick masonry surfaces shall be cleaned as necessary to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations. After cleaning, the sample panel of similar material shall be examined for discoloration or stain as a result of cleaning. If the sample panel is discolored or stained, the method of cleaning shall be changed to assure that the masonry surfaces in the structure will not be adversely affected.

The exposed masonry surfaces shall be water-soaked and then cleaned with a solution proportioned 1/2 cup (30 mL) trisodium phosphate and 1/2 cup (30 mL) laundry detergent to one gallon (1 L) of water or cleaned with a proprietary masonry cleaning agent specifically recommended for the color and texture by the clay products manufacturer. The solution shall be applied with stiff fiber brushes, followed immediately by thorough rinsing with clean water. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations. Efflorescence shall be removed in conformance with the brick manufacturer's recommendations.

3.16 PROTECTION

Facing materials shall be protected against staining. Top of walls shall be covered with nonstaining waterproof covering or membrane when work is not in progress. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system. Covering shall extend a minimum of 2 feet (600 mm) down on each side of the wall and shall be held securely in place. Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

3.17 TEST REPORTS

3.17.1 Field Testing of Mortar

At least three specimens of mortar shall be taken each day. A layer of mortar 1/2 to 5/8 inch (13 to 16 mm) thick shall be spread on the masonry units and allowed to stand for one minute. The specimens shall then be prepared and tested for compressive strength in accordance with ASTM C 780.

3.17.2 Efflorescence Test

Brick which will be exposed to weathering shall be tested for efflorescence. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary. Sampling and testing shall conform to the applicable provisions of ASTM C 67. Units meeting the definition of "effloresced" will be subject to rejection.

3.17.3 Special Inspection

Special inspection shall be performed on all CMU walls and the results submitted in a weekly special inspection report.

End of Section

SECTION 06100

ROUGH CARPENTRY

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 FOREST & PAPER ASSOCIATION (AF&PA)

AF&PA T101	(1991; Supple 1993; Addenda Apr 1997; Supple T02) National Design Specification for Wood Construction
AF&PA T11	(1988) Manual for Wood Frame Construction **

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC 111	(1979) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM D 2898	(1994; R 1999) Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Based Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2	(2000) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA C20	(1999) Structural Lumber Fire-Retardant Pressure Treatment
AWPA C27	(1999) Plywood - Fire-Retardant Pressure Treatment
AWPA M4	(1999) Standard for the Care of Preservative-Treated Wood Products
AWPA P5	(2000) Standards for Waterborne Preservatives

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA EWS R540C	(1996) Builder Tips Proper Storage and Handling of Glulam Beams

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM LPD 1-49	(1995) Loss Prevention Data Sheet - Perimeter Flashing

FOREST STEWARDSHIP COUNCIL (FSC)

FSC 1.2	(2000) FSC Principles and Criteria of Forest Stewardship
FSC 5.3.5	(2003) Forests Certified by FSC - Accredited Certification Bodies

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules	(1994) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules	(1997) Standard Grading Rules for Northeastern Lumber

REDWOOD INSPECTION SERVICE (RIS)

RIS GCRL	(1997) Grades of California Redwood Lumber

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Spec	(1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB Rules	(1994; Supple 8 thru 11) Standard Grading Rules for Southern Pine Lumber

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17	(1996; Supp. VII & VIII) Standard Grading and Dressing Rules for Douglas Fir, Western Hemlock, Western Red Cedar, White Fir, Sitka Spruce Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules	(1999) Western Lumber Grading Rules 95

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that

will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Nailers and Nailing Strips

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540C.

PART 2 PRODUCTS

2.1 LUMBER AND SHEATHING

2.1.1 Grading and Marking

2.1.1.1 Lumber Products

Solid sawn and finger-jointed lumber shall bear an authorized gradestamp or grademark recognized by ALSC, or an ALSC recognized certification stamp, mark, or hammerbrand. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view. Wood products shall be from sustainable forests as certified by the Forest Stewardship Council (FSC 1.2 and FSC 5.3.3). No added urea formaldehyde resins shall be utilized in wood products.

2.1.2 Sizes

Lumber and material sizes shall conform to requirements of the rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Unless otherwise specified, sizes indicated are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

2.1.3 Treatment

Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil. Except as specified for all-heart material of the previously mentioned species, the following items shall be treated:

a. Wood members in contact with or within 18 inches (455 mm) of soil.

b. Wood members in contact with water.

c. Wood members exposed to the weather and those used in roofing systems or as nailing strips or nailers over fiberboard or gypsum-board wall sheathing as a base for wood siding.

d. Wood members set into concrete regardless of location, including flush-with-deck wood nailers for roofs.

e. Wood members in contact with concrete that is in contact with soil or water or that is exposed to weather.

2.1.3.1 Lumber and Timbers

Lumber and timbers shall be treated in accordance with AWPA C2 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf (4 kg per cubic meter) intended for above ground use.

b. 0.40 pcf (6.4 kg per cubic meter) intended for ground contact and fresh water use.

2.1.4 Moisture Content

At the time lumber and other materials are delivered and when installed in the work their moisture content shall be as follows:

a. Treated and Untreated Lumber Except Roof Planking: 4 inches (100 mm) or less, nominal thickness, 19 percent maximum. 5 inches (125 mm) or more, nominal thickness, 23 percent maximum in a 3 inch (75 mm) perimeter of the timber cross-section.

b. Roof Planking: 15 percent maximum.

c. Materials Other Than Lumber: In accordance with standard under which product is produced.

2.1.5 Fire-Retardant Treatment

Fire-retardant treated wood shall be pressure treated in accordance with AWPA C20 for lumber and AWPA C27 for plywood. Material use shall be defined in AWPA C20 and AWPA C27 for Interior Type A and B and Exterior Type. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting shall be subjected to an accelerated weathering technique in accordance with ASTM D 2898 prior to being tested for compliance with AWPA C20 or AWPA C27. Items to be treated include: Backing blocking in non-combustible walls.

2.1.6 Miscellaneous Wood Members

2.1.6.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size inch (mm)
Bridging	1 x 3 (25 x 75) or 1 x 4 (25 x 100) for use between members 2 x 12 (50 x 300) and smaller; 2 x 4 (50 x 100) for use between members larger than 2 x 12 (50 x 300)
Corner bracing	1 x 4 (25 x 100)
Furring	1 (25) x 2 (50)
Grounds	Plaster thickness by 1-1/2 (38)
Nailing strips	1 x 3 (25 75) or 1 x 4 (25 x 100) when used as shingle base or interior finish, otherwise 2 inch (50 mm) stock

2.1.6.2 Wood Bumpers

Bumpers shall be of the species and grade in accordance with TABLE II at the end of this section, size as shown.

2.1.6.3 Sill Plates

Sill plates shall be standard or number 2 grade.

2.1.6.4 Blocking

Blocking shall be standard or number 2 grade.

2.1.6.5 Rough Bucks and Frames

Rough bucks and frames shall be straight standard or number 2 grade.

2.2 ACCESSORIES AND NAILS

Markings shall identify both the strength grade and the manufacturer. Accessories and nails shall conform to the following:

2.2.1 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

2.2.2 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use. Finish options include zinc compounds, cadmium, and aluminum paint impregnated finishes.

2.2.3 Clip Angles

Steel, 3/16 inch (5 mm) thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.2.4 Expansion Shields

Type and size best suited for intended use.

2.2.5 Nails and Staples

ASTM F 547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch (25 mm) into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch (25 mm) thick lumber and for toe nailing 2 inch (50 mm) thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch (50 mm) thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T11. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T101. Reasonable judgement backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

PART 3 EXECUTION

3.1 INSTALLATION OF FRAMING

3.1.1 General

General framing shall be in accordance with AF&PA T11.Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place. Members shall be framed for passage of ducts. Members shall be cut, notched, or bored in accordance with applicable requirements of AF&PA T101 for the passage of pipes, wires, or conduits. Rafters, purlins, and joists shall be set with crown edge up. Framing shall be kept at least 2 inches (50 mm) away from chimneys and 4 inches (100 mm) away from fireplace backwalls. When joists, beams, and girders are placed on masonry or concrete, a wood base plate shall be positioned and leveled with grout. The joist, beam, or girder shall then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket shall be formed into the wall. The joist, beam, or girder shall then be placed into the pocket and leveled with a steel shim.

3.2 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS

3.2.1 Bridging

Wood bridging shall have ends accurately bevel-cut to afford firm contact and shall be nailed at each end with two nails. Metal bridging shall be installed as recommended by the manufacturer. The lower ends of bridging shall be driven up tight and secured after subflooring or roof sheathing has been laid and partition framing installed.

3.2.2 Corner Bracing

Corner bracing shall be installed when required by type of sheathing used or when siding, other than panel siding, is applied directly to studs. Corner bracing shall be let into the exterior surfaces of the studs at an angle of

approximately 45 degrees, shall extend completely over wall plates, and shall be secured at each bearing with two nails.

3.2.3 Blocking

Blocking shall be provided as necessary for application of siding, sheathing, subflooring, wallboard, and other materials or building items, and to provide firestopping. Blocking shall be provided for support of wall mounted grab bars, equipment, casework, cabinetry and counter tops. Blocking for firestopping shall ensure a maximum dimension of 8 feet (2400 mm) for any concealed space. Blocking shall be cut to fit between framing members and rigidly nailed thereto.

3.2.4 Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials. Nailers used in conjunction with roof deck installation shall be installed flush with the roof deck system. Stacked nailers shall be assembled with spikes or nails spaced not more than 18 inches (450 mm) on center and staggered. Beginning and ending nails shall not be more than 6 inches (150 mm) for nailer end. Ends of stacked nailers shall be offset approximately 12 inches (300 mm) in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place. Nailers and nailer installation for Factory Mutual wind uplift rated roof systems specified in other Sections of these specifications shall conform to the recommendations contained in FM LPD 1-49.

3.2.5 Wood Grounds

Wood grounds shall be provided as necessary for attachment of trim, finish, and other work to plaster. Grounds shall be run in lengths as long as practicable, butt jointed, and rigidly secured in place.

3.2.6 Furring Strips

Furring strips shall be provided at the locations shown. Furring strips shall be installed at 16 inches (400 mm) on center unless otherwise shown, run in lengths as long as practicable, butt jointed and rigidly secured in place.

3.2.7 Rough Bucks and Frames

Rough bucks shall be set straight, true, and plumb, and secured with anchors near top and bottom of each wood member and at intermediate intervals of not more than 3 feet (900 mm). Anchors for concrete shall be expansion bolts, and anchors for masonry shall be 3/16 x 1-1/4 inch (5 x 32 mm) steel straps extending not less than 8 inches (200 mm) into the masonry and turned down 2 inches (50 mm) into the masonry.

3.3 TABLES

TABLE I. SPECIES AND GRADE

Furring & Blocking

Grading Rules	Species	Const Standard	No. 2 Comm	No. 2 Board Comm	No. 3 Comm
NHLA Rules					
	Cypress			X	
NELMA Grading Rules					
	Northern White Cedar				X
	Eastern White Pine	X			
	Northern Pine	X			
	Balsam Fir				X
	Eastern Hemlock-Tamarack				X
RIS GCRL					
	Redwood		X		
SCMA Spec					
	Cypress			X	
SPIB Rules					
	Southern Pine		X		
WCLIB 17					
	Douglas Fir-Larch	X			
	Hem-Fir	X			
	Sitka Spruce	X			
	Mountain Hemlock	X			
	Western Cedar	X			
WWPA Grading Rules					
	Douglas Fir-Larch	X			
	Hem-Fir	X			
	Idaho White Pine	X			
	Lodgepole Pine			X	
	Ponderosa Pine			X	
	Sugar Pine			X	
	Englemann Spruce			X	
	Douglas Fir South			X	
	Mountain Hemlock			X	
	Subalpine Fir			X	
	Western Cedar			X	

End of Section

SECTION 06200

FINISH CARPENTRY

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 2898	(1994; R 1999) Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Based Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C20	(1999) Structural Lumber Fire-Retardant Pressure Treatment
AWPA C27	(1999) Plywood - Fire-Retardant Pressure Treatment
AWPA C9	(1997) Plywood - Preservative Treatment by Pressure Processes
AWPA P5	(2000) Standards for Waterborne Preservatives

FOREST STEWARDSHIP COUNCIL (FSC)

FSC 1.2	(2000) FSC Principles and Criteria of Forest Stewardship
FSC 5.3.5	(2003) Forests Certified by FSC - Accredited Certification Bodies

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Finish Carpentry; G, RO

Drawings showing fabricated items and special mill and woodwork items. Drawings shall indicate materials and details of construction, methods of fastening, erection, and installation.

SD-04 Samples

Moldings; G, RO

Samples shall be of sufficient size to show patterns, color ranges, and types, as applicable, of the material proposed to be used.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well-ventilated areas, and protected from extreme changes in temperature and humidity.

PART 2 PRODUCTS

2.1 WOOD ITEMS VENEER PANELS, SIDING, AND TRIM

The Contractor shall furnish products which optimize design by reducing the amount of wood used (engineered wood), by using recycled wood products and preservatives without arsenic or chromium when the products and methods are competitive in price or directed by the Contracting Officer. The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. Wood products shall be from sustainable forests as certified by the Forest Stewardship Council (FSC 1.2 and FSC 5.3.3). Wood products shall contain no added urea formaldehyde resins.

2.1.1 Grading and Marking

Materials shall bear the grademark, stamp or other identifying marks indicating grades of material and rules or standards under which produced. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Except for plywood, wood structural panels, and lumber, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be architecturally exposed to view shall not bear grademarks, stamps, or other types of identifying marks.

2.1.2 Sizes and Patterns

Lumber sizes and patterns shall conform to rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Sizes and patterns for materials other than lumber shall conform to requirements of the rules or standards under which produced. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

2.1.3 Moisture Content

The maximum moisture content of untreated trim and wood siding shall be 15 percent at the time of delivery to the jobsite and when installed. Moisture

content of all other material shall be in accordance with the standard under which the product is produced.

2.1.4 Preservative Treatment

2.1.4.1 Plywood

Plywood shall be treated in accordance with AWPA C9 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf (4 kg per cubic meter) intended for above ground use.

b. 0.4 pcf (6.4 kg per cubic meter) intended for ground contact and fresh water use.

2.1.5 Fire-Retardant Treatment

Fire-retardant treated lumber shall be pressure treated in accordance with AWPA C20. Fire-retardant treated plywood shall be pressure treated in accordance with AWPA C27. Material use shall be defined in AWPA C20 and AWPA C27 for Interior Type A and Exterior Type. Treatment and performance inspection shall be by a qualified independent testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance with such rating. Treated materials to be exposed to rain wetting shall be subjected to an accelerated weathering technique in accordance with ASTM D 2898, Method A, prior to being tested for compliance with AWPA C20 or AWPA C27. Items to be treated include all items in roofing system, in contact with concrete or within 6" of gravel.

2.1.6 Epoxy-Aggregate Panels

Prefinished epoxy-aggregate panels shall consist of an asbestos-free cement board base sheet with a factory applied surface of epoxy resins and decorative natural stone chips. Factory applied finish shall be a minimum of 20 mils (0.5 mm) of 100 percent solids, two-component epoxy resin-based coating followed by an application of inert aggregate. Stone color shall be selected from manufacturer's standard colors. Cement board base sheet shall be a minimum of 1/4 inch (6 mm) thick. Finished panels shall be dimensionally stable. Water absorption on the surfaced side shall not exceed 0.20 percent after 24 hours of submergence in water. Accessories shall be manufacturer's standard extruded matching color aluminum moldings. Moldings shall be provided for meeting strips, end caps, inside corners, or outside corners. Fasteners shall be noncorrosive, self-tapping screw type and finished to match the color of stone. Caulking compound shall be color compatible, low modulus silicone or urethane type.

2.1.7 Moldings

Moldings shall be of the pattern indicated and shall be of a grade compatible with the finish specified.

2.2 NAILS

Nails shall be the size and type best suited for the purpose and shall conform to ASTM F 547. Nails shall be hot-dip galvanized or aluminum when used on exterior work. For siding, length of nails shall be sufficient to

extend 1-1/2 inches (40 mm) into supports, including wood sheathing over framing. Screws for use where nailing is impractical shall be size best suited for purpose.

PART 3 EXECUTION

3.1 MOLDING AND INTERIOR TRIM

Molding and interior trim shall be installed straight, plumb, level and with closely fitted joints. Exposed surfaces shall be machine sanded at the mill. Molded work shall be coped at returns and interior angles and mitered at external corners. Intersections of flatwork shall be shouldered to ease any inherent changes in plane. Window and door trim shall be provided in single lengths. Blind nailing shall be used to the extent practicable, and face nailing shall be set and stopped with a nonstaining putty to match the finish applied. Screws shall be used for attachment to metal; setting and stopping of screws shall be of the same quality as required where nails are used.

3.2 TABLES

TABLE I. SPECIES AND GRADE TABLES

Grading Rules	Species
NELMA Grading Rules	Maple - "character" grade

End of Section

SECTION 06410

LAMINATE AND VENEER CLAD ARCHITECTURAL CASEWORK

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A161.2	(1998) Decorative Laminate Countertops, Performance Standards for Fabricated High Pressure
ANSI A208.1	(1999) Particleboard Mat Formed Woods
ANSI A208.2	(1994) Medium Density Fiberboard (MDF)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1037	(1999) Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Based Materials

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds	(1999) Architectural Woodwork Quality Standards

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.9	(1994) Cabinet Hardware

CALIFORNIA AIR RESOURCES BOARD

AQMD 8-51	(2001) Bay Area Air Quality Management District Regulation 8, Rule 51 Adhesive and Sealant Products

FOREST STEWARDSHIP COUNCIL

FSC 1.2	(2000) FSC Principles and Criteria of Forest Stewardship
FSC 5.3.5	(2003) Forects Certified by FSC-Accredited Certification Bodies

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(1995) High-Pressure Decorative Laminates

NEMA LD 3.1 (1995) Performance, Application, Fabrication, and Installation of High-Pressure Decorative Laminates

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168 (2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

NWWDA I.S. 1-A (1997) Architectural Wood Flush Doors

1.2 GENERAL DESCRIPTION

Work in this section includes laminate and veneer clad custom casework and cabinets as shown on the drawings and as described in this specification. This Section includes high-pressure laminate surfacing and cabinet hardware. The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. All exposed and semi-exposed surfaces, whose finish is not otherwise noted on the drawings or finish schedule, shall be sanded smooth and shall receive a clear finish of water based polyurethane. Wood finish may be shop finished or field applied in accordance with Section 09900 PAINTING, GENERAL.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. All items designated with a "G", including product literature, calculations, component data, certificates, diagrams, drawings, and samples shall be submitted concurrently in one complete system submittal. Omission of any required submittal item from the package shall be sufficient cause for disapproval of the entire submittal. Unless otherwise indicated in the submittal review commentary, disapproval of any item within the package shall require a re-submittal of the entire system package, in which all deficiencies shall be corrected. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES.

SD-02 Shop Drawings

Shop Drawings; G, RO
Installation; G, RO

Shop drawings showing all fabricated casework items in plan view, elevations and cross-sections to accurately indicate materials used, details of construction, dimensions, methods of fastening and erection, and installation methods proposed. Shop drawing casework items shall be clearly cross-referenced to casework items located on the project drawings. Shop drawings shall include a color schedule of all casework items to include all countertop, exposed, and semi-exposed cabinet finishes to include finish material manufacturer, pattern, and color.

SD-03 Product Data

Wood Materials; G, RO
Wood Finishes; G, RO
Finish Schedule; G, RO

Descriptive data which provides narrative written verification of all types of construction materials and finishes, methods of construction, etc. not clearly illustrated on the submitted shop drawings. Data shall provide written verification of conformance with AWI Qual Stds for the quality indicated to include materials, tolerances, and types of construction. Both the manufacturer of materials and the fabricator shall submit available literature which describes re-cycled product content, operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

SD-04 Samples

Plastic Laminates; G, RO

Two samples of each plastic laminate pattern and color. Samples shall be a minimum of 5 by 7 inches (120 by 170 mm) in size.

Cabinet Hardware; G, RO

One sample of each cabinet hardware item specified to include hinges, pulls, drawer glides and knobs.

SD-07 Certificates

Quality Assurance; G, RO
Laminate Clad Casework; G, RO
Veneer Clad Casework; G, RO

A quality control statement which illustrates compliance with and understanding of AWI Qual Stds requirements, in general, and the specific AWI Qual Stds requirements provided in this specification. The quality control statement shall also certify a minimum of ten years contractor's experience in laminate clad casework fabrication and construction. The quality control statement shall provide a list of a minimum of five successfully completed projects of a similar scope, size, and complexity.

1.4 QUALITY ASSURANCE

Unless otherwise noted on the drawings, all materials, construction methods, and fabrication shall conform to and comply with the premium grade quality standards as outlined in AWI Qual Stds, Section 400G and Section 400B for laminate clad cabinets. These standards shall apply in lieu of omissions or specific requirements in this specification. Contractors and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that

shown and specified. Contractor must demonstrate knowledge and understanding of AWI Qual Stds requirements for the quality grade indicated.

1.5 MOCK-UP

Prior to final approval of shop drawings, a full-size mock-up shall be provided of a typical floor cabinet. The mock-up shall include all components and hardware necessary to illustrate a completed unit and shall include a minimum of one door and one drawer assembly. The completed mock-up shall include countertops and back splashes where specified. The mock-up shall utilize specified finishes in the patterns and colors as indicated in Section 09915 COLOR SCHEDULE. Upon disapproval, the Contractor shall rework or remake the mock-up until approval is secured. Rejected units shall be removed from the jobsite. Approved mock-up may remain as part of the finished work.

1.6 DELIVERY AND STORAGE

Casework may be delivered knockdown or fully assembled. All units shall be delivered to the site in undamaged condition, stored off the ground in fully enclosed areas, and protected from damage. The storage area shall be well ventilated and not subject to extreme changes in temperature or humidity.

1.7 SEQUENCING AND SCHEDULING

Work shall be coordinated with other trades. Units shall not be installed in any room or space until painting, and ceiling installation are complete within the room where the units are located. Floor cabinets shall be installed before finished flooring materials are installed.

1.8 PROJECT/SITE CONDITIONS

Field measurements shall be verified as indicated in the shop drawings before fabrication.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

Wood products shall be from sustainable forests as certified by the Forest Stewardship Council (FSC 1.2 and FSC 5.3.3). No added urea formaldehyde resins shall be utilized in wood products.

2.1.1 Lumber

All framing lumber shall be kiln-dried Grade III to dimensions as shown on the drawings. Frame front, where indicated on the drawings, shall be nominal 3/4 inch (19 mm) hardwood.

2.1.1.1 Standing and Running Trim

Standing or running trim casework components which are specified to receive a transparent finish shall be maple hardwood species, plain sawn. Grade shall be "character". Location, shape, and dimensions shall be as indicated on the drawings.

2.1.2 Panel Products

2.1.2.1 Plywood

All plywood panels used for framing and finish purposes shall be veneer core hardwood plywood, AWI Qual Stds Grade AA. Nominal thickness of plywood panels shall be as indicated in this specification and on the drawings. Face veneer shall be "character" grade or better and finished in accordance with Section 09915 COLOR SCHEDULE.

2.1.2.2 Particleboard

All particleboard shall be industrial grade, medium density 40 to 50 pounds per cubic foot (640 to 800 kg per cubic meter), 3/4 inch (19 mm) thick. A moisture-resistant particleboard in grade Type 2-M-2 or 2-M-3 shall be used as the substrate for plastic laminate covered components as located on the drawings and other areas subjected to moisture. Particleboard shall meet the minimum standards listed in ASTM D 1037 and ANSI A208.1.

2.1.2.3 Medium Density Fiberboard

Medium density fiberboard (MDF) shall be an acceptable panel substrate where noted on the drawings. Medium density fiberboard shall meet the minimum standards listed in ANSI A208.2 and shall contain formaldehyde-free resins.

2.2 SOLID POLYMER MATERIAL

Solid surfacing casework components shall conform to the requirements of Section 06650 SOLID POLYMER FABRICATIONS.

2.3 HIGH PRESSURE DECORATIVE LAMINATE (HPDL)

All plastic laminates shall meet the requirements of NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates. Design, colors, surface finish and texture, and locations shall be as indicated on Section 09915 COLOR SCHEDULE. Plastic laminate types and nominal minimum thicknesses for casework components shall be as indicated in the following paragraphs.

2.3.1 Horizontal General Purpose Standard (HGS) Grade, PL-2

Horizontal general purpose standard grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) 1.22 mm (plus or minus 0.127 mm) in thickness. This laminate grade is intended for horizontal surfaces where postforming is not required.

2.3.2 Vertical General Purpose Standard (VGS) Grade, PL-3, PL-4, PL-5

Vertical general purpose standard grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) 0.71 mm (plus or minus 0.012 mm) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of casework components where postforming is not required.

2.3.3 Backing Sheet (BK) Grade

Undecorated backing sheet grade laminate is formulated specifically to be used on the backside of plastic laminated panel substrates to enhance dimensional stability of the substrate. Backing sheet thickness shall be

0.020 inches (0.51 mm). Backing sheets shall be provided for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

2.4 THERMO FUSED LOW PRESSURE LAMINATE (MELAMINE)

Thermoset decorative overlays (melamine panels) shall be used for casework cabinet interiors, drawer interior and all semi-exposed surfaces.

2.5 EDGE BANDING

Edge banding for casework doors and drawer fronts shall be high pressure laminate. Material width shall be as indicated on the drawings. Color and pattern shall match exposed door and drawer front laminate pattern and color.

2.6 COUNTERTOP EDGE

Where located on the drawings, edging for countertops shall be high pressure laminate with a flat edge profile. Finished width shall be as indicated on the drawings. Color shall be as indicated on Section 09915 COLOR SCHEDULE.

2.7 CABINET HARDWARE

All hardware shall conform to BHMA A156.9, unless otherwise noted, and shall consist of the following components:

a. Door Hinges: concealed type, BHMA No. B01503.

b. Cabinet Pulls: Finger pull type, of cylindrical shape with indentation at bottom for operation with one finger. Aluminum or stainless steel in brushed finish. Back mounted, grade 3.

c. Drawer Slide: Side mounted type, BHMA No. B05053 with full extension and a minimum 100 pound (45kg) load capacity. Slides shall include an integral stop to avoid accidental drawer removal.

d. Adjustable Shelf Support System: Recessed (mortised) metal standards, BHMA No. BO4071. Support clips for the standards shall be closed type, BHMA No. B04081

e. Sliding Rail System: Sliding rail system for audio/video equipment constructed of 11 gauge steel rails and 13 gauge steel pan, 300 lbs (136 kgs) capacity, and equal to Middle Atlantic Products model #SRS4-20. Coordinate with Audio/Video equipment.

2.8 FASTENERS

Nails, screws, and other suitable fasteners shall be the size and type best suited for the purpose and shall conform to ASTM F 547 where applicable.

2.9 ADHESIVES, CAULKS, AND SEALANTS

2.9.1 Adhesives

Adhesives shall be of a formula and type recommended by AWI. Adhesives shall be selected for their ability to provide a durable, permanent bond and

shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance. ~~Adhesives shall meet local regulations regarding VOC emissions and off-gassing~~All adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AWMD Rule 1168.

2.9.1.1 Wood Joinery

Adhesives used to bond wood members shall be a Type II for interior use polyvinyl acetate resin emulsion. Adhesives shall withstand a bond test as described in NWWDA I.S. 1-A.

2.9.1.2 Laminate Adhesive

Adhesive used to join high-pressure decorative laminate to wood shall be a water-based contact adhesive. PVC edgebanding shall be adhered using a polymer-based hot melt glue.

2.9.2 Caulk

Caulk used to fill voids and joints between laminated components and between laminated components and adjacent surfaces shall be clear, 100 percent silicone.

2.9.3 Sealant

Sealant shall be of a type and composition recommended by the substrate manufacturer to provide a moisture barrier at sink cutouts and all other locations where unfinished substrate edges may be subjected to moisture. All sealants used as a filler must meet or exceed California Air Resources Board AQMD 8-51.

2.10 WOOD FINISHES

Paint, stain, varnish and their applications required for veneer clad casework components shall be as indicated in Section 09915 COLOR SCHEDULE. Color and location shall be as indicated on the drawings.

2.11 ACCCESSORIES

2.11.1 Grommets

Grommets shall be plastic material for cutouts with a diameter of 2 inches (50 mm). Locations shall be as indicated on the drawings.

2.12 FABRICATION

Fabrication and assembly of components shall be accomplished at the shop site to the maximum extent possible. Construction and fabrication of cabinets and their components shall meet or exceed the requirements for AWI premium grade unless otherwise indicated in this specification. Cabinet style, in accordance with AWI Qual Stds, Section 400-G descriptions, shall be reveal overlay.

2.12.1 Base and Wall Cabinet Case Body

Frame members shall be glued-together, kiln-dried hardwood lumber. Top corners, bottom corners, and cabinet bottoms shall be braced with either hardwood blocks or water-resistant glue and nailed in place metal or plastic corner braces. Cabinet components shall be constructed from the following materials and thicknesses:

a. Body Members (Ends, Divisions, Bottoms, and Tops): 3/4 inch (19 mm) veneer core plywood panel product.

b. Face Frames and Rails: 3/4 inch (19 mm) panel product.

c. Shelving: 3/4 inch (19 mm) veneer core plywood panel product.

d. Cabinet Backs: 1/4 inch (6 mm) veneer core plywood panel product.

e. Drawer Sides, Backs, and Subfronts: 1/2 inch (13 mm) hardwood lumber or panel product.

f. Drawer Bottoms: 1/4 inch (6 mm) veneer core plywood panel product.

g. Door and Drawer Fronts: 3/4-inch (19 mm) veneer core plywood panel product.

2.12.1.1 Joinery Method for Case Body Members

a. Tops, Exposed Ends, and Bottoms.

1) Steel "European" assembly screws 1-1/2 inch (37 mm) from end, 5 inch (128 mm) on center, fasteners will not be visible on exposed parts).

2) Doweled, glued under pressure (approx. 4 dowels per 12 inches (300 mm) of joint).

3) Stop dado, glued under pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts).

b. Exposed End Corner and Face Frame Attachment.

1) For mitered joint: lock miter or spline or biscuit, glued under pressure (no visible fasteners).

2) For non-mitered joint (90 degree): butt joint glued under pressure (no visible fasteners).

c. Cabinet Backs (Wall Hung Cabinets): Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery and hanging/mounting mechanisms should transfer the load to case body members. Fabrication method shall be:

1) Full bound, captured in grooves on cabinet sides, top, and bottom. Cabinet backs for floor standing cabinets shall be side bound, captured in grooves; glued and fastened to top and bottom.

2) Full overlay, plant-on backs with minimum back thickness of 1/2 inch (13 mm) and minimum No. 12 plated (no case hardened) screws

spaced a minimum 3 inches (80 mm) on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.

d. Cabinet Backs (Floor Standing Cabinets).

1) Side bound, captured in grooves; glued and fastened to top and bottom.

2) Full overlay, plant-on backs with minimum back thickness of 1/2 inch (13 mm) and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches (80 mm) on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.

e. Wall Anchor Strips shall be required for all cabinets with backs less than 1/2 inch 13 mm) thick. Strips shall consist of minimum 1/2 inch (13 mm) thick lumber, minimum 2-1/2 inches (60 mm) width; securely attached to wall side of cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.

2.12.2 Cabinet Floor Base

Floor cabinets shall be mounted on a base constructed of 3/4 inch (19 mm) veneer core exterior plywood. Base assembly components shall be a moisture-resistant panel product. Finished height for each cabinet base shall be as indicated on the drawings. Bottom edge of the cabinet door or drawer face shall be as indicated on the drawings.

2.12.3 Cabinet Door and Drawer Fronts

Door and drawer fronts shall be fabricated from 3/4 inch (19 mm) veneer core hard plywood. Door and drawer front edges shall be surfaced with high pressure plastic laminate pr wood veneer as indicated in Section 09915 COLOR SCHEDULE.

2.12.4 Drawer Assembly

Drawer components shall consist of a removable drawer front, sides, backs, and bottom. Drawer components shall be constructed of the following materials and thicknesses:

a. Drawer Sides and Back For Thermofused Melamine Finish: 1/2 inch (13 mm) thick veneer core hard plywood.

b. Drawer Bottom: 1/4 inch (6 mm) thick veneer core hard plywood thermo fused melamine finish.

2.12.4.1 Drawer Assembly Joinery Method

a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.

b. Doweled, glued under pressure.

c. Lock shoulder, glued and pin nailed.

d. Bottoms shall be set into sides, front, and back, 1/4 inch (6 mm) deep groove with a minimum 3/8 inch (9 mm) standing shoulder.

2.12.5 Shelving

Shelving shall be fabricated from 3/4 inch (19 mm) veneer core plywood. All shelving top and bottom surfaces shall be finished with HPDL plastic laminate. Shelf edges shall be finished in a HPDL plastic laminate.

2.12.5.1 Shelf Support System

The shelf support system shall be: Recessed (mortised) metal shelf standards. Standards shall be mortised flush with the finishes surface of the cabinet interior side walls, two per side. Standards shall be positioned and spaced on the side walls to provide a stable shelf surface that eliminates tipping when shelf front is weighted. Standards shall be installed and adjusted vertically to provide a level, stable shelf surface when clips are in place.

2.12.6 Laminate Clad Countertops

Laminate countertop substrate shall be constructed of 3/4 inch (19 mm) veneer core plywood. The substrate shall be moisture-resistant where countertops receive sinks, lavatories, or are subjected to liquids. All substrates shall have sink cutout edges sealed with appropriate sealant against moisture. No joints shall occur at any cutouts. A balanced backer sheet is required.

2.12.6.1 Edge Style

Front countertop edges shall be in shapes and to dimensions as shown on the drawings. The countertop edge material shall be: Plastic laminate Self Edge. Flat, 90 degree "self " edge. Edge must be applied before top. Laminate edge shall overlap countertop laminate and shall be eased to eliminate sharp corners.

2.12.6.2 Laminate Clad Splashes

Countertop splash substrate shall be 3/4 inch (19 mm) veneer core plywood. Laminate clad backsplash shall be loose, to be installed at the time of countertop installation. Side splashes shall be straight profile and provided loose, to be installed at the time of countertop installation. Back and side splash laminate pattern and color shall match the adjacent countertop laminate.

2.12.7 Laminate Application

Laminate application to substrates shall follow the recommended procedures and instructions of the laminate manufacturer and NEMA LD 3.1, using tools and devices specifically designed for laminate fabrication and application. Provide a balanced backer sheet (Grade BK) wherever only one surface of the component substrate requires a plastic laminate finish. Apply required grade of laminate in full uninterrupted sheets consistent with manufactured sizes using one piece for full length only, using adhesives specified herein or as recommended by the manufacturer. Fit corners and joints hairline. All laminate edges shall be machined flush, filed, sanded, or buffed to remove machine marks and eased (sharp corners removed). Clean up at easing

shall be such that no overlap of the member eased is visible. Fabrication shall conform to NEMA LD 3.1 and ANSI A161.2. Laminate types and grades for component surfaces shall be as follows unless otherwise indicated on the drawings:

a. Base/Wall Cabinet Case Body.

1) Exterior (exposed) surfaces to include exposed and semi-exposed face frame surfaces: HPDL Grade VGS.

2) Interior (semi-exposed) surfaces to include interior back wall, bottom, and side walls: Thermofused melamine.

b. Adjustable Shelving.

1) Top and bottom surfaces: HPDL Grade HGS.

2) All edges: HPDL Grade VGS.

c. Fixed Shelving.

1) Top and bottom surfaces: HPDL Grade HGS.

2) Exposed edges: HPDL Grade VGS.

d. Door, Drawer Fronts, Access Panels of High Pressure Decorative Laminate.

1) Exterior (exposed) faces: HPDL Grade VGS

2) Edges: HPDL Grade VGS.

3) Interior (semi-exposed) faces: Thermofused Melamine.

e. Door, Drawer Fronts, Access Panels of Wood Veneer

1) Exterior (exposed) and interior (semi-exposed) faces: WD-2

2) Edges: Veneer edge banding to match.

f. Drawer Assembly. All interior and exterior surfaces: Thermofused Melamine.

g. Countertops and Splashes. All exposed and semi-exposed surfaces: HPDL Grade HGS

2.12.7.1 Tolerances

Flushness, flatness, and joint tolerances of laminated surfaces shall meet the AWI Qual Stds premium grade requirements.

2.12.8 Finishing

2.12.8.1 Filling

No fasteners shall be exposed on laminated surfaces. All nails, screws, and other fasteners in non-laminated cabinet components shall be countersunk and the holes filled with wood filler consistent in color with the wood species.

2.12.8.2 Sanding

All surfaces requiring coatings shall be prepared by sanding with a grit and in a manner that scratches will not show in the final system.

2.12.8.3 Coatings

Types, method of application and location of casework finishes shall be in accordance with the finish schedule, drawings and Section 09900 PAINTING, GENERAL. All cabinet reveals shall be painted.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall comply with applicable requirements for AWI Qual Stds premium quality standards. Countertops and fabricated assemblies shall be installed level, plumb, and true to line, in locations shown on the drawings. Cabinets and other laminate clad casework assemblies shall be attached and anchored securely to the floor and walls with mechanical fasteners that are appropriate for the wall and floor construction.

3.1.1 Anchoring Systems

3.1.1.1 Floor

Base cabinets shall utilize a floor anchoring system. Anchoring and mechanical fasteners shall not be visible from the finished side of the casework assembly. Cabinet assemblies shall be attached to anchored bases without visible fasteners. Where assembly abutts a wall surface, anchoring shall include a minimum 1/2 inch (13 mm) thick lumber or panel product hanging strip, minimum 2-1/2 inch (60 mm) width; securely attached to the top of the wall side of the cabinet back.

3.1.1.2 Wall

Cabinet to be wall mounted shall utilize minimum 1/2 inch (13 mm) thick lumber or panel product hanging strips, minimum 2-1/2 inch 60 mm) width; securely attached to the wall side of the cabinet back, both top and bottom.

3.1.2 Countertops

Countertops shall be installed in locations as indicated on the drawings. Countertops shall be fastened to supporting casework structure with mechanical fasteners, hidden from view. All joints formed by the countertop or countertop splash and adjacent wall surfaces shall be filled with a clear silicone caulk.

3.1.2.1 Loose Splashes

Loose back and side splashes shall be adhered to both the countertop surface perimeter and the adjacent wall surface with adhesives appropriate for the type of materials to be adhered. Joints between the countertop surface and splash shall be filled with clear silicone caulk in a smooth consistent concave bead. Bead size shall be the minimum necessary to fill the joint and any surrounding voids or cracks.

3.1.3 Hardware

Casework hardware shall be installed in types and locations as indicated on the drawings. Where fully concealed European-style hinges are specified to be used with particleboard or fiberboard doors, the use of plastic or synthetic insertion dowels shall be used to receive 3/16 inch (5 mm) "Euroscrews". The use of wood screws without insertion dowels is prohibited.

3.1.4 Doors, Drawers and Removable Panels

The fitting of doors, drawers and removable panels shall be accomplished within target fitting tolerances for gaps and flushness in accordance with AWI Qual Stds premium grade requirements.

3.1.5 Plumbing Fixtures

Sinks, sink hardware, and other plumbing fixtures shall be installed in locations as indicated on the drawings and in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

End of Section

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SECTION 06650

SOLID POLYMER (SOLID SURFACING) FABRICATIONS

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A136.1	(1992) Organic Adhesives for Installation of Ceramic Tile
ANSI Z124.3	(1995) Plastic Lavatories
ANSI Z124.6	(1997) Plastic Sinks

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 570	(1998) Water Absorption of Plastics
ASTM D 635	Fire Resistance
ASTM D 638	(1999) Tensile Properties of Plastics
ASTM D 638M	(1998) Tensile Properties of Plastics (Metric)
ASTM D 695	Compressive Strength
ASTM D 696	(1998) Coefficient of Linear Thermal Expansion of Plastics Between Minus 30 degrees C and 30 degrees C
ASTM D 785	Rockwell M Hardness
ASTM D 790	Flexural Strength
ASTM D 792	Density
ASTM D 2583	(1995) Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
ASTM E 84	(1999) Surface Burning Characteristics of Building Materials
ASTM G 21	(1996) Determining Resistance of Synthetic Polymeric Materials to Fungi
ASTM G 22	(1976; R 1996) Determining Resistance of Plastics to Bacteria

CALIFORNIA AIR RESOURCES BOARD

AQMD 8-51	(2001) Bay Area Air Quality Management District Regulation 8, Rule 51 Adhesive and Sealant Products

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(1995) High Pressure Decorative Laminates

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

1.2 GENERAL DESCRIPTION

Work in this section includes counter tops, vanity tops and other items utilizing solid polymer (solid surfacing) fabrication as shown on the drawings and as described in this specification.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G, RO
Installation; G, RO

Shop Drawings indicating locations, dimensions, component sizes, fabrication and joint details, attachment provisions, installation details, and coordination requirements with adjacent work.

SD-03 Product Data

Solid polymer material; G, RO
Qualifications; G, RO
Fabrications; G, RO

Product data indicating product description, fabrication information, and compliance with specified performance requirements for solid polymer, joint adhesive, sealants, and heat reflective tape. Both the manufacturer of materials and the fabricator shall submit a detailed description of operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

SD-04 Samples

Material; G, RO

A minimum 2 by 2 inch (50 by 50 mm) sample of each color and pattern for approval. Samples shall indicate full range of color and pattern variation. Approved samples shall be retained as a standard for this work.

Counter and Vanity Tops; G, RO

A minimum 1 foot (300 mm) wide by 6 inch (150 mm) deep, full size sample for each type of counter top shown on the project drawings. The sample shall include the edge profile and backsplash as detailed on the project drawings. Solid polymer material shall be of a pattern and color as indicated on the drawings. Sample shall include at least one seam. Approved sample shall be retained as standard for this work.

SD-06 Test Reports

Solid polymer material; G, RO

Test report results from an independent testing laboratory attesting that the submitted solid polymer material meets or exceeds each of the specified performance requirements.

SD-07 Certificates

Fabrications; G, RO
Qualifications; G, RO

Solid polymer manufacturer's certification attesting to fabricator qualification approval.

SD-10 Operation and Maintenance Data

Solid polymer material; G, RO
Clean-up; G, RO

A minimum of six copies of maintenance data indicating manufacturer's care, repair and cleaning instructions. Maintenance video shall be provided, if available. Maintenance kit for matte finishes shall be submitted.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall not be delivered to project site until areas are ready for installation. Materials shall be stored indoors and adequate precautions taken to prevent damage to finished surfaces. Protective coverings shall be provided to prevent physical damage or staining following installation, for duration of project.

1.5 WARRANTY

Manufacturer's warranty of ten years against defects in materials, excluding damages caused by physical or chemical abuse or excessive heat, shall be

provided. Warranty shall provide for material and labor for replacement or repair of defective material for a period of ten years after component installation.

1.6 QUALIFICATIONS

To insure warranty coverage, solid polymer fabricators shall be certified to fabricate by the solid polymer material manufacturer being utilized. All fabrications shall be marked with the fabricator's certification label affixed in an inconspicuous location. Fabricators shall have a minimum of 5 years of experience working with solid polymer materials.

1.7 MOCK-UP

Prior to final approval of shop drawings, a full-size mock-up shall be provided of a typical vanity top or countertop where multiple units are required. The mock-up shall include all solid polymer components required to provide a completed unit. The mock-up shall utilize finishes in patterns and colors indicated on the drawings. Should the mock-up not be approved, the Contractor shall re-work or remake it until approval is secured. Rejected units shall be removed from the jobsite. Approved mock-up may remain as part of the finished work.

PART 2 PRODUCTS

2.1 MATERIAL

Solid polymer material shall be a homogeneous filled solid polymer; not coated, laminated or of a composite construction; meeting ANSI Z124.3 and ANSI Z124.6 requirements. Material shall have minimum physical and performance properties specified. Superficial damage to a depth of 1/32 inch (0.75 mm) shall be repairable by sanding or polishing. Material thickness shall be as indicated on the drawings. In no case shall material be less than 1/4 inch (6 mm) in thickness.

2.1.1 Cast,100 Percent Acrylic Polymer Solid Surfacing Material; SS-1, SS-2

Cast, 100 percent acrylic solid polymer material shall be composed of acrylic polymer, mineral fillers, and pigments and shall meet the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	5000 psi (min.) (351 kg/cm<SPS>2</SPS>)	ASTM D 638 (ASTM D 638M)
Hardness	52-Barcol Impressor (min.)	ASTM D 2583
Thermal Expansion	.000023 in/in/F (max.) (.0000386cm/cm/degC)	ASTM D 696
Boiling water Surface Resistance	No Change	NEMA LD 3-3.05
High Temperature Resistance	No Change	NEMA LD 3-3.06

Impact Resistance (Ball drop)		NEMA LD 3-303
1/4" sheet (6.4 mm sheet)	36", 1/2 lb (910 mm, 227 g) ball, no failure	
1/2" sheet (12.7 mm sheet)	100", 1/2 lb (2540 mm, 227 g) ball, no failure	
3/4" sheet (19 mm shet)	150", 1/2 lb (3810 mm, 227m) ball, no failure	
Mold & Mildew Growth	No growth	ASTM G 21
Bacteria Growth	No Growth	ASTM G 22
Liquid Absorption (Weight in 24 hrs.)	0.1% max.	ASTM D 570
Flammability		ASTM E 84
Flame Spread	25 max.	
Smoke Developed	30 max	

2.1.2 Epoxy-modified Resin Solid Surfacing Material: SS-3

Modified epoxy resin material shall be composed of a formulation containing a DGEBA type resin, an inert filler and pegmentation, cured and cast at an elevated temperature. The material must meet the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Compressive Strength	36,500 psi (min) (2,566 kg/cm2)	ASTM D 695
Tensile Strength	10,500 psi (min.) (738 kg/cm<SPS>2</SPS>)	ASTM D 638 ASTM D 638M
Hardness	110-Rockwell M scale (min.)	ASTM D 785
Thermal Expansion	.0000131 in/in/F (max.) (.0000235 mm/mm/degC)	ASTM D 696
Density	125 lb/cubic foot (2.01 g/cm3)	ASTM D 792
Boiling water Surface Resistance	No Change	NEMA LD 3-3.05

High Temperature Resistance	No Change	NEMA LD 3-3.06
Flexural Strength	16,000 psi (1.125 kg/cm2)	ASTM D 790
Impact Resistance (Ball drop)		NEMA LD 3-303
1/4" sheet (6.4 mm sheet)	36", 1/2 lb (910 mm, 227 m) ball, no failure	
1/2" sheet (12.7 mm sheet)	140", 1/2 lb (3550 mm, 227 m) ball, no failure	
3/4" sheet (19 mm sheet)	200", 1/2 lb (507 mm, 227 m) ball, no failure	
Mold & Mildew Growth	No growth	ASTM G 21
Bacteria Growth	No Growth	ASTM G 22
Liquid Absorption (Weight in 24 hrs.)	0.0076% max.	ASTM D 570
Flammability	does not ignite	ASTM D 635

2.1.3 Material Patterns and Colors

Patterns and colors for all solid polymer components and fabrications shall be those indicated in Section 09915 COLOR SCHEDULE. Pattern and color shall occur, and shall be consistent in appearance, throughout the entire depth (thickness) of the solid polymer material.

2.1.4 Surface Finish

Exposed finished surfaces and edges shall receive a uniform appearance. Exposed surface finish shall be matte; gloss rating of 5-20.

2.2 ACCESSORY PRODUCTS

Accessory products, as specified below, shall be manufactured by the solid polymer manufacturer or shall be products approved by the solid polymer manufacturer for use with the solid polymer materials being specified. All adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AWMD Rule 1168. All sealants used as a filler must meet or exceed California Air Resources Board AQMD 8-51.

2.2.1 Seam Adhesive

Seam adhesive shall be a two-part adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid polymer materials and components to create a monolithic appearance of the fabrication. Adhesive shall be approved by the solid polymer manufacturer. Adhesive shall be color-matched to the surfaces being bonded where solid-colored, solid polymer materials are being bonded together. The seam adhesive shall be clear or color matched where particulate patterned, solid polymer materials are being bonded together.

2.2.2 Panel Adhesive

Panel adhesive shall be neoprene based panel adhesive meeting ANSI A136.1, Underwriter's Laboratories (UL) listed. This adhesive shall be used to bond solid polymer components to adjacent and underlying substrates.

2.2.3 Silicone Sealant

Sealant shall be a mildew-resistant, FDA and UL listed silicone sealant or caulk in a clear formulation. The silicone sealant shall be approved for use by the solid polymer manufacturer. Sealant shall be used to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures.

2.2.4 Conductive Tape

Conductive tape shall be manufacturer's standard foil tape, 4 mils thick, applied around the edges of cut outs containing hot or cold appliances.

2.3 FABRICATIONS

Components shall be factory or shop fabricated to the greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and manufacturer's requirements. Factory cutouts shall be provided for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii shall be routed to template, with edges smooth. Defective and inaccurate work will be rejected.

2.3.1 Joints and Seams

Joints and seams shall be formed between solid polymer components using manufacturer's approved seam adhesive. Joints shall be inconspicuous in appearance and without voids to create a monolithic appearance.

2.3.2 Edge Finishing

Rout and finish component edges to a smooth, uniform appearance and finish. Edge shapes and treatments, including any inserts, shall be as detailed on the drawings. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.3.3 Counter and Vanity Top Splashes

Backsplashes and end splashes shall be fabricated from 1/2 inch (13 mm) thick solid surfacing material and shall be 4 inches (100 mm) high.

Backsplashes and end splashes shall be provided for all counter tops and vanity tops. Backsplashes shall be shop fabricated and be loose, to be field attached.

2.3.3.1 Permanently Attached Backsplash

Permanently attached backsplashes shall be attached straight with seam adhesive to form a 90 degree transition.

2.3.3.2 End Splashes

End splashes shall be provided loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed.

2.3.4 Counter and Vanity Tops

All solid surfacing, solid polymer counter top and vanity top components shall be fabricated from 1/2 inch (13 mm) thick material. Edge details, dimensions, locations, and quantities shall be as indicated on the Drawings. Counter tops shall be complete with 4 inch (100 mm) high permanently attached, 90 degree transition at all locations. Attach 2 inch (50 mm) wide reinforcing strip of polymer material under each horizontal counter top seam.

2.3.4.1 Counter Top With Sink

Stainless Steel Sink. Countertops with sinks shall include cutouts to template as furnished by the sink manufacturer. Manufacturer's standard sink mounting hardware for stainless steel installation shall be provided. Seam between sink and counter top shall be sealed with silicone sealant. Sink, faucet, and plumbing requirements shall be in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

2.3.4.2 Vanity Tops With Bowls

A. Vitreous China Bowl: Countertops with vitreous china bowls shall include cutouts to template as furnished by the sink manufacturer. Manufacturer's standard sink mounting hardware for vitreous china installation shall be provided. Seam between sink and counter top shall be sealed with silicone sealant. Sink, faucet, and plumbing requirements shall be in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

PART 3 EXECUTION

3.1 COORDINATION

In most instances, installation of solid polymer fabricated components and assemblies will require strong, correctly located structural support provided by other trades. To provide a stable, sound, secure installation, close coordination is required between the solid polymer fabricator / installer and other trades to insure that necessary structural wall support, cabinet counter top structural support, proper clearances, and other supporting components are provided for the installation of wall panels, countertops, shelving, and all other solid polymer fabrications to the degree and extent recommended by the solid polymer manufacturer. Contractor shall appropriate staging areas for solid polymer fabrications.

3.2 INSTALLATION

3.2.1 Components

All components and fabricated units shall be installed plumb, level, and rigid. Field joints between solid polymer components to provide a monolithic appearance shall be made using solid polymer manufacturer's approved seam adhesives, with joints inconspicuous in the finished work. Metal or vitreous china sinks and lavatory bowls shall be attached to counter tops using solid polymer manufacturer's recommended clear silicone sealant and mounting hardware. Solid polymer sinks and bowls shall be installed using a color-matched seam adhesive. Plumbing connections to sinks and lavatories shall be made in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

3.2.1.1 Loose Counter Top Splashes

Loose splashes shall be mounted in locations as noted on the drawings. Loose splashes shall be adhered to the counter top with a color matched silicone sealant when the solid polymer components are solid colors. Adhesion of particulate patterned solid polymer splashes to counter tops shall utilize a clear silicone sealant.

3.2.1.2 Wall Panels & Panel Systems

Installation of wall panels and system components to substrates shall include the use of a neoprene-based panel adhesive. Seam adhesive shall be used to adhere all solid polymer components to each other with the exception of expansion joints and inside corners. All inside corners and expansion joints between solid polymer components shall be joined with silicone sealant. All joints between solid polymer components and non-solid polymer surfaces shall be sealed with a clear silicone sealant.

3.2.2 Silicone Sealant

A clear, silicone sealant or caulk shall be used to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures. Sealant bead shall be smooth and uniform in appearance and shall be the minimum size necessary to bridge any gaps between the solid surfacing material and the adjacent surface. Bead shall be continuous and run the entire length of the joint being sealed.

3.2.3 Plumbing

Plumbing connections to sinks and lavatories shall be made in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

3.3 CLEAN-UP

Components shall be cleaned after installation and covered to protect against damage during completion of the remaining project items. Components damaged after installation by other trades will be repaired or replaced at the General Contractor's cost. Component supplier will provide a repair/replace cost estimate to the General Contractor who shall approve estimate before repairs are made.

End of Section

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SECTION 07900

JOINT SEALING

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 C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 570	(1995) Oil- and Resin-Base Caulking Compound for Building Construction
ASTM C 734	(1993) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 834	(1995) Latex Sealants
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM D 217	(1997) Cone Penetration of Lubricating Grease (IP50/88)
ASTM D 1056	(1998) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM E 84	(1999) Surface Burning Characteristics of Building Materials

CALIFORNIA AIR RESOURCES BOARD

AQMD 8-51	(2001) Bay Area Air Quality Management District Regulation 8, Rule 51 Adhesive and Sealant Products

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Backing; G RO.

Bond-Breaker; G RO.

Sealant; G RO.

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

SD-07 Certificates

Sealant; G RO.

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 40 to 90 degrees F (4 to 32 degrees C) when the sealants are applied.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between 40 and 90 degrees F (4 and 32 degrees C) unless otherwise specified by the manufacturer.

PART 2 PRODUCTS

2.1 INDOOR QUALITY

All adhesives must meet or excced the VOC limits of South Coast Air Quality Management District AQMD Rule 1168. All sealants used as a filler must meet or exceed California Air Resources Board AQMD 8-51.

2.1 BACKING

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

2.~~1~~2.1 Rubber

Cellular rubber sponge backing shall be ASTM D 1056, Type 2, closed cell, Class A, round cross section.

2.~~1~~2.2 Synthetic Rubber

Synthetic rubber backing shall be ASTM C 509, Option I, Type I preformed rods or tubes.

2.~~1~~2.3 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

2.~~2~~3 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.~~3~~4 PRIMER

Primer shall be non-staining type as recommended by sealant manufacturer for the application.

2.~~4~~5 CAULKING

Oil- and resin-based caulking shall be ASTM C 570, Type I, Use only indoors and where there is little or no anticipated joint movement.

2.~~5~~6 SEALANT

2.~~5~~6.1 LATEX

Latex Sealant shall be ASTM C 834.

2.~~5~~6.2 ELASTOMERIC

Elastomeric sealants shall conform to ASTM C 920 and the following:

a. Polyurethane sealant: Grade NS, Class 25, Use NT, M, G or A as appropriate for adjacent materials.

2.~~5~~6.3 ACOUSTICAL

Rubber or polymer-based acoustical sealant shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. Acoustical sealant shall have a consistency of 250 to 310 when tested in accordance with ASTM D 217, and shall remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and shall be non-staining.

2.~~5~~6.4 PREFORMED

Preformed sealant shall be polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F (34 to plus 71 degrees C), the sealant shall be non-bleeding and shall have no loss of adhesion.

2.~~5~~6.4.1 Tape

Tape sealant: cross-section dimensions shall be as indicated.

2.~~5~~6.4.2 Bead

Bead sealant: cross-section dimensions shall be as indicated.

2.~~5~~6.4.3 Foam Strip

Foam strip shall be polyurethane foam; cross-section dimensions shall be as indicated. Foam strip shall be capable of sealing out moisture, air, and dust when installed and compressed as recommended by the manufacturer. Service temperature shall be minus 40 to plus 275 degrees F (minus 40 to plus 135 degrees C). Untreated strips shall be furnished with adhesive to hold them in place. Adhesive shall not stain or bleed into adjacent finishes. Treated strips shall be saturated with butylene waterproofing or impregnated with asphalt.

2.~~6~~7 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

3.1.4 Aluminum Surfaces

Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be non-staining.

3.1.5 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

3.2 APPLICATION

3.2.1 Masking Tape

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

3.2.2 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

3.2.3 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

3.2.4 Primer

Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

3.2.5 Sealant

Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Joints shall be sealed as detailed in the drawings. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

End of Section

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SECTION 08210

WOOD DOORS

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 the basic designation only.

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds	(1997) Architectural Woodwork Quality Standards and Quality Certification Program

FOREST STEWARDSHIP COUNCIL

FSC 1.2	(2000) FSC Principles and Criteria of Forest Stewardship
FSC 5.3.5	(2003) Forests Certified by FSC-Accredited Certification Bodies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1995) Fire Doors and Fire Windows

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

NWWDA I.S. 1-A	(1993) Architectural Wood Flush Doors
NWWDA TM-5	(1990) Split Resistance Test
NWWDA TM-7	(1990) Cycle - Slam Test
NWWDA TM-8	(1990) Hinge Loading Resistance Test

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors; G

Submit drawings or catalog data showing each type of door unit. Drawings and data shall indicate door type and construction, sizes, thickness, methods of assembly and glazing.

SD-03 Product Data

Doors; G

Accessories

Water-resistant sealer

Sample warranty

SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of each type of door which shows the stile, rail, veneer, finish, and core construction.

Door finish colors; G

Submit a minimum of three color selection samples.

SD-06 Test Reports

Split resistance

Cycle-slam

Hinge loading resistance

Submit split resistance test report for doors tested in accordance with NWWDA TM-5, cycle-slam test report for doors tested in accordance with NWWDA TM-7, and hinge loading resistance test report for doors tested in accordance with NWWDA TM-8.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of 4 inches (100 mm) thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete, masonry work, and plaster are dry. Replace defective or damaged doors with new ones.

1.4 WARRANTY

Warranty shall warrant doors free of defects as set forth in the door manufacturer's standard door warranty.

PART 2 PRODUCTS

2.1 DOORS

Provide doors of the types, sizes, and designs indicated.

2.1.1 Flush Doors

Flush doors shall conform to NWWDA I.S. 1-A. Hollow core doors shall have lock blocks and one inch (25 mm) minimum thickness hinge stile. Stile edge bands of doors to receive natural finish shall be hardwood, compatible with face veneer. Stile edge bands of doors to be painted shall be mill option specie. No visible finger joints will be accepted in stile edge bands. When used, locate finger-joints under hardware.

2.1.1.1 Interior Flush Doors

Provide staved lumber core, Type II flush doors conforming to NWWDA I.S. 1-A with faces of character grade maple. Hardwood veneers shall be plain sliced book matched. Wood door products shall be from sustainable forests as certified by the Forest Stewardship Council (FSC 1.2 and FSC 5.3.3). No added urea formaldehyde resins shall be utilized in door components.

2.1.2 Door Frames

Frames for interior wood doors to be for clear finish, with 3 piece adjustable jamb units. Provide doors as specified complete with frame, hinges and prepared to receive finish hardware. Wood frame products shall be from sustainable forests as certified by the Forest Stewardship Council (FSC 1.2 and FSC 5.3.3).

2.2 ACCESSORIES

2.2.1 Additional Hardware Reinforcement

Provide fire rated doors with hardware reinforcement blocking. Size of lock blocks shall be as required to secure the hardware specified. Reinforcement blocking shall be in compliance with the manufacturer's labeling requirements and shall not be mineral material similar to the core.

2.3 FABRICATION

2.3.1 Marking

Each door shall bear a stamp, brand, or other identifying mark indicating quality and construction of the door.

2.3.2 Quality and Construction

Identify the standard on which the construction of the door was based, identify the standard under which preservative treatment was made and identify doors having a Type I glue bond.

2.3.3 Adhesives and Bonds

NWWDA I.S. 1-A. Use Type I bond for exterior doors and Type II bond for interior doors. Adhesive for doors to receive a natural finish shall be non-staining. ~~Adhesives used shall be low VOC~~All adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AWMD Rule 1168.

2.3.4 Pre-Fitting

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

2.3.5 Finishes

2.3.5.1 Factory Finish

Provide doors finished at the factory by the door manufacturer as follows: AWI Qual Stds Section 1500, specification for System No. 4 Conversion varnish alkyd urea or System No. 5 Vinyl catalyzed. The coating shall be AWI Qual Stds premium, medium rubbed sheen, closed grain effect. Use stain when required to produce the finish specified for color. Seal edges, cutouts, trim, and wood accessories, and apply two coats of finish compatible with the door face finish. Touch-up finishes that are scratched or marred, or where exposed fastener holes are filled, in accordance with the door manufacturer's instructions. Match color and sheen of factory finish using materials compatible for field application.

2.3.5.2 Color

Provide door finish colors as indicated in Section 09915, COLOR SCHEDULE.

2.3.6 Water-Resistant Sealer

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

2.4 SOURCE QUALITY CONTROL

Stiles of "B" and "C" label fire doors utilizing standard mortise leaf hinges shall meet the following performance criteria:

a. Split resistance: Average of ten test samples shall be not less than 500 pounds (225 kilograms) load when tested in accordance with NWWDA TM-5.

b. Cycle-slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of NWWDA TM-7.

c. Hinge loading resistance: Average of ten test samples shall be not less than 700 pounds (315 kilograms) load when tested for direct screw withdrawal in accordance with NWWDA TM-8 using a No. 12, 1 1/4 inch (30 mm) long, steel, fully threaded wood screw. Drill 5/32 inch (4 mm) pilot hole, use 1 1/2 inch (40 mm) opening around screw for bearing surface, and engage screw full, except for last 1/8 inch (3 mm). Do not use a steel plate to reinforce screw area.

PART 3 EXECUTION

3.1 INSTALLATION

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 1/16 inch (2 mm) minimum, 1/8 inch (3 mm) maximum clearance at sides and top, and a 3/16 inch (5 mm) minimum, 1/4 inch (6 mm) maximum clearance over thresholds. Provide 3/8 inch (10 mm) minimum, 7/16 inch (11 mm) maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 1/8 inch in 2 inches (3 mm in 50 mm. Door warp shall not exceed 1/4 inch when measured in accordance with NWWDA I.S. 1-A.

3.1.1 Fire Doors

Install fire doors in accordance with NFPA 80. Do not paint over labels.

3.1.2 Prehung Doors

Install doors in accordance with the manufacturer's instructions and details. Provide fasteners for stops and casing trim within 3 inches (75 mm) of each end and spaced 11 inches (275 mm) on centers maximum. Provide side and head jambs joined together with a dado or notch of 3/16 inch (5 mm) minimum depth.

3.1.3 Acoustic Seals

Install doors in strict accordance with the manufacturer's printed instructions and details. Seal doors swing-type doors at heads and jambs to provide continuous installation. Apply caulk to door frames at jambs and head.

End of Section

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SECTION 08520

ALUMINUM AND ENVIRONMENTAL CONTROL ALUMINUM WINDOWS

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.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 101	(1997) Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors
AAMA 603	(1998) Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
AAMA 605	(1998) voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 90	(1999) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
ASTM E 283	(1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 330	(1997el) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM E 331	(1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM E 413	(1987; R 1999) Rating Sound Insulation

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(1997) Procedure for Determining Fenestration Product U-factors

NFRC 200	(1997) Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence

1.2 WINDOW PERFORMANCE

Aluminum windows shall meet the following performance requirements. Testing requirements shall be performed by an independent testing laboratory or agency.

1.2.1 Structural Performance

Structural test pressures on window units shall be for positive load (inward) and negative load (outward) in accordance with ASTM E 330. After testing, there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by AAMA 101 for the window types and classification specified in this section.

1.2.2 Air Infiltration

Air infiltration shall not exceed the amount established by AAMA 101 for each window type when tested in accordance with ASTM E 283.

1.2.3 Water Penetration

Water penetration shall not exceed the amount established by AAMA 101 for each window type when tested in accordance with ASTM E 331.

1.2.4 Thermal Performance

Thermal transmittance for thermally broken aluminum windows with insulating glass shall not exceed a U-factor of 0.~~35~~ 65 Btu/hr-ft<SPS>2</SPS>-F (2.0 W/m<SPS>2</SPS>K) determined according to NFRC 100. ~~Window units shall comply with the U.S. Department of Energy, Energy Star Window Program for the Northern Climate Zone.~~

1.2.5 Condensation Index Rating

The condensation index rating shall be 85 as determined using NFRC approved software THERM.

1.2.6 Sound Attenuation

The window unit shall have a minimum STC of 41 with the window glazed with two pieces of 1/4 inch (6 mm) thick laminated glass or (use laminated glass where indicated) 34 with the window glazed with 1/2 inch (13 mm) air space between two pieces of 1/4 inch (6 mm) thick glass when tested in accordance with ASTM E 90 and ASTM E 413.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aluminum Windows; G DO

Drawings indicating elevations of window, rough-opening dimensions for each type and size of window, full-size sections, thicknesses of metal, fastenings, methods of installation and anchorage, connections with other work, type of wall construction, size and spacing of anchors, method of glazing, types and locations of operating hardware, mullion details, weatherstripping details and window schedules showing locations of each window type.

SD-03 Product Data

Aluminum Windows; G DO

Manufacturer's descriptive data and catalog cut sheets.

Manufacturer's preprinted installation instructions and cleaning instructions.

SD-04 Samples

Aluminum Windows; G DO

Manufacturer's standard color samples of the specified finishes.

SD-06 Test Reports

Aluminum Windows; G DO

Reports for each type of aluminum window attesting that identical windows have been tested and meet all performance requirements established under paragraph WINDOW PERFORMANCE.

SD-07 Certificates

Aluminum Windows; G DO

Certificates stating that the aluminum windows are AAMA certified conforming to requirements of this section. Labels or markings permanently affixed to the window will be accepted in lieu of certificates. Product ratings determined using NFRC 100 and NFRC 200 shall be authorized for certification and properly labeled by the manufacturer.

1.4 QUALIFICATION

Window manufacturer shall specialize in designing and manufacturing the type of aluminum windows specified in this section, and shall have a minimum of 10 years of documented successful experience. Manufacturer shall have the facilities capable of meeting contract requirements, single-source responsibility and warranty.

1.5 MOCK-UPS

Before fabrication, full-size mock-up of one window unit complete with glass and AAMA certification label for structural purposes and NFRC Temporary and Permanent Label for certification of thermal performance raitingwill be required for review of window construction and quality of hardware operation.

1.6 DELIVERY AND STORAGE

Aluminum windows shall be delivered to project site and stored in accordance with manufacturer's recommendations. Damaged windows shall be replaced with new windows.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 ALUMINUM WINDOW TYPES

OPTIONAL PERFORMANCE CLASSES ENGLISH

Optional Performance Class	Applicable Product Designation	*A Design Pressure lb/ft sq.	*B Structural Test Pressure lb/ft sq.	Water Resistance Test Pressure lb/ft sq. R,C,HC	AW
20	R	20.0	30.0	3.00	
25	R	25.0	37.5	3.75	
30	R,LC	30.0	45.0	4.50	
35	R,LC,C	35.0	52.5	5.25	
40	R,LC,C	40.0	60.0	6.00	
45	R,LC,C,HC,AW	45.0	67.5	6.75	
50	R,LC,C,HC,AW	50.0	75.0	7.50	
55	R,LC,C,HC,AW	55.0	82.5	8.25	11.0
60	R,LC,C,HC,AW	60.0	90.0	9.00	12.0
65	R,LC,C,HC,AW	65.0	97.5	9.75	12.0
70	R,LC,C,HC,AW	70.0	105.0	10.50	12.0
75	R,LC,C,HC,AW	75.0	112.5	11.25	12.0
80	R,LC,C,HC,AW	80.0	120.0	12.00	12.0
85	R,LC,C,HC,AW	85.0	127.5	12.00	12.0
90	R,LC,C,HC,AW	90.0	135.0	12.00	12.0

*A. Design pressure = Performance Class

*B. Structural test pressures shown are for both positive and negative loads.

Aluminum windows shall consist of complete units including sash, glass, frame, weatherstripping thermal break type double-glazed. Thermal barrier shall be neoprene, rigid vinyl, or polyurethane and shall be resistant to weather. Window members shall be heli-arc welded or angle-reinforced and mechanically joined and sealed. Exposed welded joints shall be dressed and finished. Joints shall be permanent and weathertight. Frames shall be constructed to provide a minimum 1/4 inch (6 mm) thermal break between the exterior and interior frame surfaces. Sash corners shall be internally sealed to prevent air and water leaks. Inner sash shall be key-controlled to swing to the interior to allow maintenance and replacement of the glass. Not less than 5 control keys shall be furnished. Operable windows shall permit cleaning the outside glass from inside the building.

2.1.1 Fixed Windows

Aluminum fixed (F) windows shall conform to AAMA 101 F-HC40 type, non-operable glazed frame, complete with provisions for reglazing in the field.

2.2 WEATHERSTRIPPING

Weatherstripping for ventilating sections shall be of type designed to meet water penetration and air infiltration requirements specified in this section in accordance with AAMA 101, and shall be manufactured of material compatible with aluminum and resistant to weather. Weatherstrips shall be factory-applied and easily replaced in the field. Neoprene or polyvinylchloride weatherstripping are not acceptable where exposed to direct sunlight.

2.3 ACCESSORIES

2.3.1 Fasteners

Fastening devices shall be window manufacturer's standard design made from aluminum or non-magnetic stainless steel in compliance with AAMA 101. Self-tapping sheet metal screws will not be acceptable for material thicker than 1/16 inch (2 mm).

2.3.2 Hardware

Hardware shall be as specified for each window type and shall be fabricated of aluminum, stainless steel, cadmium-plated steel, zinc-plated steel or nickel/chrome-plated steel in accordance with requirements established by AAMA 101.

2.3.3 Window Anchors

Anchoring devices for installing windows shall be made of aluminum, cadmium-plated steel, stainless steel, or zinc-plated steel conforming to AAMA 101.

2.4 GLASS AND GLAZING

Aluminum windows shall be designed for inside glazing, field glazing, and for glass types scheduled on drawings and specified in Section 08810 GLASS

AND GLAZING. Units shall be complete with glass and glazing provisions to meet AAMA 101. Glazing material shall be compatible with aluminum, and shall not require painting.

2.5 FINISH

2.5.1 Anodized Aluminum Finish

Exposed surfaces of aluminum windows shall be finished with anodic coating conforming to AA DAF-45: Architectural Class I, AA-M10-C22-A41, clear anodic coating, 0.7 mil (0.02 mm)or thicker, 215-R1 Natural Color. Finish shall be free of scratches and other blemishes.

2.5.2 Baked-Acrylic Resin-Based Coating

Exposed surfaces of aluminum windows shall be finished with acrylic resin-based coating conforming to AAMA 603, total dry thickness of 1.0 mils (0.03 mm). Finish shall be free of scratches and other blemishes.

2.5.3 High-Performance Coating

Exposed surfaces of aluminum windows shall be finished with a two-coat fluoropolymer coating system containing at least 70 percent by weight polyvinylidene fluoride, PVF2 resin, factory-applied, oven-baked, conforming to AAMA 605, with a primer coat of 0.20 to 0.30 mils (0.005 to 0.008 mm) and a color coat of minimum 1.0 mil (0.025 mm), total dry film thickness of 1.20 to 1.3 mils (0.030 to 0.033 mm). Finish shall be free of scratches and other blemishes.

2.5.4 Color

Color shall be in accordance with Section 09915 COLOR SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Aluminum windows shall be installed in accordance with approved shop drawings and manufacturer's published instructions. Aluminum surfaces in contact with masonry, concrete, wood and dissimilar metals other than stainless steel, zinc, cadmium or small areas of white bronze, shall be protected from direct contact using protective materials recommended by AAMA 101. The completed window installation shall be watertight in accordance with Section 07900 JOINT SEALING. Glass and glazing shall be installed in accordance with requirements of this section and Section 08810 GLASS AND GLAZING.

3.2 ADJUSTMENTS AND CLEANING

3.2.1 Hardware Adjustments

Final operating adjustments shall be made after glazing work is complete. Operating sash or ventilators shall operate smoothly and shall be weathertight when in locked position.

3.2.2 Cleaning

Aluminum window finish and glass shall be cleaned on exterior and interior sides in accordance with window manufacturer's recommendations. Alkaline or abrasive agents shall not be used. Precautions shall be taken to avoid scratching or marring window finish and glass surfaces.

End of Section

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SECTION 08810

GLASS AND GLAZING

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; R 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 669	(1995) Glazing Compounds for Back Bedding and Face Glazing of Metal Sash
ASTM C 864	(1999) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM C 1036	(1991; R 1997) Flat Glass
ASTM C 1048	(1997b) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM C 1172	(1996el) Laminated Architectural Flat Glass
ASTM D 395	(1998) Rubber Property - Compression Set
ASTM E 119	(1998) Fire Tests of Building Construction and Materials
ASTM E 773	(1997) Accelerated Weathering of Sealed Insulating Glass Units
ASTM E 774	(1997) Classification of the Durability of Sealed Insulating Glass Units
ASTM E 1300	(1998) Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201	Safety Standard for Architectural Glazing Materials

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-378	(Basic) Putty Linseed Oil Type, (for Wood-Sash-Glazing)

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(1997) Glazing Manual
GANA Standards Manual	(1995) Engineering Standards Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G, RO

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

SD-03 Product Data

Insulating Glass; G, RO
Glazing Accessories

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-04 Samples

Insulating Glass; G, RO

Two 8 x ~~10~~ 10-inch (203 x 254 mm) samples of each of the following: tinted glass, patterned glass, heat-absorbing glass, and insulating glass units.

SD-07 Certificates

Insulating Glass

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

Certificates from the manufacturer attesting that the units meet the luminous and solar radiant transmission requirements for heat absorbing glass.

1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind/snow loading in accordance with ASTM E 1300.

1.4 DELIVERY, STORAGE AND HANDLING

Glazing compounds shall be delivered to the site in the manufacturer's unopened containers. Glass shall be stored indoors in a safe, ~~well~~ well- ventilated dry location in accordance with manufacturer's instructions, and shall not be unpacked until needed for installation. Glass shall not be stored on site over 1 month.

1.5 PROJECT/SITE CONDITIONS

Glazing work shall not be started until outdoor temperature is above 40 degrees F (5 degrees C) and rising, unless procedures recommended by glass manufacturer and approved by Contracting Officer are made to warm the glass and rabbet surfaces. Ventilation shall be provided to prevent condensation of moisture on glazing work during installation. Glazing work shall not be performed during damp or raining weather.

1.6 WARRANTY

1.6.1 Insulating Glass

Manufacturer shall warrant the insulating glass to be free of fogging or film formation on the internal glass surfaces caused by failure of the hermetic seal for a period of 10 years from Date of Substantial Completion. Warranty shall be signed by manufacturer.

1.6.2 Monolithic Reflective Glass

Manufacturer shall warrant the monolithic reflective glass to be free of peeling or deteriorating of coating for a period of 10 years after Date of Substantial Completion. Warranty shall be signed by manufacturer.

1.6.3 Monolithic Opacified Spandrel

Manufacturer shall warrant the opacifier film on the spandrel to be free of peeling for a period of five years after Date of Substantial Completion. Warranty shall be signed by manufacturer.

PART 2 PRODUCTS

2.1 FLOAT GLASS

2.1.1 Annealed Glass

Annealed glass shall be Type I transparent flat type, Class 1 - clear or tinted as indicated, Quality q3 - glazing select, 73 percent light transmittance, 0.96 percent shading coefficient for clear 14 percent light transmittance, 0.53 shading coefficient for tinted, conforming to ASTM C 1036. Color shall be as shown in Section 09915 COLOR SCHEDULE.

2.1.2 Tinted (Light-Reducing) Glass

Tinted (light-reducing) glass shall be Type I transparent flat type, Class 3-tinted, Quality q3 - glazing select, 14 percent light transmittance, 0.53 percent shading coefficient, conforming to ASTM C 1036. Color shall be as shown in Section 09915 COLOR SCHEDULE.

2.2 ROLLED GLASS

2.3 INSULATING GLASS

Insulating glass shall be Class A preassembled units of dual-seal construction consisting of lites of glass separated by an aluminum, steel, or stainless steel, spacer and dehydrated space conforming to ASTM E 773 and ASTM E 774. Spacer shall be roll-formed, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone. Glass types shall be as follows:

2.3.1 Clear Insulating Glass

Glass for two-pane insulating units shall be Type I annealed glass, Class 1 - clear, Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be R-Value/Winter Nighttime 3.57 (K-Value/Winter Nighttime).

2.3.2 Low-E Insulating Glass

Interior and exterior glass panes for Low-E insulating units shall be laminated glass, Type 1, clear or translucent for inner pane and tinted or non-tinted, tempered or float, as indicated~~Type 2-tinted~~ for outer pane ~~2-tinted~~ with anti-reflective low-emissivity coating on No. 2 surface (inside surface of exterior pane), Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be R-Value/Winter Nighttime 3.22 (K-Value/Winter Nighttime), shading coefficient .26. Color shall be gray as shown in Section 09915 COLOR SCHEDULE.

2.4 HEAT-TREATED GLASS

Heat-treated glass shall conform to the following requirements.

2.4.1 Tempered Glass

Tempered glass shall be kind FT fully tempered transparent flat type, Class 1-clear or 2-tinted as indicated, Condition A uncoated surface, Quality q3 - glazing select. Tinted glazing shall have 73 percent light transmittance, 0.96 percent shading coefficient conforming to ASTM C 1048 and GANA Standards Manual. Color shall be as shown in Section 09915 COLOR SCHEDULE.

2.4.2 Heat-Strengthened Glass

Heat-strengthened glass shall be kind HS heat-strengthened transparent flat type, Class 1-clear or 2-tinted as indicated, Condition A uncoated surface, Quality q3 - glazing select, conforming to ASTM C 1048. Color shall be as shown in Section 09915 COLOR SCHEDULE.

2.5 LAMINATED GLAZINGS

2.5.1 Laminated Glass

Laminated glass shall consist of two layers of Type I transparent float glass, Class 1-clear or 2-tinted Quality q3 - glazing select, conforming to ASTM C 1036. Glass shall be bonded together with 0.030 inch (0.76 mm) thick PVB interlayer under pressure, or alternatives such as resin laminates, conforming to requirements of 16 CFR 1201 and ASTM C 1172. Color shall be clear or gray as shown in Section 09915 COLOR SCHEDULE.

2.6 FIRE/SAFETY RATED GLASS

Fire/safety rated glass shall be laminated Type I transparent flat type, Class 1-clear. Glass shall have a 20, 45, or 60 minute rating to match rating of door when tested in accordance with ASTM E 119. Glass shall be permanently labeled with appropriate markings.

2.7 MIRRORS

2.7.1 Glass Mirrors

Glass for mirrors shall be Type I transparent flat type, Class 1-clear, Glazing Quality q1 1/4 inch (6 mm) thick conforming to ASTM C 1036. Glass color shall be clear. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness which shall provide reflectivity of 83 percent or more of incident light when viewed through 1/4 inch (6 mm) thick glass, and shall be free of pinholes or other defects. Copper protective coating shall be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and shall be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint, and shall be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.7.2 Mirror Accessories

2.7.2.1 Mastic

Mastic for setting mirrors shall be a polymer type mirror mastic resistant to water, shock, cracking, vibration and thermal expansion. Mastic shall be compatible with mirror backing paint, and shall be approved by mirror manufacturer.

2.7.2.2 Mirror Frames

Mirrors shall be provided with mirror frames (J-mold channels) fabricated of one-piece roll-formed Type 304 stainless steel with No. 4 brushed satin finish and concealed fasteners which will keep mirrors snug to wall. Frames shall be 1-1/4 x 1/4 x 1/4 inch (32 x 6 x 6 mm) continuous at top and bottom of mirrors. Concealed fasteners of type to suit wall construction material shall be provided with mirror frames.

2.7.2.3 Mirror Clips

Concealed fasteners of type to suit wall construction material shall be provided with clips.

2.8 GLAZING ACCESSORIES

2.8.1 Preformed Tape

Preformed tape shall be elastomeric rubber extruded into a ribbon of a width and thickness suitable for specific application. Tape shall be of type which will remain resilient, have excellent adhesion, and be chemically compatible to glass, metal, or wood.

2.8.2 Sealant

Sealant shall be elastomeric conforming to ASTM C 920, Type S or M, Grade NS, Class 12.5, Use G, of type chemically compatible with setting blocks, preformed sealing tape and sealants used in manufacturing insulating glass. Color of sealant shall be as selected.

2.8.3 Glazing Gaskets

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

2.8.3.1 Fixed Glazing Gaskets

Fixed glazing gaskets shall be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C 509, Type 2, Option 1.

2.8.3.2 Wedge Glazing Gaskets

Wedge glazing gaskets shall be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM C 864, Option 1, Shore A durometer between 65 and 75.

2.8.3.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing shall be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

2.8.4 Putty and Glazing Compound

Glazing compound shall conform to ASTM C 669 for face-glazing metal sash. Putty shall be linseed oil type conforming to CID A-A-378for face-glazing primed wood sash. Putty and glazing compounds shall not be used with insulating glass or laminated glass.

2.8.5 Setting and Edge Blocking

Neoprene setting blocks shall be dense extruded type conforming to ASTM D 395, Method B, Shore A durometer between 70 and 90. Edge blocking shall be Shore A durometer of 50 (+ or - 5). Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

Openings and framing systems scheduled to receive glass shall be examined for compliance with approved shop drawings, GANA Glazing Manual and glass manufacturer's recommendations including size, squareness, offsets at corners, presence and function of weep system, face and edge clearance requirements and effective sealing between joints of glass-framing members. Detrimental materials shall be removed from glazing rabbet and glass surfaces and wiped dry with solvent. Glazing surfaces shall be dry and free of frost.

3.2 INSTALLATION

Glass and glazing work shall be performed in accordance with approved shop drawings, GANA Glazing Manual, glass manufacturer's instructions and warranty requirements. Glass shall be installed with factory labels intact and removed only when instructed. Wired glass and fire/safety rated glass shall be installed in accordance with NFPA 80. Edges and corners shall not be ground, nipped or cut after leaving factory. Springing, forcing or twisting of units during installation will not be permitted.

3.3 CLEANING

Upon completion of project, outside surfaces of glass shall be washed clean and the inside surfaces of glass shall be washed and polished in accordance with glass manufacturer's recommendations.

3.4 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

End of Section

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4078	(1992; R 1996) Water Emulsion Floor Polish
ASTM E 648	(2000) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 662	(2001) Specific Optical Density of Smoke Generated by Solid Materials
ASTM F 2195	(2002) Linoleum Floor Tile

CALIFORNIA AIR RESOURCES BOARD

AQMD 8-51	(2001) Bay Area Air Quality Management District Regulation 8, Rule 51 Adhesive and Sealant Products

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

1.2 FIRE RESISTANCE REQUIREMENTS

Flooring 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. The smoke density rating shall be less than 450 when tested in accordance with ASTM E 662.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Sheet Flooring; G RO
Tile Flooring; G RO

Drawings indicating location of seams, integral cove, including details of outside corner and cap, and edge strips.

SD-03 Product Data

Tile Flooring; G RO
Sheet Flooring; G RO
Integral Coved Base; G RO
Adhesive for Sheet Vinyl
Adhesive for Vinyl Composition Tile
Adhesive for Wall Base

Manufacturer's descriptive data and installation instructions including cleaning and maintenance instructions.

SD-04 Samples

Tile Flooring; G RO
Sheet Flooring; G RO
Seaming Bead; G RO
Wall Base; G RO

Three samples of each indicated color and type of flooring and base. Sample size shall be minimum 2-1/2 x 4 inches (60 x 100 mm).

SD-06 Test Reports

Moisture Test

Copies of test reports showing that representative product samples of the flooring proposed for use have been tested by an independent testing laboratory within the past three years or when formulation change occurred and conforms to the requirements specified.

SD-08 Manufacturer's Instructions

Sheet Flooring
Tile Flooring

Copies of flooring manufacturer's recommended installation procedures.

SD-10 Operation and Maintenance Data

Data Package 1; G RO

Data Package in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the building site in original unopened containers bearing the manufacturer's name, brands, stock names, production run, project identification, and handling instructions. Materials shall be stored in a clean dry area with temperature maintained above 70 degrees F (21 degrees C) for 2 days prior to installation, and shall be stacked

according to manufacturer's recommendations. Materials shall be protected from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances. Do not open containers until materials are to be used, except for inspection to verify compliance with requirements.

1.5 ENVIRONMENTAL REQUIREMENTS

a. Areas to receive resilient flooring shall be maintained at a temperature above 70 degrees F (21 degrees C) and below 100 degrees F (38 degrees C) for 2 days before application, during application and 2 days after application and until flooring is tensioned to a point of being completely smooth. A minimum temperature of 55 degrees F (13 degrees C) shall be maintained thereafter.

b. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

1.6 SCHEDULING

Resilient flooring application shall be scheduled after the completion of other work which would damage the finished surface of the flooring.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.8 EXTRA MATERIALS

Extra flooring material and butt-to base of each color and pattern shall be furnished at the rate of 10 tiles for each 1000 tiles. Extra materials shall be from the same lot as those installed. Extra base material composed of 20 linear feet (6 m) of each color shall be furnished. All extra materials shall be packaged in original containers, properly marked.

PART 2 PRODUCTS

	A	B	C
Medical operating rooms	yes	yes	no
Delivery rooms	yes	yes	no
Cast rooms	yes	yes	no
Emergency rooms	yes	yes	no
Isolation rooms	yes	yes	yes
Other medical areas	no	no	no
Dental operatories	yes	yes	no
Clean corridors	yes	yes	yes
High-traffic corridors	yes	yes	no
Laboratories/research areas	yes	yes	yes
Public areas where smoking is allowed	no	no	no
Food preparation and serving areas	no	no	no

2.1 UNDERLAYMENT

Underlayment shall be latex type, as recommended by flooring manufacturer. Wood and hardboard underlayments are specified in Section 06100 ROUGH CARPENTRY.

2.2 TILE FLOORING

2.2.1 Linoleum Tile; RTL-1, RTL-2, RTL-3

Linoleum tile shall conform to ASTM F 2195, (through pattern tile), asbestos-free, and shall be 18.9 inches (48 cm) square and 1/10 inch (2.5 mm) thick. Tile shall have the color and pattern uniformly distributed throughout the thickness of the tile and a Woven Jute backing for dimensional stability. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.

2.2.2 Adhesive for Linoleum Tile

Cutback adhesive for installation of tile over concrete above, on or above grade. Moisture and alkali resistant. Non-asbestos formulated or a latex adhesive recommended by flooring manufacturer. Adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AQMD Rule # 1168.

2.3 STRIPS; FT-1, FT-2

2.3.1 Transition

Provide transition strip of nonferrous metal or resilient rubber and approved by flooring manufacturer. Limit vertical lips in edge strips to 1/4 inch (6 mm); limit total rise to 1/2 inch (13 mm).

2.4 WALL BASE; RB-1

Base shall be manufacturers standard rubber. Base shall be 4 inches (100 mm) high and a minimum 1/8 inch (3 mm) thick, in approved color, and in matte finish~~sih~~. Preformed outside corners shall be furnished. Use flexible base to conform to irregularities in walls, partitions, and floors. Provide premolded corners in matching size, shape, and color for all right-angle inside and outside corners.

2.4.1 Adhesive for Wall Base

Adhesive for wall base shall be emulsified acrylic latex; non-flammable. Adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AQMD Rule #1168.

2.5 POLISH/FINISH

Polish shall conform to ASTM D 4078. Use flooring manufacturer's standard high-solids finish for shine without buffing; non-flammable; compatible with factory-applied finish; may be buffed or burnished for maximum gloss.

2.6 CAULKING AND SEALANTS

Caulking and sealants shall be in accordance with Section 07900 JOINT SEALING. All sealants used as a filler must meet or exceed California Air Resources Board AQMD 8-51.

2.7 MANUFACTURER'S COLOR AND TEXTURE

Color and distinct pattern shall be uniformly distributed throughout thickness of tile. Color and texture shall be in accordance with Section 09915 COLOR SCHEDULE. Flooring in continuous area or replacement of damaged flooring in continuous area shall be from same production run with same shade and pattern,

PART 3 EXECUTION

3.1 EXAMINATION/VERIFICATION OF CONDITIONS

The Contractor shall examine and verify that site conditions are in agreement with the design package and shall report all conditions that will prevent a proper installation. The Contractor shall not take any corrective action without written permission from the Government.

3.1.1 Subfloor Requirements

Provide subfloor and underlayment as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.1.2 Surface Examination

Examine surfaces to receive sheet linoleum flooring. Correct conditions which will impair proper installation, including:

a. Variation in surface level greater than 1/8 inch in 10 feet (1 mm in 1 m).

b. Trowel marks, pits, dents, protrusions.

c. 1/16 inch (2 mm) wide or wider cracks.

d. Chalk and dust.

e. Oil, paint, wax, and other deleterious substances.

f. Moisture.

g. Concrete curing agents, paint, and sealers that can inhibit bonding or harm flooring.

3.2 SURFACE PREPARATION

Flooring shall be in a smooth, true, level plane, except where indicated as sloped. Before any work under this section is begun, all defects such as rough or scaling concrete, low spots, high spots, and uneven surfaces shall have been corrected, and all damaged portions of concrete slabs shall have been repaired as recommended by the flooring manufacturer. Concrete curing compounds, other than the type that does not adversely affect adhesion,

shall be entirely removed from the slabs. Paint, varnish, oils, release agents, sealers, waxers, and adhesives shall be removed, as recommended by the flooring manufacturer.

3.2.1 Concrete Floor

Grind ridges and other uneven surfaces smooth. Cut out and fill cracks 1/16 inch (2 mm) or wider with crack filler. Provide mastic underlayment to fill remaining holes, cracks, and depressions and for smoothing, leveling, or creating a feather edge in accordance with instructions of mastic manufacturer. After cleaning and removal of loose particles, prime chalky or dusty surfaces with primer recommended by flooring manufacturer.

3.2.2 Final Cleaning of Substrate

Clean substrate with broom or vacuum immediately prior to the installation of flooring.

3.3 MOISTURE TEST

The suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content shall be determined by a moisture test as recommended by the flooring manufacturer.

3.4 GENERAL APPLICATION REQUIREMENTS

To avoid damage, install flooring after other work in same area has been completed. Apply flooring and accessories in accordance with manufacturer's directions, using experienced workers. Detailed requirements follow:

a. Adhesives: Do not allow smoking, open flames or other sources of ignition in area where solvent-containing adhesives are being used or spread, after posting conspicuous signs reading "NO SMOKING OR OPEN FLAME".

b. Flooring: Apply in patterns indicated. Start in center of room or area, and work toward edges. Keep tile lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary width of edge tiles as necessary to maintain full-size tiles in field, but no edge tile shall be less than one-half full size, except where irregular-shape makes it impossible.

c. Cutting: Cut flooring edges and scribe to walls and partitions after field flooring has been applied.

d. Edge Strips: Provide edging strips where flooring terminates at points higher than contiguous finished flooring, except where thresholds are provided. Anchor metal strips to concrete floor surfaces by countersunk screws into metal or fiber expansion sleeves. Secure plastic strips with adhesive.

3.5 INSTALLATION OF LINOLEUM FLOORING

Linoleum flooring shall be installed with adhesive in accordance with the manufacturer's written installation instructions. Lines and joints shall be kept square, symmetrical, tight, and even. Edge width shall vary as

necessary to maintain full-size sheets or tiles in the center field, but no edge pieces shall be less than one-half the field size, except where irregular shaped rooms make it impossible. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Edges shall be cut, fitted, and scribed to walls and partitions after field flooring has been applied. Tiles shall be quarter turned every other tile.

3.6 INSTALLATION OF WALL BASE

Wall base shall be installed with adhesive in accordance with the manufacturer's written instructions. Base joints shall be tight and base shall be even with adjacent resilient flooring. Voids along the top edge of base at masonry walls shall be filled with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

3.7 CLEANING

Immediately upon completion of installation of tile in a room or an area, flooring and adjacent surfaces shall be dry-cleaned to remove all surplus adhesive. No sooner than 5 days after installation, flooring shall be washed with a nonalkaline cleaning solution, rinsed thoroughly with clear cold water, and, except for raised pattern rubber flooring, rubber tile and sheet rubber flooring, rubber stair treads, and static control linoleum tile, given two coats of polish in accordance with manufacturers written instructions. Raised pattern rubber flooring, rubber tile and sheet rubber flooring, rubber stair treads, and static control linoleum tile shall be cleaned and maintained as recommended by the manufacturer.

a. Linoleum flooring shall be buffed to an even sheen without polish with an electric polishing machine, using a lamb's wool pad when dry buffing.

3.8 PROTECTION

From the time of laying until acceptance, flooring shall be protected from damage as recommended by the flooring manufacturer. Flooring which becomes damaged, loose, broken, or curled and cove base which is not tight to backing fillet shall be removed and replaced.

End of Section

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SECTION 09685

CARPET TILE

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 the basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 16	(1993) Colorfastness to Light
AATCC 107	(1997) Colorfastness to Water
AATCC 129	(1996) Colorfastness to Ozone in the Atmosphere under High Humidities
AATCC 134	(1996; R 1996) Electrostatic Propensity of Carpets
AATCC 165	(1993) Colorfastness to Crocking: Carpets - AATCC Crockmeter Method

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 418	(1993) Testing Pile Yarn Floor Covering Construction
ASTM D 1335	(1998) Tuft Bind of Pile Yarn Floor Coverings
ASTM D 1423	(1998) Twist in Yarns by Direct-Counting
ASTM D 1630	Taber Abrasion
ASTM D 2047	Static Coefficient of Friction
ASTM D 2257	(1996) Extractable Matter in Textiles
ASTM D 3936	(1997) Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering
ASTM E 648	(1997) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1630	Surface Flammability of Carpet and Rugs

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(1994) Installation of Commercial Texture Floorcovering Materials

CRI/IAQ	"Green Label" Indoor Air Quality Carpet Testing Program

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-501	(Rev. A) Floor Coverings, Resilient, Nontextile: Sampling and Testing

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 2551	(1981) Man-made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effect of Varied Water and Heat Conditions (AACHEN Test)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 99	(1996) Health Care Facilities
NFPA 101	(1997) Life Safety Code

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Carpet tile installation

Submit drawings that include area to be carpeted; moldings and edge strips and location; details of special treatments, such as ducts and trench headers and location.

SD-04 Samples

Carpet tile; G

Molding; G

SD-06 Test Reports

Flammability; G

Static control; G

CRI Green Label Requirements for Indoor Air Quality Test Criteria

ADA requirements

The reports shall be dated within two years of submittal for approval.

SD-07 Certificates

Installation experience

Carpet tile

Submit certificates attesting that the carpet tile meets the requirements of the paragraphs entitled "Flammability," "ADA Requirements," and "Indoor Air Quality."

SD-08 Manufacturer's Instructions

Carpet tile installation

Submit the carpet manufacturer's printed installation instructions. Include procedures for installation covering preparation of the substrate, seaming techniques, and recommended adhesives and tapes where applicable.

SD-10 Operation and Maintenance Data

Carpet tile, Data Package 1; G

Submit data package in accordance with Section 01781, "Operation and Maintenance Data." Submit copies of the manufacturer's maintenance manual.

1.3 INSTALLATION REQUIREMENTS

1.3.1 Experience

All work shall be done by installation firms specializing in commercial carpet installation. The firm shall be a member of the Floor Covering Installation Contractor's Association (FCICA) or certified by the Floor Covering Installation Board (FCIB).

1.3.2 Certificate

Submit certificate from the Contractor attesting that the installation supervisor has had a minimum of 5 years experience in this type of work and will provide qualified, experienced installers to perform work. Include a list of previous jobs giving name, location, dollar value, and date, setting forth supervisor's installation experience.

1.4 DELIVERY AND STORAGE

Deliver carpet tile to the site in manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, and

related information. Attach register number or stencil on carton. Store in a safe, dry, clean, and well ventilated area. Do not open containers until needed for installation unless verifying inspection is required. Do not stock more than eight cartons high.

1.5 SAFETY

Carpet adhesives may contain toxic volatile components. Follow ventilation, personal protection, and other safety precautions as recommended by the manufacturer of the adhesive.

1.6 REGULATORY REQUIREMENTS

1.6.1 Indoor Air Quality

Carpet shall bear the Carpet and Rug Institute Indoor Air Quality CRI/IAQ label. Carpet type bearing the label will indicate that the carpet has been tested and meets the criteria of the CRI Green Label Requirements for Indoor Air Quality Test Criteria.

1.6.2 ADA Requirements

Carpet shall meet the ADA requirements as follows:

If carpet tiles are used on a ground or floor surface, then it shall be securely attached; have a firm cushion, pad, or backing, or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. The maximum thickness shall be 1/2 inches (). Exposed edges of carpet shall be fastened to floor surfaces and have trim along the entire length of the exposed edge.

1.6.3 Adhesives

All adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AQMD Rule 1168.

PART 2 PRODUCTS; CPT-1

2.1 PHYSICAL REQUIREMENTS

Provide carpet tile from manufacturer's standard stock. Carpet shall be first quality; and free of visual blemishes, streaks, poorly dyed areas, and other physical and manufacturing defects. Use nontoxic carpet materials and treatments, reasonably nonallergenic, and free of other recognized health hazards. Provide carpet tile of tufted construction. Carpet tile shall be of the modular type, identical in size, precision die cut for complete interchangeability. Sides shall be straight and the corners square. Tufts shall be firmly secured at the edges as in the other areas of the carpet tile. Carpet tile must lay flat on a flat surface without curling, warping, buckling, cupping, or doming and without any lumpiness, unevenness, or differences in thickness in individual tiles or from tile-to-tile. Provide carpet tile that does not stretch or shift position in use when installed according to the carpet tile manufacturer's instructions. Use nontoxic carpet tile materials and treatment, free from other recognized health hazards, and conforming to the following:

a. Surface Texture: Tufted Tip-Sheared.

b. Pile Yarn Type: Level-loop.

c. Pile Fiber: Commercial branded 6.6 Nylon continuous filament comprised of at least 10% recycled fiber.

d. Finished Pile Yarn Weight: Minimum 20 oz/sqyd (678 kg/m2). This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

e. Pile Density: Minimum 7129.

f. Width: 19.7 inch by 19.7 inch plus or minus 1/16 inch (50 by 50 cm plus or minus 1.6 mm).

g. Gage: 12 per one inch (25 mm) minimum in accordance with ASTM D 418ASTM D 418.

h. Dye method: Solution dyed.

i. Pattern and Color: As specified in Section 09915 COLOR SCHEDULE

2.1.1 Surface Texture

2.1.1.1 Loop Pile

Provide single-level cut and uncut pile creating an overall nondirectional surface. Maximum differential finished pile heights (high and low pile loops) of textured pile is 0.125 inch (3 mm).

2.1.2 Pile Yarn

Do not use undrawn fiber in spun yarn. Provide spun yarn of at least two ply for loop pile carpet tile. Use yarn setting method sufficient to assure permanent texture retention under normal use conditions, cleaning, and shampooing. Use autoclave or continuous heat process to set yarn in cut pile construction; yarns for fusion bonded plush cut pile may be crimp-set. Fiber denier and staple lengths may be subject to normal manufacturing tolerances with the following limitations:

a. Acceptable variance in staple length, plus or minus 10 percent.

b. Acceptable denier variance, plus or minus 10 percent, in individual filament denier and plus or minus 3 percent in average denier.

2.1.2.1 Twist and Twist Multiplier

For loop pile carpet tile, ASTM D 1423. The minimum twist multiplier for singles is 2.75; minimum for a 2-ply yarn is 80 percent of the twist in the singles yarns; for a 3-ply yarn, 70 percent; and for a 4-ply yarn, 60 percent.

2.1.2.2 Continuous Filament Nylon

Branded, continuous type 6.6 carpet fiber with average filament size of 15 denier or coarser modified to provide increased translucence or opacity for soil hiding.

2.1.2.3 Extractable Matter in Finished Yarn

Not more than two percent when tested in accordance with ASTM D 2257.

2.1.3 Primary Carpet Backing

Those customarily used and accepted by the trade for each type of carpet tile. Use a back coating compound of synthetic resin or natural or synthetic latex compound. Use back coating quantity normally used in the supplier's product.

2.1.4 Secondary Backing

Shall be fiberglass reinforced vinyl hardback for fusion bonded carpet tile. Shall be fiberglass reinforced vinyl hardback, adhered with ethylene/vinyl acetate polymer and hydrocarbon resin (hot melt) for woven or tufted carpet tile.

2.1.4.1 Vinyl Hardback

A suitably compounded thermoplastic vinyl composite material, reinforced with fiberglass containing recycled content contributing to a minimum of 40% total recycled content for the whole carpet. Provide anti-microbal coating between primary and secondary backings.

a. Hardback: Average not less than 0.090 inch (2.286 mm) in total backing thickness.

b. Weight: Average not less than 125 oz/sqyd (4.2 kg/m2).

c. Compression resistance: Not less than 100 pounds per square inch (690 kPa).

d. Adherence: No separation of the carpet tile and hardback.

e. Accelerated weathering: No cracking, stiffness, brittleness, soft or tacky and appreciable change in color, when compared to the unexposed sample, after 100 hours in the weatherometer.

f. Flexibility at 70 degrees F and at 30 degrees F (21 degrees C and at minus one degree C): No cracking, flaking, crazing, or show any other indication of failure.

g. Moisture absorbency: Maximum one percent moisture absorbency, after 4 hours submersion in water at 72 degrees F (22 degrees C).

h. Volatile matter: No more than one percent.

2.2 PRODUCTS; CPT-2, CPT-3

2.2.1 Physical Requirements

Provide carpet tile from manufacturer's standard stock. Carpet shall be first quality; and free of visual blemishes, streaks, poorly dyed areas, and other physical and manufacturing defects. Use nontoxic carpet materials and treatments, reasonably nonallergenic, and free of other recognized health

hazards. Provide carpet tile of tufted construction. Carpet tile shall be of the modular type, identical in size, precision die cut for complete interchangeability. Sides shall be straight and the corners square. Tufts shall be firmly secured at the edges as in the other areas of the carpet tile. Carpet tile must lay flat on a flat surface without curling, warping, buckling, cupping, or doming and without any lumpiness, unevenness, or differences in thickness in individual tiles or from tile-to-tile. Provide carpet tile that does not stretch or shift position in use when installed according to the carpet tile manufacturer's instructions. Use nontoxic carpet tile materials and treatment, free from other recognized health hazards, and conforming to the following:

a. Surface Texture: Tufted Tip-Sheared.

b. Pile Yarn Type: Level-loop.

c. Pile Fiber: Commercial branded 6.6 Nylon continuous filament comprise of at least 10% recycled fiber.

d. Finished Pile Yarn Weight: Minimum 24 oz/sqyd (814 kg/m2). This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

e. Pile Density: Minimum 7116.

f. Width: 19.7 inch by 19.7 inch plus or minus 1/16 inch (50 by 50 cm plus or minus 1.6 mm).

g. Gage: 12 per one inch (25 mm) minimum in accordance with ASTM D 418ASTM D 418.

h. Dye method: Solution dyed.

i. Pattern and Color: As specified in Section 09915 COLOR SCHEDULE

2.2.1.1 Loop Pile

Provide single-level cut and uncut pile creating an overall nondirectional surface. Maximum differential finished pile heights (high and low pile loops) of textured pile is 0.125 inch (3 mm).

2.2.2 Pile Yarn

Do not use undrawn fiber in spun yarn. Provide spun yarn of at least two ply for loop pile carpet tile. Use yarn setting method sufficient to assure permanent texture retention under normal use conditions, cleaning, and shampooing. Use autoclave or continuous heat process to set yarn in cut pile construction; yarns for fusion bonded plush cut pile may be crimp-set. Fiber denier and staple lengths may be subject to normal manufacturing tolerances with the following limitations:

a. Acceptable variance in staple length, plus or minus 10 percent.

b. Acceptable denier variance, plus or minus 10 percent, in individual filament denier and plus or minus 3 percent in average denier.

2.2.2.1 Twist and Twist Multiplier

For loop pile carpet tile, ASTM D 1423. The minimum twist multiplier for singles is 2.75; minimum for a 2-ply yarn is 80 percent of the twist in the singles yarns; for a 3-ply yarn, 70 percent; and for a 4-ply yarn, 60 percent.

2.2.2.2 Continuous Filament Nylon

Branded, continuous type 6.6 carpet fiber with average filament size of 15 denier or coarser modified to provide increased translucence or opacity for soil hiding.

2.2.2.3 Extractable Matter in Finished Yarn

Not more than two percent when tested in accordance with ASTM D 2257.

2.2.3 Primary Carpet Backing

Those customarily used and accepted by the trade for each type of carpet tile. Use a back coating compound of synthetic resin or natural or synthetic latex compound. Use back coating quantity normally used in the supplier's product.

2.2.4 Secondary Backing

Shall be fiberglass reinforced vinyl hardback for fusion bonded carpet tile. Should be fiberglass reinforced vinyl hardback, adhered with ethylene/vinyl acetate polymer and hydrocarbon resin (hot melt) for woven or tufted carpet tile.

2.2.5 Vinyl Hardback

A suitably compounded thermoplastic vinyl composite material, reinforced with fiberglass containing recycled content contributing to a minimum of 40% total recycled content for the whole carpet. Provide anti-microbal coating between primary and secondary backings.

a. Hardback: Average not less than 0.090 inch (2.286 mm) in total backing thickness.

b. Weight: Average not less than 125 oz/sqyd (4.2 kg/m2).

c. Compression resistance: Not less than 100 pounds per square inch (690 kPa).

d. Adherence: No separation of the carpet tile and hardback.

e. Accelerated weathering: No cracking, stiffness, brittleness, soft or tacky and appreciable change in color, when compared to the unexposed sample, after 100 hours in the weatherometer.

f. Flexibility at 70 degrees F and at 30 degrees F (21 degrees C and at minus one degree C): No cracking, flaking, crazing, or show any other indication of failure.

g. Moisture absorbency: Maximum one percent moisture absorbency, after 4 hours submersion in water at 72 degrees F (22 degrees C).

h. Volatile matter: No more than one percent.

2.3 PERFORMANCE REQUIREMENTS

2.3.1 Dimensional Stability

Dimensional stability shall be maintained at +/- 0.1 percent maximum in according with ISO 2551 (AACHEN Test).

2.3.2 Delamination Strength

Delamination strength for turfed carpet with secondary back shall be a minimum of 25 lb/inch (440 n/m) in accordance with ASTM D 3936.

2.3.3 Flexibility

Secondary backing must not crack, flake, craze, or show any other indications of failure when tested as specified below.

2.3.3.1 At 70 Degrees F (21 Degrees C)

Use a 4 by 4 inch (100 by 100 mm) specimen. Double the specimen and press flat on itself in any direction. Hold doubled for 5 minutes. Examine for indications of failure while doubled and after pressed flat. Make the examination visually at a distance of one foot (300 mm).

2.3.3.2 At 30 Degrees F (Minus One Degree C)

FED-STD-501, Method 6511, using one-inch (25 mm) mandrel plus or minus 1/8 inch (3 mm).

2.3.4 Colorfastness to Light

AATCC 16. Use the Xenon arc as the light source. Consider colors that are deeper or equivalent in hue to Row 2 of the AATCC Color Transference Chart as dark colors; consider those lighter as light colors. Colors for synthetic yarns shall show a gray scale rating of at least 4 for light shades after the equivalent of two L-4 breaks and at least 4 for dark shades after the equivalent of at least three L-4 breaks. Woolen yarns show a gray scale rating of at least 4 for light shades after the equivalent of one L-4 break and at least 4 for dark shades after the equivalent of two L-4 breaks. Base classification on the AATCC Blue Wool Lightfastness Standards L-2 to L-9. Test all colors specified. If the Xenon Arc Fadeometer has a built-in continuous monitor and control device made by the manufacturer, the blue wool standards referenced in AATCC 16 need not be used to judge the L-4 breaks, providing the manufacturer's instructions are followed.

2.3.5 Dry and Wet Crocking, Color Fastness to Water and to Ozone

AATCC 165 AATCC 107 AATCC 129. All colors specified shall show a minimum rating of step 4 on the AATCC Color Transference Chart.

2.3.6 Pile Coverage

Sufficient to conceal backing.

2.3.7 Tuft Bind

ASTM D 1335. The minimum tuft bind for loop pile is 10 pounds (4.54 kilograms) and for cut pile 5 pounds (2.27 kilograms).

2.3.8 Flammability

In addition to meeting the requirements of CPSC 16 CFR 1630, all carpet tile shall meet the minimum radiant flux requirements of NFPA 101 when tested in accordance with ASTM E 648. Test carpet tile and hardback together, as they will be installed.

2.3.9 Static Control

AATCC 134. Incorporate a permanent static control system to control static build-up to less than 3.0 kV. Test at 20 percent relative humidity at 70 degrees F (21 degrees C).

2.3.10 Electrical Resistance

NFPA 99, Chapter 3. Maximum electrical resistance for carpet tile shall be 20,000 megohms measured between the floor surface and building or applicable ground material, and shall provide a resistance of not less than 150 kiloohms when measured from any point on the floor.

2.3.11 Rubber Carpet Tile Performance

Product to exceed rating of 0.60 for flat surfaces in accordance with ASTM D 2047. Product to receive less than 0.003 feet (0.9144 mm) abrasion at 5000 cycles using H-10 wheels in accordance with ASTM D 1630.

2.4 PRODUCTS: WM-1

2.4.1 Physical Requirements

Provide carpet tile from manufacturer's standard stock. Carpet shall be first quality; and free of visual blemishes, streaks, poorly dyed areas, and other physical and manufacturing defects. Provide rubber carpet tile with a vulcanized rubber backing. Carpet tile shall be of the modular type, identical in size, precision die cut for complete interchangeability. Sides shall be straight and the corners square. Carpet tile must lay flat on a flat surface without curling, warping, buckling, cupping or doming and without any lumpiness, unevenness, or differences in thickness in individual tiles or from tile-to-tile. Use nontoxic carpet tile materials and treatment, free from other recognized health hazards and conforming to the following:

a. Surface Texture: Bonded.

b. Pile Materials: 95% recycled rubber tires, and nylon cord.

c. Width: 12" x 12" (305 mm x 305 mm)

d. Thickness: 3/8" (9.525 mm)

e. Pattern and Color: in accordance with Section 09915 COLOR SCHEDULE

2.4.1.1 Cut Pile

Level cut pile fibers.

2.4.1.2 Carpet Backing

Synthetic fiber scrim reinforces the tire cord, and is vulcanized to a thin rubber backing.

2.5 PRODUCTS; WM-2

2.5.1 Physical Requirements

Provide carpet tile from manufacturer's standard stock. Carpet shall be first quality; and free of visual blemishes, streaks, poorly dyed areas and other physical and manufacturing defects. Use nontoxic carpet materials and treatments, reasonably nonallergenic and free of other recognized health hazards. Provide carpet tile of tufted construction. Carpet tile shall be of the modular type, identical in size, precision die cut for complete interchangeability. Sides shall be straight and the corners square. Tufts shall be firmly secured at the edges as in the other areas of the carpet tile. Carpet tile must lay flat on a flat surface without curling, warping, buckling, cupping or doming and without any lumpiness, unevenness or differences in thickness in individual tiles or from tile-to-tile. Provide carpet tile that does not stretch or shift position in use when installed according to the carpet tile manufacturer's instructions. Use nontoxic carpet tile materials and treatment, free from other recognized health hazards and conforming to the following:

a. Surface Texture: Needle punched, hair texture.

b. Pile Yarn Type: Cut Pile.

c. Pile Fiber: 82.5% nylon, 17.5% polyester.

d. Finished Pile Yarn Weight: Minimum 41.0 oz/sqyd. (1390 kg/m2). This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

e. Pile Density: Minimum 8945 oz/cuyd (8936 kg/m3).

f. Width: 19.69 inch by 19.69 inch plus or minus 1/16 inch (50 by 50 cm plus or minus 1.6 mm)

g. Dye method: Yarn dyed.

h. Pattern and Color: in accordance with Section 09915 COLOR SCHEDULE.

2.5.1.1 Surface Texture

Cut Pile: Cut pile fabrics in multi-length needle punch texture, laying flat to backing.

2.5.1.2 Pile Yarn

Do not use undrawn fiber in spun yarn. Provide spun yarn of at least two ply for loop pile carpet tile. Use yarn setting method sufficient to assure permanent texture retention under normal use conditions, cleaning and shampooing. Use autoclave or continuous heat process to set yarn in cut pile construction; yarns for fusion bonded plush cut pile may be crimp-set. Fiber denier and staple lengths may be subject to normal manufacturing tolerances with the following limitations:

a. Acceptable variance in staple length, plus or minus 10 percent.

b. Acceptable denier variance, plus or minus 10 percent, in individual filament denier and plus or minus 3 percent in average denier.

1. Twist and Twist Multiplier: For loop pile carpet tile, ASTM D 1423. The minimum twist multiplier for singles is 2.75; minimum for a 2-ply yarn is 80 percent of the twist in the singles yarns; for a 3-ply yarn, 70 percent; and for a 4-ply yarn, 60 percent.

2. Continuous Filament Nylon: Branded, continuous high bulk or textured carpet fiber with average filament size of 15 denier or coarser modified to provide increased translucence or opacity for soil hiding.

3. Extractable Matter in Finished Yarn: Not more than two percent when tested in accordance with ASTM D 2257.

2.5.1.3 Primary Carpet Backing

Those customarily used and accepted by the trade for each type of carpet tile. Use a back coating compound of synthetic resin or natural or synthetic latex compound. Use back coating quantity normally used in the supplier's product.

2.5.1.4 Secondary Backing

Shall be fiberglass reinforced vinyl hardback for fusion bonded carpet tile. Should be fiberglass reinforced vinyl hardback adhered with ethylene/vinyl acetate polymer and hydrocarbon resin (hot melt) for woven or tufted carpet tile.

Vinyl Hardback: A suitable compounded thermoplastic vinyl composite material, reinforced with fiberglass containing recycled content contributing to a minimum of 40% total recycled content for the whole carpet. Provide anti-microbal coating between primary and secondary backings.

a. Hardback: Average not less than 0.115 inch (2.9 mm) in total backing thickness.

b. Weight: Average not less than 130 oz/sqyd (4.4 kg/m2)

c. Compression resistance: Not less than 100 pounds per square inch (690 kPa).

d. Adherence: No separation of the carpet tile and hardback.

e. Accelerated weathering: No cracking, stiffness, brittleness, soft or tacky and appreciable change in color, when compared to the unexposed sample, after 100 hours in the weatherometer.

f. Flexibility at 70 degrees F and at 30 degrees F (21 degrees C and at minus one degree C)

g. Moisture absorbency: Maximum one percent moisture absorbency, after 4 hours submersion in water at 72 degrees F (22 degrees C).

h. Volatile matter: No more than one percent.

2.6 MOLDING; FT-2

See Resilient Transition Strips, Section 09650 RESILIENT FLOORING.

2.7 ADHESIVES

Provide factory applied "peel and stick" type adhesive. To be waterproof, nonflammable, pressure sensitive releasable adhesive. Use waterproof, nonflammable, and nonstaining seal adhesive factory applied as furnished by the carpet manufacturer. Low emitting volatile organic compound (VOC) adhesive should be used to improve indoor air quality. Rubber carpet tile to be adhered with solvent free epoxy adhesive with 0 grams VOC per liter.

PART 3 EXECUTION

3.1 CARPET TILE INSTALLATION

Install carpet tile in accordance with CRI 104 and manufacturer's printed instructions after the work of other trades, including painting, is done. Installed carpet tile must be smooth, uniform, and secure. Install tile with carpet pile lay in quarter turn every other tile or in design as indicated on drawings. Fit cutouts, such as door jambs, columns, and ducts, neatly and securely.

3.1.1 Carpet Tile Location

Install carpet tile wall-to-wall in rooms and areas indicated on floor finish drawings. Include all material indicated, specified, or necessary for a completely finished installation. Contractors responsible for providing carpet of the same dye lot for each type indicated, for the required quantities of carpet and must verify all dimensions in the field as well as other conditions affecting the work.

3.1.2 Extra Carpet Tile

Furnish 5% cartons of carpet tiles of each pattern and color in addition to the quantity required for installation. Furnish extra carpet tile, for replacement use, of same manufacturer, type, and quality as the installed carpet tile; provided in original cartons; and properly marked.

3.1.3 Substrate Preparation

Inspect rooms and areas to be carpeted. Before installation, verify that concrete floors comply with requirements on moisture content recommended by adhesive or carpet manufacturer's instructions. Repair holes, cracks, depressions, or rough areas using material recommended by the carpet tile manufacturer. Grind raised areas or ridges smooth and level with surrounding surface. Provide floor free of any foreign materials and swept broom clean. Comply with requirements for conditioning adhesives and minimum floor temperature before, during, and after installation as recommended by the carpet tile and adhesive manufacturer's instructions. However, in no case may floor temperature be less than 60 degrees F (16 degrees C) for 24 hours prior to, during, and after installation. Do not permit traffic or movement of furniture or equipment in carpeted areas for at least 24 hours after installation. Carpet tile installation constitutes validation by the Contractor that the substrate and conditions in the area meet all requirements for satisfactory installation.

3.1.4 Accessibility

Installed carpet tiles shall be removable. Ensure that the exposed area is capable of being restored to its original condition by replacing the removed tiles or installing new tiles of the same manufacturer, type, and quality.

3.1.5 Molding

Finish carpet tile edges meeting hard surface flooring with moldings (transition strips). Install in accordance with manufacturer's instructions.

3.2 CLEANING AND PROTECTION

3.2.1 Cleaning

After installation, remove all debris, moldings, scraps, and other foreign matter. Remove any soiled spots or adhesive from the face of the carpet tile with the appropriate spot remover. Clip any protruding face yarn with sharp scissors. Vacuum the carpet tile until clean.

3.2.2 Protection

Carefully protect installed carpet tile with heavy, reinforced, nonstaining kraft building paper or polyethylene film of an approved quality and thickness. Lap and secure edges of covering widths. Keep covering in repair and replace damaged portions. Remove protective covering when directed by the Contracting Officer.

TABLE I
CARPET WEAR CLASSIFICATION BY FACILITY TYPE

FACILITY	CARPET WEAR CLASSIFICATION		
	MODERATE	HEAVY	SEVERE
ADMINISTRATIVE FACILITIES			
Open Plan Office			X

Closed Private Offices	X	X	
Corridors			X
Conference Rooms	X	X	X
BACHELOR ENLISTED QUARTERS			
Sleeping Rooms		X	
Combination Living/Sleeping Rooms		X	
Public Areas (Lobbies, Lounges, etc.)			X
Dining Facilities			X
Offices (See Administrative Facilities)			
BANKS/CREDIT UNIONS			
Entrance and Customer Banking Space			X
Open Office Space and Private Offices (See Administrative Facilities)			
CHAPELS AND OTHER RELIGIOUS FACILITIES			
Worship Areas		X	X
Educational Wing		X	X
CHILD CARE CENTERS			
Child Care Rooms		X	X
Staff Offices	X	X	
Lounges		X	X
CLUBS			
		X	(Officer, Enlisted, CPO,
NCO & Service)		X	
Enlisted Dining Facilities (Excluding Work Spaces & Serving Areas)			X
EXCHANGE FACILITIES			
Sales Areas			X
Offices (See Administrative Facilities)			
Restaurants and Cafeteria Dining Areas			X

LIBRARIES		X	X
MEDICAL FACILITIES (Excluding Patient Treatment Areas)			
Offices, Private/Semi-Private & Command	X	X	
Playrooms, OB/Gyn-Pediatric Clinic		X	X
Clinical Waiting Areas			X
Day Room and Lounges			X
Dining Areas			X
Chapels		X	X
Libraries		X	X
Staff Sleeping and Watch Areas		X	X
Classrooms			X
Consultation Rooms		X	
Psychiatric Clinic (Child Play/Observation Areas only)		X	X
MUSIC AND/OR DRAMA CENTERS		X	X
RESEARCH FACILITIES			
Bio-Optic Laboratories		X	
THEATERS			X
TEMPORARY LODGING FACILITIES COMBINATION LIVING/SLEEPING ROOMS (Excluding Kitchen and Dining Areas)			X
TRAINING BUILDINGS/EDUCATIONAL FACILITIES (Including Dependent's Schools)			
Staff Offices (See Administrative Facilities)			
Classrooms		X	X
Corridors			X
YOUTH CENTERS			X

TABLE II RECOMMENDED CARPET TILE SPECIFICATIONS BY CARPET CONSTRUCTION

PILE YARN TYPE	SURFACE TEXTURE	PILE FIBER	WEIGHT oz/sqyd	PILE DENSITY oz/cuyd
CUT PILE	BONDED	6&6.6 NYLON	28	6500
LOOP PILE	TUFTED	6&6.6 NYLON	26	7500
CUT & LOOP	TUFTED	6&6.6 NYLON	26	5600
TIP-SHEAR	TUFTED	6&6.6 NYLON	26	8000

PILE YARN TYPE	MODERATE TRAFFIC	HEAVY TRAFFIC	SEVERE TRAFFIC
CUT PILE	X	BORDERS ONLY	NR
LOOP PILE	X	X	X
CUT & LOOP	X	X	NR
TIP-SHEAR	X	X	X

NR - NOT RECOMMEND

End of Section

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SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values	(1991-1992) Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC	Documentation of Threshold Limit Values and Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 235	Standard Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
ASTM D 523	(1999) Standard Test Method for Specular Gloss
ASTM D 2092	(1995) Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM D 4263	(1983; R 1999) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D 4444	(1998) Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters
ASTM F 1869	(1998) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000	Air Contaminants

FEDERAL STANDARDS (FED-STD)

FED-STD-313	(Rev. C) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

GREEN SEAL

GS-11	(1993) Standard Establishes Environmental Requirements for Paints

MASTER PAINTERS INSTITUTE (MPI)

MPI 2	(2001) Aluminum Heat Resistant Enamel (up to 427 C and 800 F)
MPI 11	(2001) Exterior Latex, Semi-Gloss
MPI 19	(2001) Inorganic Zinc Primer
MPI 21	(2001) Heat Resistant Enamel, Gloss, (Up to 205 C or 400 F)
MPI 22	(2001) High Heat Resistant Coating
MPI 23	(2001) Surface Tolerant Metal Primer
MPI 39	(2001) Interior Latex-based Wood Primer
MPI 42	(2001) Latex Stucco and Masonry Textured Coating
MPI 47	(2001) Interior Alkyd, Semi-Gloss
MPI 50	(2001) Interior Latex Primer Sealer
MPI 57	(2001) Interior Oil Modified Clear Urethane, Satin
MPI 72	(2001) Polyurethane, Two Component, Pigmented, Gloss
MPI 77	(2001) Epoxy Cold Cured, Gloss
MPI 79	(2001) Marine Alkyd Metal Primer
MPI 90	(2001) Interior Wood Stain, Semi-Transparent
MPI 94	(2001) Exterior Alkyd, Semi-Gloss
MPI 95	(2001) Fast Drying Metal Primer
MPI 107	(2001) Rust Inhibitive Primer (Water-Based)
MPI 110	(2001) Interior/Exterior High Performance Acrylic
MPI 134	(2001) Waterborne Galvanized Primer
MPI 139	(2001) High Performance Latex, White and Tints - MPI Gloss Level 3
MPI 140	(2001) High Performance Architectural Latex - Gloss Level 4
MPI 141	(2001) High Performance Semi-Gloss Latex, White and Tints - Gloss Level 5

MPI 145	(2001) Institutional Low Odor / VOC Interior Latex, Gloss Level 3
MPI 146	Institutional Low Odor/VOC Interior Latex - Gloss Level 4 (a 'satin-like' finish)
MPI 147	(2001) Institutional Low Odor / VOC Interior Latex, Gloss Level 5

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-101	(Rev. B) Color Code for Pipelines and for Compressed Gas Cylinders

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS-EPP-SP01-01	(2001) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC PA 1	(2000) Shop, Field, and Maintenance Painting
SSPC PA 3	(1995) Safety in Paint Application
SSPC VIS 1	(1989) Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
SSPC VIS 3	(1993) Visual Standard for Power- and Hand-Tool Cleaned Steel (Standard Reference Photographs)
SSPC VIS 4	(2001) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 6	(1994) Commercial Blast Cleaning
SSPC SP 7	(1994) Brush-Off Blast Cleaning
SSPC SP 10	(1994) Near-White Blast Cleaning
SSPC SP 12	(1995) Surface Preparation and Cleaning of Steel and Other Hard Materials by High-and Ultra High-Pressure Water Jetting Prior to Re-Coating

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS-EPP-SP01-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Piping identification

Submit color stencil codes

SD-03 Product Data

Coating; G RO

Manufacturer's Technical Data Sheets

Sealant

SD-04 Samples

Color; G RO

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

Textured Wall Coating System; G RO

Sample Textured Wall Coating System Mock-Up; G RO

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings G RO

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings: G RO

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.4 QUALITY ASSURANCE

1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that conform to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart (one liter) samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.4.2 Textured Wall Coating System

Three complete samples of each indicated type, pattern, and color of textured wall coating system applied to a panel of the same material as that on which the coating system will be applied in the work. Samples of wall coating systems shall be minimum 125 x 175 mm (5 x 7 inches) and of sufficient size to show pattern repeat and texture.

1.4.3 Sample Textured Wall Coating System Mock-Up

After coating samples are approved, and prior to starting installation, a minimum 2430 mm x 2430 mm (8 foot x 8 foot) mock-up shall be provided for each substrate and for each color and type of textured wall coating, using the actual substrate materials. Once approved the mock-up samples shall be used as a standard of workmanship for installation within the facility. At least 48 hours prior to mock-up installation, the Contractor shall submit written notification to the Contracting Officer's Representative.

1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform. Paints and coatings must meet or exceed the VOC and chemical component limits of Green Seal (GS-11) requirements.

1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.4 Asbestos Content

Materials shall not contain asbestos.

1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.5.6 Silica

Abrasive blast media shall not contain free crystilline silica.

1.5.7 Human Carcinogens

Materials shall not contain ACGIH Limit Values and ACGIH TLV-DOC confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons (20 liters). Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover,

with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F (4 to 35 degrees C).

1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525,"Safety Requirements" and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA 3.

1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH Limit Values, threshold limit values.

1.8 ENVIRONMENTAL CONDITIONS

1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F (3 degrees C) above dew point;

b. Below 50 degrees F (10 degrees C) or over 95 degrees F (35 degrees C), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.9 COLOR SELECTION

Color Coding for Shore-to-Ship
Utility Connections

Service	Color	FED-STD-595 No.
Potable Water*	Blue	15044
Water Provided for Fire Protection**	Red	11105
Chilled Water	Striped Blue/White	15044/17886

Oily Waste Water	Striped Yellow/Black	13538/17038
Sewer	Gold	17043
Steam	White	17886
High Pressure Air	Gray	16081
Low Pressure Air	Tan	10324
Fuel	Yellow	13655

* This includes connections serving domestic functions.

** This includes non-potable salt water or, at some locations, fresh water connections provided for fire protection (may also include flushing and cooling requirements). Note: This does not include waterfront fire hydrants.

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be in accordance with Section 09915 COLOR SCHEDULE.

1.10 LOCATION AND SURFACE TYPE TO BE PAINTED

1.10.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.10.1.1 Exterior Painting

Includes new surfaces of the building and appurtenances as indicated.

1.10.1.2 Interior Painting

Includes new surfaces of the building and appurtenances as indicated. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and metal deck; and

b. Other contiguous surfaces.

1.10.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.10.3 Mechanical and Electrical Painting

Includes field coating of interior new surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.10.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one

coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil (0.025 mm) in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material. In lieu of red enamel finish coat, provide piping with 2 inch (50 mm) wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot (6 meters) intervals.

b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil (0.025 mm). Provide piping with 2 inch (50 mm) wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot (6 meters) intervals throughout the piping systems.

1.10.4 Exterior Painting of Site Work Items

Field coat the new surfaces as indicated.

1.10.5 Definitions and Abbreviations

1.10.5.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.10.5.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.10.5.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.10.5.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.10.5.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.10.5.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.10.5.7 EXT

MPI short term designation for an exterior coating system.

1.10.5.8 INT

MPI short term designation for an interior coating system.

1.10.5.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.10.5.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.10.5.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.10.5.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.10.5.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.10.5.14 Paint

See Coating definition.

1.10.5.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.10.5.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Substrate Repair

a. Repair substrate surface damaged during coating removal;

b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and

c. Clean and prime the substrate as specified.

3.3 PREPARATION OF METAL SURFACES

3.3.1 Existing and New Ferrous Surfaces

Ferrous Surface Preparation

SSPC Blasting/Cleaning Levels [a] - Primer Types/Exposures

	Exposure[b]		
	Mild	Moderate	Severe[c]
Primer Type	alkyd/oil latex oleoresinous phenolic	alkyd/oil latex oleoresinous phenolic	epoxy silicone inorganic zinc-rich
Surface Condition			
Uncoated			
Oil, grease, dirt	SP 1	for all moderate conditions, select from "mild" or "severe" for intended performance level	SP 10, SP 12 WJ2 or SP 5 SP 12 WJ1
Localized corrosion - mill scale, rust	SP 2, SP 3, or SP 7 SP 12 WJ-4		AS ABOVE
Extensive deterioration	SP 6[d] SP 12 WJ-3		AS ABOVE
Shop coated			
Oil, grease, dirt	[e]		AS ABOVE
Localized damage to be spot repaired	SP 2, SP 3, or SP 7, SP 12 WJ-4		AS ABOVE
Extensive deterioration	SP 6[d], SP 12 WJ-3		AS ABOVE

Existing coating			
Oil, grease	[e]	[e]	SP 1
Chalking, foreign matter other than oil or grease, localized deterioration	[f]		[g]
Extensive deterioration	SP 6[d], SP 12 WJ-3		SP 10, SP 12 WJ2 or SP 5 SP 12 WJ1

[a] If it is not possible to abrasive blast or use water jetting, SP 11 is recommended. It is considered equivalent to SP 6. SP 11 is also preferred wherever SP 2 or SP 3 are shown in the Table.

[b] These are minimum requirements. A high-performing system may be a better choice for longer performance.

[c] For marine, chemical, or immersion service, or application of heat resistant or non-slip floor coatings. SP 10 is preferred for zinc-rich primers and for extremely severe environments where long-term performance is desired.

[d] Use water jetting to SP 12 WJ-3, as alternate to SP 6 degree of cleanliness.

[e] Use only the steam clean, or non-alkaline detergent solutions of SP 1.

[f] First, remove chalk and dirt with a non-alkaline detergent solution, and follow with power wash at minimum 2000 psi. Second, spot clean, in order of preference by SP 6, SP 11, SP 7, SP 3, or SP 2.

[g] First, remove chalk and dirt with a non-alkaline detergent solution, and follow with power wash at minimum 2000 psi. Second, spot clean, in order of preference, by SP 10, SP 6, or SP 11.

[h] SSPC SP 12 provides four levels of water jetting cleanliness and they reflect the four levels of abrasive blast cleanliness but direct correlation is inaccurate or inappropriate. The four levels are (best to worst): WJ-1, WJ-2, WJ-3, and WJ-4. They are equivalent to the abrasive blast standards SSPC SP 5, SP 10, SP 6, and SP 7. The standard also includes three levels of cleanliness for non-visual contaminants, SC-1, SC-2, and SC-3. The preferred level of cleanliness is between SC-1 or SC-2.

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2 or SSPC SP 3. Water jetting to SSPC SP 12 WJ-4 may be used to remove loose coating and other loose

materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/SSPC SP 12 WJ-3.

c. Metal Floor Surfaces to Receive Nonslip Coating: Clean in accordance with SSPC SP 10 for rusted surfaces SSPC SP 12 WJ-2 for all other surfaces.

3.3.2 Final Ferrous Surface Condition:

Type Coating	Level of Cleaning, SSPC SP
a. Latex or Alkyd	2,3,6 or SP 12 WJ-2 (7 and 10, SP 12 WJ-2 or SP 12 WJ-1 may be left in as Contractor options)
b. High Performance (i.e. Epoxy, Urethane, others)	7,10

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7, SSPC SP 6, and SSPC SP 10. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4.

3.3.3 Galvanized Surfaces

a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

a. Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.3.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, ASTM D 235. Wipe dry with clean, dry cloths.

3.3.6 Existing Surfaces with a Bituminous or Mastic-Type Coating

Remove chalk, mildew, and other loose material by washing with a solution of 1/2 cup (0.20 liter) trisodium phosphate, 1/4 cup (0.1 liter) household detergent, one quart (1.6 liters) 5 percent sodium hypochlorite solution and 3 quarts (4.8 liters) of warm water.

3.4 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.4.1 Concrete and Masonry

a. Curing: Concrete, stucco and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new surfaces with a solution composed of 1/2 cup (0.2 liter) trisodium phosphate, 1/4 cup (0.1 liter)household detergent, and 4 quarts (6.4 liters) of warm water. Then rinse thoroughly with fresh water. For large areas, water blasting may be used.

(2) Fungus and Mold: Wash new surfaces with a solution composed of 1/2 cup (0.2 liter) trisodium phosphate, 1/4 cup (0.1 liter) household detergent, 1 quart (1.6 liters) 5 percent sodium hypochlorite solution and 3 quarts (4.8 liters) of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet (0.4 square meter) of surface, per workman, at one time.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D 4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow

manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.4.2 Gypsum Board, Plaster, and Stucco

a. Surface Cleaning: Plaster and stucco shall be clean and free from loose matter; gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D 4263. New plaster to be coated shall have a maximum moisture content of 8 percent, when measured in accordance with ASTM D 4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

3.5 PREPARATION OF WOOD AND PLYWOOD SURFACES

3.5.1 New Plywood and Wood Surfaces, Except Floors:

a. Wood surfaces shall be cleaned of foreign matter.

Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood.

b. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter in accordance with ASTM D 4444, Method A, unless otherwise authorized.

c. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints.

d. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.

e. Cosmetic Repair of Minor Defects:

(1) Knots and Resinous Wood: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut (1.3-kg-cut) shellac varnish, plasticized with 5 ounces (0.14 liters) of castor oil per gallon (liter). Scrape away existing coatings from knotty areas, and sand before treating. Prime before applying any putty over shellacked area.

(2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.

(3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

3.5.2 Interior Wood Surfaces, Stain Finish

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth.

3.6 APPLICATION

3.6.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil (0.025 mm). Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd

gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

e. Floors: For nonslip surfacing on level floors, as the intermediate coat is applied, cover wet surface completely with almandite garnet, Grit No. 36, with maximum passing U.S. Standard Sieve No. 40 less than 0.5 percent. When the coating is dry, use a soft bristle broom to sweep up excess grit, which may be reused, and vacuum up remaining residue before application of the topcoat. For nonslip surfacing on ramps, provide MPI 77 with non-skid additive, applied by roller in accordance with manufacturer's instructions.

3.6.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint (0.125 L) of suitable thinner per gallon (liter). The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.6.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.6.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 3. Exterior Concrete Paint Table
Division 4. Exterior Concrete Masonry Units Paint Table
Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table
Division 6. Exterior Wood; Dressed Lumber, Paneling, Decking, Shingles Paint Table
Division 9: Exterior Stucco Paint Table
Division 10. Exterior Cloth Coverings and Bituminous Coated Surfaces Paint Table

Division 3. Interior Concrete Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table
Division 6. Interior Wood Paint Table
Division 9: Interior Plaster, Gypsum Board, Textured Surfaces Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil (0.038 mm) each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.7 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils (0.038 mm) DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.8 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.9 COATING SYSTEMS FOR WOOD AND PLYWOOD

a. Apply coatings of Tables in Division 6 for Exterior and Interior.

b. Prior to erection, apply two coats of specified primer to treat and prime wood and plywood surfaces which will be inaccessible after erection.

c. Apply stains in accordance with manufacturer's printed instructions.

3.10 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with MIL-STD-101. Place stenciling in clearly visible locations. On piping not covered by MIL-STD-101, stencil approved names or code letters, in letters a minimum of 1/2 inch (13 mm) high for piping and a minimum of 2 inches (50 mm) high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

3.11 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.12 PAINT TABLES

All DFT's are minimum values.

3.12.1 EXTERIOR PAINT TABLES

DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

A. New and uncoated existing concrete;
vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs:

1. New; MPI EXT 3.1A-G5 (Semigloss) / Existing; MPI EXT 3.1A-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 11	MPI 11	MPI 11

System DFT: 3.5 mils (88 microns)

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces.

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd
New; MPI EXT 5.1Q-G5 (Semigloss) Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 94	MPI 94

System DFT: 5.25 mils (131 microns)

B. New Steel that has been blast-cleaned to SSPC SP 6:

1. Alkyd
New; MPI EXT 5.1D-G5 (Semigloss) / Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 94	MPI 94

System DFT: 5.25 mils (131 microns)

EXTERIOR GALVANIZED SURFACES

C. New Galvanized surfaces:

1. Waterborne Primer / Latex
MPI EXT 5.3H-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 11	MPI 11

System DFT: 4.5 mils (112 microns)

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

D. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

1. Alkyd
MPI EXT 5.4F-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 94	MPI 94

System DFT: 5 mils (125 microns)

2. MPI EXT 5.4G-G5(Semigloss)
   Primer: Intermediate: Topcoat:
   MPI 95 MPI 110-G5 MPI 110-G5
   System DFT: 5 mils (125 microns)

E. Surfaces adjacent to painted surfaces; Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. Alkyd
   MPI EXT 5.1D-G5 (Semigloss)
   Primer: Intermediate: Topcoat:
   MPI 79 MPI 94 MPI 94
   System DFT: 5.25 mils (131 microns)

F. Hot metal surfaces including smokestacks subject to temperatures up to 205 degrees C (400 degrees F):

1. Heat Resistant Enamel
   MPI EXT 5.2A
   Primer: Intermediate: Topcoat:
   MPI 21 Surface preparation and number of coats per manufacturer's instructions.
   System DFT: Per Manufacturer

G. Ferrous metal subject to high temperature, up to 400 degrees C (750 degrees F):

1. Inorganic Zinc Rich Coating
   MPI EXT 5.2C
   Primer: Intermediate: Topcoat:
   MPI 19 Surface preparation and number of coats per manufacturer's instructions.
   System DFT: Per Manufacturer

H. New surfaces and made bare cleaning to SSPC SP 10 subject to temperatures up to 593 degrees C (1100 degrees F):

1. Heat Resistant Coating
   MPI EXT 5.2D
   Primer: Intermediate: Topcoat:
   MPI 22 Surface preparation and number of coats per manufacturer's instructions.
   System DFT: Per Manufacturer

3.12.2 INTERIOR PAINT TABLES

DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. New and uncoated existing Concrete, vertical surfaces, not specified otherwise:

1. Institutional Low Odor / Low VOC Latex
   New; MPI INT 3.1M-G3 (Eggshell) / Existing; MPI RIN 3.1L-G3 (Eggshell)
   Primer: Intermediate: Topcoat:
   MPI 50 MPI 145 MPI 145
   System DFT: 4 mils (100 microns)

B. Concrete ceilings, uncoated:

1. Latex Aggregate
   MPI INT 3.1N
   Primer: Intermediate: Topcoat:
   N/A N/A MPI 42
   System DFT: Per Manufacturer

   Texture - Fine. Surface preparation, number of coats, and primer in accordance with manufacturer's instructions. Topcoat: Coating to match adjacent surfaces.

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, Surfaces adjacent to painted surfaces (Match surrounding finish), and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. High Performance Architectural Latex
   MPI INT 5.1R-G5 (Semigloss)
   Primer: Intermediate: Topcoat:
   MPI 79 MPI 141 MPI 141
   System DFT: 5 mils (125 microns)

B. Metal in toilets, restrooms, shower areas and other high-humidity areas not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. Alkyd
   MPI INT 5.1T-G5 (Semigloss)
   Primer: Intermediate: Topcoat:
   MPI 23 MPI 47 MPI 47
   System DFT: 5.25 mils (131 microns)

C. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. High Performance Architectural Latex (finish to match adjacent ceiling or wall areas)
   MPI INT 5.4F-G3 (Eggshell)
   Primer: Intermediate: Topcoat:
   MPI 95 MPI 139 MPI 139
   System DFT: 5 mils (125 microns)

   MPI INT 5.4F-G4 (Satin)
   Primer: Intermediate: Topcoat:

MPI 95 MPI 140 MPI 140
System DFT: 5 mils (125 microns)

MPI INT 5.4F-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 95 MPI 141 MPI 141
System DFT: 5 mils (125 microns)

D. Hot metal surfaces subject to temperatures up to 205 degrees C (400 degrees F):

1. Heat Resistant Enamel
MPI INT 5.2A
Primer: Intermediate: Topcoat:
MPI 21 Surface preparation and number of coats per manufacturer's instructions.
System DFT: Per Manufacturer

E. Ferrous metal subject to high temperature, up to 400 degrees C (750 degrees F):

1. Heat Resistant Aluminum Paint
MPI INT 5.2B (Aluminum Finish)
Primer: Intermediate: Topcoat:
MPI 2 Surface preparation and number of coats per manufacturer's instructions.
System DFT: Per Manufacturer

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New Wood and plywood not otherwise specified:

Provide finish indicated in Section 09915, COLOR SCHEDULE

1. High Performance Architectural Latex
MPI INT 6.4S-G3 (Eggshell)
Primer: Intermediate: Topcoat:
MPI 39 MPI 139 MPI 139
System DFT: 4.5 mils (112 microns)

MPI INT 6.4S-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 39 MPI 141 MPI 141
System DFT: 4.5 mils (112 microns)

B. New Wood and Plywood, except floors; natural finish or stained:

1. Natural finish, oil-modified polyurethane
New; MPI INT 6.4J-G4 / Existing; MPI RIN 6.4L-G4
Primer: Intermediate: Topcoat:
MPI 57 MPI 57 MPI 57
System DFT: 4 mils (100 microns)

2. Stained, oil-modified polyurethane
New; MPI INT 6.4E-G4 / Existing; MPI RIN 6.4G-G4
Stain: Primer: Intermediate: Topcoat:

MPI 90	MPI 57	MPI 57	MPI 57

System DFT: 4 mils (100 microns)

C. New Wood Doors; Natural Finish or Stained:

1. Natural finish, oil-modified polyurethane
New; MPI INT 6.3K-G4

Primer:	Intermediate:	Topcoat:
MPI 57	MPI 57	MPI 57

System DFT: 4 mils (100 microns)

2. Stained, oil-modified polyurethane
New; MPI INT 6.3E-G4

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 57	MPI 57	MPI 57

System DFT: 4 mils (100 microns)

D. New Wood Doors; Pigmented finish:

1. Pigmented Polyurethane
New; MPI INT 6.1E-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 72	MPI 72	MPI 72

System DFT: 4.5 mils (112 microns)

Note: Sand between all coats per manufacturers recommendations.

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

A. New Wallboard not otherwise specified:

Provide finish indicated in Section 09915, COLOR SCHEDULE.

1. New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 139	MPI 139

System DFT: 4 mils (100 microns)

New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 141	MPI 141

System DFT: 4 mils (100 microns)

2. Institutional Low Odor / Low VOC Latex
New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 145	MPI 145

System DFT: 4 mils (100 microns)

New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 146	MPI 146

System DFT: 4 mils (100 microns)

New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 147	MPI 147

System DFT: 4 mils (100 microns)

B. New Wallboard in toilets, food-preparation, restrooms, laundry areas, shower areas and other high humidity areas not otherwise specified.:

1. Alkyd

New; MPI INT 9.2C-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 47	MPI 47

System DFT: 4 mils (100 microns)

End of Section

SECTION 10100

VISUAL COMMUNICATIONS SPECIALTIES

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 B 221	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221M	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

1.2 GENERAL REQUIREMENTS

The term visual display board when used herein includes presentation boards, marker boards, tackboards, board cases, display track system and horizontal sliding units. Visual display boards shall be from manufacturer's standard product line.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Visual Display Boards; G RO

Manufacturer's descriptive data and catalog cuts. Manufacturer's installation instructions, and cleaning and maintenance instructions.

SD-04 Samples

Aluminum; G RO

Sections of frame, map rail, and chalktray.

Porcelain Enamel; G RO

Section showing porcelain enamel coating, steel, core material and backing.

Materials; G RO

Section of core material showing the lamination of colored cork, natural cork, woven fabric, non-woven fabric, and vinyl wall covering. Sample of hardwood and plastic laminate finish, and glass type. Samples shall be minimum 4 by 4 inches (100 by 100 mm) and show range of color.

SD-07 Certificates

Visual Display Boards; G RO

Certificate of compliance signed by Contractor attesting that visual display boards conform to the requirements specified.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered to the building site in the manufacturer's original unopened containers and shall be stored in a clean dry area with temperature maintained above 50 degrees F (10 degrees C). Materials shall be stacked according to manufacturer's recommendations. Visual display boards shall be allowed to acclimate to the building temperature for 24 hours prior to installation.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 COLOR

Finish colors for required items shall be as specified in Section 09915 COLOR SCHEDULE.

2.2 MATERIALS

2.2.1 Aluminum

Aluminum frame extrusions shall be alloy 6063-T5 or 6063-T6, conform to ASTM B 221 (ASTM B 221M), and be a minimum 0.06 inches (1.5 mm) thick. Exposed aluminum shall have an anodized, satin finish. Straight, single lengths shall be used wherever possible. Joints shall be kept to a minimum. Corners shall be mitered and shall have a hairline closure.

2.3 MARKERBOARD

Markerboard shall have a porcelain magnetic enamel writing surface and a chalktray. Markerboard shall be a factory assembled unit complete in one piece, without joints whenever possible. When markerboard dimensions require delivery in separate sections, components shall be prefit at the factory, disassembled for delivery and jointed at the site. Frame shall be aluminum. Chalktray shall be the same material as the frame and extend the

full length of the markerboard. The markerboard shall have a map rail. The map rail with a tackable insert shall extend the full length and shall have map hooks with clips for holding sheets of paper. Two map hooks shall be provided for each 4 foot (1220 mm) of map rail. Dry erase markings shall be removable with a felt eraser or dry cloth without ghosting. Each unit shall come complete with an eraser and four compatible dry erase markers. The sizes shall be as shown in the drawings.

2.4 TACKBOARDS, CRK-1

Tackable surfaces shall be a continuous resilient sheet made from resilient homogeneous linoleum and cork material and bonded with a binder suitable for the purpose intended with a burlap backing. The wearing surface shall be free from streaks, spots, cracks or other imperfections that would impair its usefulness or appearance.

2.5 ADHESIVES

All adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AQMD Rule 1168.

PART 3 EXECUTION

3.1 PLACEMENT SCHEDULE

Location and mounting height of visual display boards shall be as shown on the drawings. Mounting height is defined as distance from finished floor to top of the display board frame.

3.2 INSTALLATION

Installation and assembly shall be in accordance with manufacturer's printed instructions. Concealed fasteners shall be used. Marker boards shall be attached to the walls with suitable devices to anchor each unit. Tackboards shall be adhered to the walls in accordance with manufacturer's printed instructions. The Contractor shall furnish and install trim items, accessories and miscellaneous items in total, including but not limited to hardware, grounds, clips, backing materials, adhesives, brackets, and anchorages incidental to or necessary for a sound, secure, complete and finished installation. Installation shall not be initiated until completion of room painting and finishing operations. Visual display boards shall be installed in locations and at mounting heights indicated. Visual display boards shall be installed level and plumb, and if applicable doors shall be aligned and hardware shall be adjusted. Damaged units shall be repaired or replaced by the Contractor as directed by the Contracting Officer.

3.3 CLEANING

Writing surfaces shall be cleaned in accordance with manufacturer's instructions.

End of Section

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SECTION 10260

WALL AND CORNER GUARDS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AQMD Rule 1168	(2002) Regulation XI, Rule 1168 Adhesive and Sealant Applications

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Corner Guards
Wall Guards (Crash Rails)
Door Protectors
Wall Covering/Panels

Drawings indicating locations and typical elevations of each type of item. Drawings shall show vertical and horizontal dimensions, full size sections, thickness of materials, and fastening details.

SD-03 Product Data

Corner Guards
Wall Guards (Crash Rails)
Door Protectors
Wall Covering/Panels

Manufacturer's descriptive data, catalog cuts, installation instructions, and recommended cleaning instructions.

SD-04 Samples

Finish; G, RO

Manufacturer's standard samples indicating color and texture of materials requiring color and finish selection.

SD-06 Test Reports

Corner Guards
Wall Guards (Crash Rails)
Door Protectors
Wall Covering/Panels

Fire rating and extinguishing test results for resilient material.

SD-07 Certificates

Corner Guards; G, RO
Wall Guards (Crash Rails); G, RO
Door Protectors; G, RO
Wall Covering/Panels; G, RO

Statements attesting that the items comply with specified fire and safety code requirements.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the project site in manufacturer's original unopened containers with seals unbroken and labels and trademarks intact. Materials shall be kept dry, protected from weather and damage, and stored under cover. Materials shall be stored at approximately 70 degrees F (21 degrees C) for at least 48 hours prior to installation.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 GENERAL

To the maximum extent possible, corner guards, door and door frame protectors, wall guards (crash rails), wall panels and wall covering shall be the standard products of a single manufacturer and shall be furnished as detailed. Drawings show general configuration of products required, and items differing in minor details from those shown will be acceptable.

2.2 CORNER GUARDS

2.2.1 Stainless Steel Corner Guards

Stainless steel corner guards shall be fabricated of 0.0625 inch (1.58 mm) thick material conforming to ASTM A 167, type 302 or 304. Corner guards

shall extend from floor to ceiling. Corner guard shall be 3.5 x 3.5 inches (88.9 x 88.9 mm.

2.3 WALL GUARDS (CRASH RAILS)

2.3.1 Wall Guards, Combination Handrail/Wall Guards and Handrails

Wall guards, combination handrail/wall guards, and handrails shall be provided with prefabricated end closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories standard with the manufacturer. Rails shall be stainless steel profile as indicated. End caps and corners shall be field adjustable to assure close alignment with handrails and wall guards.

2.4 TRIM, FASTENERS AND ANCHORS

Vinyl trim, fasteners and anchors shall be provided for each specific installation as shown.

2.5 FINISH

2.5.1 Stainless Steel Finish

Finish for stainless steel shall be in accordance with ASTM A 167, Type 302 or 304, finish number 4.

2.6 ADHESIVES

Adhesive for resilient material shall be in accordance with manufacturers recommendations. All adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District AQMD Rule 1168.

2.7 COLOR

Color shall be in accordance with Section 09915 COLOR SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Corner Guards and Wall Guards

Material shall be mounted at location indicated in accordance with manufacturer's recommendations.

3.1.2 Door, Door Frame Protectors, and Wall Panels

Surfaces to receive protection shall be clean, smooth, and free of obstructions. Protectors shall be installed after frames are in place, but prior to hanging of doors, in accordance with manufacturer's specific instructions. Adhesives shall be applied in controlled environment in accordance with manufacturer's recommendations. Protection for fire doors and frames shall be installed in accordance with NFPA 80.

3.1.3 Stainless Steel Guards

a. Mount guards on external corners of interior walls, partitions and columns as per manufacturer's recommendations.

b. Where corner guards are installed on gypsum board, clean surfaces and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from the guard edges and allow to cure undisturbed for 24 hours.

c. For wall guards, space brackets at no more than 3 feet (900 mm) on centers and anchor to the wall in accordance with the manufacturer's installation instructions.

End of Section

This Specification 13721 is added by Amendment R0002

SECTION 13721

INTRUSION DETECTION SYSTEM

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)

47 CFR 68	Connection of Terminal Equipment to the Telephone Network

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(1997) National Electrical Safety Code
IEEE C62.41	(1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits
IEEE Std 100	(1997) IEEE Standard Dictionary of Electrical and Electronics Terms
IEEE Std 142	(1991) IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(1993) Industrial Control and Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 294	(1999) Access Control System Units
UL 639	(1997; Rev thru Mar 1999) Intrusion Detection Units
UL 681	(1999) Installation and Classification of Burglar and Holdup Alarm Systems
UL 796	(1999) Printed-Wiring Boards
UL 1037	(1999) Antitheft Alarms and Devices

UL 1076 (1995; Rev thru Feb 1999) Proprietary Burglar Alarm Units and Systems

1.2 SYSTEM DESCRIPTION

1.2.1 General

The Contractor shall configure the Intrusion Detection System (IDS) as described and shown, including Government Furnished Equipment (GFE). Computing devices, as defined in 47 CFR 15, shall be certified to comply with the requirements for Class A computing devices and labeled as set forth in 47 CFR 15.

The system shall include an Integrated Commercial Intrusion Detection System (ICIDS II) Safenet Remote Terminal Unit (RTU) [and a Safenet Pre-Processor Unit (PPU)][and a telco card] by Ultrak Inc., 1301 Waters Ridge Drive, Lewisville, TX 75057, 800-796-2288 (www.ultrak.com). The system shall use the [OS2][NT] operating system and shall be fully compatible with the existing ICIDS II security system at Ft Lewis.

1.2.3 Definitions

1.2.3.1 Intrusion Alarm

An alarm resulting from the detection of a specified target and which results in an attempt to intrude into the protected area or when entry into an entry-controlled area is attempted without successfully using entry control procedures.

1.2.3.2 Nuisance Alarm

An alarm resulting from the detection of an alarm stimuli, but which does not represent an attempt to intrude into the protected area.

1.2.3.3 Environmental Alarm

An alarm during environmental conditions which exceed those specified.

1.2.3.4 False Alarm

An alarm when there is no alarm stimulus.

1.2.3.5 Duress Alarm

An alarm condition which results from a set of pre-established conditions such as entering a special code into a keypad or by activating a switch. This alarm category shall take precedence over other alarm categories.

1.2.4 Probability of Detection

Each zone shall have a continuous probability of detection greater than 90 percent and shall be demonstrated with a confidence level of 95 percent. This probability of detection equates to 49 successful detections out of 50 tests or 98 successful detections out of 100 tests.

1.2.5 Standard Intruder and Intruder Movement

The system shall be able to detect an intruder that weighs 45 kg (100 pounds) or less and is 1.5 m (5 feet) tall or less. The intruder shall be dressed in a long-sleeved shirt, slacks and shoes unless environmental conditions at the site require protective clothing. Standard intruder movement is defined as any movement such as walking, running, crawling, rolling, or jumping through a protected zone in the most advantageous manner for the intruder.

1.2.6 Electrical Requirements

Electrically powered IDS equipment shall operate on 120 or 240 volt [60] [50] Hz AC sources as shown. Equipment shall be able to tolerate variations in the voltage source of plus or minus 10 percent and variations in the line frequency of plus or minus 2 percent with no degradation of performance.

1.2.7 Power Line Surge Protection

Equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41. Fuses shall not be used for surge protection.

1.2.8 Sensor Wiring and Communication Circuit Surge Protection

Inputs shall be protected against surges induced on sensor wiring. Outputs shall be protected against surges induced on control and sensor wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications circuit. All cables and conductors, except fiber optics, which serve as communications circuits from the console to field equipment and between field equipment, shall have surge protection circuits installed at each end. Protection shall be furnished at equipment and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 900 mm (3 feet) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10-microsecond rise time by 1000-microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.

b. An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.

1.2.10 Environmental Conditions

1.2.10.1 Interior, Controlled Environment

All system components, except the console, installed in interior locations having controlled environments shall be rated for continuous operation under ambient environmental conditions of 2 to 50 degrees C (36 to 122 degrees F) dry bulb and 20 to 90 percent relative humidity, non-condensing.

1.2.10.2 Interior, Uncontrolled Environment

All system components installed in interior locations having uncontrolled environments shall be rated for continuous operation under ambient environmental conditions of minus 18 to plus 50 degrees C (0 to 122 degrees F) dry bulb and 10 to 95 percent relative humidity, non-condensing.

1.2.10.3 Exterior Environment

System components that are installed in locations exposed to weather shall be rated for continuous operation under ambient environmental conditions of minus 34 degrees to 50 degrees C (minus 30 to 122 degrees F) dry bulb and 10 to 95 percent relative humidity, condensing. In addition, the system components shall be rated for continuous operation when exposed to performance conditions as specified in UL 294 and UL 639 for outdoor use equipment. In addition, components shall be rated for continuous operation when exposed to rain as specified in NEMA 250, winds up to 137 km per hr (85 mph) and snow cover up to 610 mm(2 feet) thick, measured vertically.

1.2.10.4 Hazardous Environment

System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings, shall be rated and installed according to Chapter 5 of NFPA 70 and as shown.

1.2.11 System Capacity

The system shall monitor and control the number of inputs and outputs shown and shall include an expansion capability of a minimum of 25 percent.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Intrusion Detection System; G, Ft. Lewis Security Representative

a. System block diagram.

b. Processor installation, typical block and wiring diagrams.

c. Details of connections to power sources, including power supplies and grounding.

d. Details of surge protection device installation.

e. Sensor detection patterns.

f. The qualifications of the Manufacturer, Contractor and Installer to perform the work specified herein.

Key Control Plan; G, Ft. Lewis Security Representative

Key control plan including the following:

a. Procedures that will be used to log and positively control all keys during installation.

b. A listing of all keys and where they are used.

c. A listing of all persons allowed entry to the keys.

Spare Parts; G, Ft. Lewis Security Representative

Data lists of spare parts, tools and test equipment for each different item of material and equipment specified, after approval of detail drawings and not later than [2] months prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply and a list of the parts recommended for stocking.

Manufacturer's Instructions; G, Ft. Lewis Security Representative

Printed copies of manufacturer's recommendations for installation of materials prior to installation. Where installation procedures, or any part thereof, are required to be in accordance with manufacturer's recommendations, installation of the item will not be allowed to proceed until the recommendations are received and approved.

Testing; G, Ft. Lewis Security Representative

Test plan defining all tests required to ensure that the system meets technical, operational and performance specifications, [60] days prior to proposed test date. The test plan must be approved before the start of any testing. The test plan shall identify the capabilities and functions to be tested and include detailed instructions for the setup and execution of each test and procedures for evaluation and documentation of the results.

Experience; G, Ft. Lewis Security Representative

Written proof of specified experience requirements.

SD-06 Test Reports

Performance Verification Test; G, Ft. Lewis Security Representative

Test reports, in booklet form with witness signatures verifying execution of tests. Reports shall show the field tests to verify compliance with the specified performance criteria. Test reports shall include records of the physical parameters verified during testing. Test reports shall be submitted within [7] [14] [_____] days after completion of testing.

Materials and Equipment; G, Ft. Lewis Security Representative

Where materials or equipment are specified to conform, be constructed or tested to meet specific requirements, certification that the items provided conform to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.

1.4 TESTING

The Contractor shall perform site testing and adjustment of the completed intrusion detection system. The Contractor shall provide all personnel, equipment, instrumentation and supplies necessary to perform all testing. Written notification of planned testing shall be given to the Government at least 14 days prior to the test and in no case shall notice be given until after the Contractor has received written approval of the specific test procedures.

1.7 EXPERIENCE

The Contractor shall submit written proof that the following experience requirements are being met.

1.7.1 Hardware Manufacturer

All system components shall be produced by manufacturers who have been regularly engaged in the production of intrusion detection system components of the types to be installed for at least 3 years.

1.7.2 Software Manufacturer

All system and application software shall be produced by manufacturers who have been regularly engaged in the production of intrusion detection system and application software of similar type and complexity as the specified system for at least 2 years.

1.7.3 System Installer

The system shall be installed by a contractor who has been regularly engaged in the installation of intrusion detection systems of similar type and complexity as the specified system for at least 2 years.

The contractor whose duties involve the design, operation or maintenance of IDS require completion of a favorable local Agency Check with written inquiries prior to appointment to such non-critical-sensitive positions. Civilian contractor employees must possess a minimum security clearance of CONFIDENTIAL, granted in accordance with AR 380-67, paragraph 3-400.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

2.1.1 Materials and Equipment

Units of the same type of equipment shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's model and serial number in a conspicuous place.

2.1.2 Enclosures

System enclosures shall be as shown.

2.1.2.1 Interior Sensor

Sensors to be used in an interior environment shall be housed in an enclosure that provides protection against dust, falling dirt and dripping non-corrosive liquids.

2.1.2.2 Interior Electronics

System electronics to be used in an interior environment shall be housed in enclosures which meet the requirements of NEMA 250 Type 12.

2.1.2.3 Exterior Electronics

System electronics to be used in an exterior environment shall be housed in enclosures which meet the requirements of NEMA 250 Type 4X.

2.1.2.4 Corrosion Resistant

System electronics to be used in a corrosive environment as defined in NEMA 250 shall be housed in an enclosure which meet the requirements of NEMA 250 Type 4X.

2.1.2.5 Hazardous Environment Equipment

System electronics to be used in a hazardous environment shall be housed in an enclosure which meets the requirements of paragraph Hazardous Environment.

2.1.3 Nameplates

Laminated plastic nameplates shall be provided for local processors. Each nameplate shall identify the local processor and its location within the system. Laminated plastic shall be 3 mm (1/8 inch) thick, white with black center core. Nameplates shall be a minimum of 25 by 75 mm, (1 by 3 inches,) with minimum 6 mm (1/4 inch) high engraved block lettering. Nameplates shall be attached to the inside of the enclosure housing the local processor. Other major components of the system shall have the manufacturer's name, address, type or style, model or serial number and catalog number on a corrosion resistant plate secured to the item of equipment. Nameplates will not be required for devices smaller than 25 by 75 mm. (1 by 3 inches.)

2.1.4 Fungus Treatment

System components located in fungus growth inductive environments shall be completely treated for fungus resistance. Treating materials containing a mercury bearing fungicide shall not be used. Treating materials shall not increase the flammability of the material or surface being treated. Treating materials shall cause no skin irritation or other injury to personnel handling it during fabrication, transportation, operation, or maintenance of the equipment, or during use of the finished items when used for the purpose intended.

2.1.5 Tamper Provisions

2.1.5.1 Tamper Switches

Enclosures, cabinets, housings, boxes and fittings of every description having hinged doors or removable covers and which contain circuits or connections of the intrusion detection system and its power supplies, shall be provided with cover operated, corrosion-resistant tamper switches, arranged to initiate an alarm signal when the door or cover is moved. The enclosure and the tamper switch shall function together in such a manner as to not allow direct line of sight to any internal components before the switch activates. Tamper switches shall be inaccessible until the switch is activated; have mounting hardware so concealed that the location of the switch cannot be observed from the exterior of the enclosure; be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating; shall be spring-loaded and held in the closed position by the door or cover; and shall be wired so that they break the circuit when the door or cover is disturbed.

a. Non-sensor Enclosures: Tamper switches on non-sensor enclosures, which must be opened to make routine maintenance adjustments to the system and to service the power supplies, shall be push/pull-set, automatic reset type.

b. Sensor Enclosures: Tamper switches on sensor enclosures, which must be opened to make routine maintenance adjustments to the sensor, shall be single pole single throw type.

2.1.5.2 Enclosure Covers

Covers of pull and junction boxes provided to facilitate initial installation of the system need not be provided with tamper switches if they contain no splices or connections, but shall be protected by tack welding or brazing the covers in place or by tamper resistant security fasteners. Labels shall be affixed to such boxes indicating they contain no connections.

2.1.6 Locks and Key-Lock Switches

2.1.6.1 Locks

Locks shall be installed on system enclosures for maintenance purposes. Locks shall be UL listed, [round-key type, with three dual, one mushroom and three plain pin tumblers] [or] [conventional key type lock having a combination of five cylinder pin and five-point three position side bar].

Keys shall be stamped "U.S. GOVT. DO NOT DUP." The locks shall be so arranged that the key can only be withdrawn when in the locked position. All maintenance locks shall be keyed alike and only two keys shall be furnished for all of these locks. These keys shall be controlled in accordance with the key control plan.

2.1.6.2 Key-Lock-Operated Switches

All key-lock-operated switches required to be installed on system components shall be UL listed, [round-key type, with three dual, one mushroom and three plain pin tumblers] [or] [conventional key type lock having a combination of five cylinder pin and five-point three position side bar]. Keys shall be stamped "U.S. GOVT. DO NOT DUP." Key-lock-operated switches shall be two positions, with the key removable in either position. All key-lock-operated switches shall be keyed differently and only two keys shall be furnished for each key-lock-operated-switch. These keys shall be controlled in accordance with the key control plan.

2.1.6.3 Construction Locks

If the Contractor requires locks during installation and construction, a set of temporary locks shall be used. The final set of locks installed and delivered to the Government shall not include any of the temporary locks.

2.1.7 Application of System Component

System components shall be designed for continuous operation. Electronic components shall be solid state type, mounted on printed circuit boards conforming to UL 796. Printed circuit board connectors shall be plug-in, quick-disconnect type. Power dissipating components shall incorporate safety margins of not less that 25 percent with respect to dissipation ratings, maximum voltages and current carrying capacity. Light duty relays and similar switching devices shall be solid state type or sealed electro-mechanical.

2.1.7.1 Maintainability

Components shall be designed to be maintained using commercially available tools and equipment. Components shall be arranged and assembled so they are accessible to maintenance personnel. There shall be no degradation in tamper protection, structural integrity, EMI/RFI attenuation, or line supervision after maintenance when it is performed in accordance with manufacturer's instructions. The system shall be configured and installed to yield a mean time to repair (MTTR) of not more than 8 hours. Repair time is the clock time from the time maintenance personnel are given entrance to the system and begin work, until the system is fully functional.

2.1.7.2 Interchangeability

The system shall be constructed with off-the-shelf components which are physically, electrically and functionally interchangeable with equivalent components as complete items. Replacement of equivalent components shall not require modification of either the new component or of other components with which the replacement items are used. Custom designed or one-of-a-kind items shall not be used. Interchangeable components or modules shall not require trial and error matching in order to meet integrated system requirements, system accuracy, or restore complete system functionality.

2.1.7.3 Electromagnetic and Radio Frequency Interference (EMI/RFI)

System components generating EMI/RFI shall be designed and constructed in accordance with 47 CFR 15.

2.1.7.4 Product Safety

System components shall conform to applicable rules and requirements of NFPA 70. System components shall be equipped with instruction plates, including warnings and cautions, describing physical safety and special or important procedures to be followed in operating and servicing system equipment.

2.1.8 Controls and Designations

Controls and designations shall be as specified in NEMA ICS 1.

2.1.9 Special Test Equipment

The Contractor shall provide all special test equipment, special hardware, software, tools and programming or initialization equipment needed to start or maintain any part of the system and its components. Special test equipment is defined as any test equipment not normally used in an electronics maintenance facility.

2.1.12.2 Key Pads

Secure/Access keypads shall use a unique combination of alphanumeric and other symbols as an identifier. Keypads shall contain an integral alphanumeric/special symbols keyboard with symbols arranged in ascending ASCII code ordinal sequence. The keypad shall have a contact output.

2.2 INTERIOR SENSORS

2.2.1 Balanced Magnetic Switch (BMS)

The BMS shall detect 6 mm (1/4 inch) of separating relative movement between the magnet and the switch housing. Upon detecting such movement, it shall transmit an alarm signal to the alarm annunciation system.

2.2.1.1 BMS Subassemblies

The BMS shall consist of a switch assembly and an actuating magnetic assembly. The switch mechanism shall be of the balanced magnetic type. Each switch shall be provided with an over current protective device, rated to limit current to 80 percent of the switch capacity. Switches shall be rated for a minimum lifetime of one million operations. The housings of surface mounted switches and magnets shall be made of nonferrous metal and shall be weatherproof. The housings of recess mounted switches and magnets shall be made of nonferrous metal or plastic.

2.2.1.2 Remote Test

A remote test capability shall be provided. The remote test shall be initiated when commanded by the alarm annunciation system. The remote test shall activate the sensor's switch mechanism causing an alarm signal to be transmitted to the alarm annunciation system. The remote test shall

simulate the movement of the actuating magnet relative to the switch subassembly.

2.2.2 Duress Alarm Switches

Duress alarm switches shall provide the means for an individual to covertly notify the alarm annunciation system that a duress situation exists.

2.2.2.1 Pushbutton

Latching pushbutton duress alarms shall be designed to be activated by depressing a pushbutton located on the duress switch housing. No visible or audible alarm or noise shall emanate from the switch. The switch shall lock in the activated position until manually reset with a key. The switch housing shall shroud the activating button to prevent accidental activation. Switches shall be rated for a minimum lifetime of 50,000 operations.

2.2.3 Security Screen

Security screens shall detect an intruder when the sensor wire is disconnected, cut, or broken. An alarm signal shall be transmitted to the alarm annunciation system. The sensor shall be constructed from 26 gauge insulated hard-drawn copper wire installed in a grid pattern on a wooden frame or as shown. The sensor grid wires connection to the alarm annunciation system shall be housed within a junction box as shown. A tamper switch shall be provided to detect attempts to remove the screen and to detect attempts to tamper with connections and end of line resistor.

2.2.4 Microwave-Passive Infrared Dual Detection Motion Sensor

The dual detection motion sensor shall be a single unit combining a detector which detects changes in the transmitted microwave signal and a detector which detects changes in the ambient level of infrared emissions caused by the movement of a standard intruder within the detection pattern. The detection pattern shall be capable of covering a 6 by 9 m (20 by 30 feet) room. Upon detection of changes by either detector, a window of more than 3 seconds but less than 8 seconds shall be opened. If the other detector detects a change during this window, the sensor shall transmit an alarm signal to the alarm annunciation system. The passive infrared detector shall detect a change in temperature of no more than 1.1 degrees C, (2 degrees F,) and shall detect a standard intruder traveling within the detection pattern at a speed of 0.09 to 2.3 m (0.3 to 7.5 feet) per second across two adjacent segments of the field of view. Emissions monitored by the sensor shall be in the range of 8 to 14 microns. The microwave detector shall detect a standard intruder moving within the detection pattern at a speed of 0.09 to 2.3 m (0.3 to 7.5 feet) per second. The microwave detector shall comply with 47 CFR 15 Subpart F. The controls shall not be accessible when the sensor housing is in place. The sensor shall be configured to produce an alarm when both detectors sense a target.

2.2.4.1 Test Indicator

The sensor shall be equipped with an LED walk test indicator for both the passive infrared detector and the microwave detector. The walk test indicator shall not be visible during normal operations. When visible, the walk test indicator shall light when the sensor detects an intruder. The

sensor shall either be equipped with a manual control, located within the sensor's housing, to enable/disable the test indicators or the test indicators shall be located within the sensor such that it can only be seen when the housing is open/removed.

2.2.4.2 Remote Test

A remote test capability shall be provided. The remote test hardware may be integral to the sensor or a separate piece of equipment. The remote test shall be initiated when commanded by the alarm annunciation system. The remote test shall excite each sensing element and associated electronics causing an alarm signal to be transmitted to the alarm annunciation system. The sensor stimulation generated by the remote test hardware shall simulate a standard intruder moving within the sensor's detection pattern.

2.3 PROCESSOR POWER SUPPLY

Local processor and sensors shall be powered from an uninterruptible power source. The uninterruptible power source shall provide 6 hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored. There will be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa. Batteries shall be sealed, non-outgassing type. The power supply shall be equipped with an indicator for ac input power and an indicator for dc output power. Loss of primary power shall be reported to the central station as an alarm.

2.3.1 Auxiliary Equipment Power

A GFI service outlet shall be furnished inside the local processor's enclosure.

2.4 COMMUNICATIONS CONTROL

A pre-processor unit (PPU) shall serve as the communications front-end to the existing host file server. The PPU shall handle error checking and correcting, signal time division multiplexing and signal prioritization. The PPU shall have an alarm point capacity of 4096 zones and shall be configured for operation with the existing system.

2.5 WIRE AND CABLE

2.5.1 General

The Contractor shall provide all wire and cable not indicated as Government furnished equipment. All wiring shall meet NFPA 70 standards.

2.5.2 Above Ground Sensor Wiring

Sensor wiring shall be 20 AWG minimum, twisted and shielded, 2, 3, 4 or 6 pairs to match hardware. Multi-conductor wire shall have an outer jacket of PVC.

2.5.3 Class 2 Low Energy Conductors

The conductor sizes specified for digital functions shall take precedence over any requirements for Class 2 low energy signal-circuit conductors specified elsewhere.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

The Contractor shall install all system components, including Government furnished equipment and appurtenances in accordance with the manufacturer's instructions, IEEE C2 and as shown and shall furnish necessary interconnections, services and adjustments required for a complete and operable system as specified and shown.

3.1.1 Installation

The Contractor shall install the system in accordance with the standards for safety, NFPA 70, UL 681, UL 1037 and UL 1076 and the appropriate installation manual for each equipment type. Components within the system shall be configured with appropriate service points to pinpoint system trouble in less than 20 minutes. Minimum size of conduit shall be 13 mm. (1/2 inch.) DTS shall not be pulled into conduits or placed in raceways, compartments, outlet boxes, junction boxes, or similar fittings with other building wiring. Flexible cords or cord connections shall not be used to supply power to any components of the system, except where specifically noted herein. All other electrical work shall be as specified in Section~~s~~ 16415 and as shown. Grounding shall be installed as necessary to preclude ground loops, noise and surges from adversely affecting system operation.

3.1.2 Enclosure Penetrations

All enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.

3.1.3 Cold Galvanizing

All field welds and/or brazing on factory galvanized components, such as boxes, enclosures and conduits, shall be coated with a cold-galvanized paint containing at least 95 percent zinc by weight.

3.2 SYSTEM STARTUP

The Contractor shall not apply power to the intrusion detection system until the following items have been completed:

a. Intrusion-detection system equipment items and DTS have been set up in accordance with manufacturer's instructions.

b. A visual inspection of the intrusion detection system has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.

c. System wiring has been tested and verified as correctly connected as indicated.

d. All system grounding and transient protection systems have been verified as properly installed and connected as indicated.

e. Power supplies to be connected to the intrusion detection system have been verified as the correct voltage, phasing and frequency as indicated.

f. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work/equipment.

3.3 SITE TESTING

3.3.1 General

The Contractor shall provide personnel, equipment, instrumentation and supplies necessary to perform the site testing. The Government will witness all testing. Written permission shall be obtained from the Government before proceeding with the next phase of testing. Original copies of all data produced during performance verification and endurance testing shall be turned over to the Government at the conclusion of each phase of testing prior to Government approval of the test.

3.3.2 Contractor's Field Testing

The Contractor shall calibrate and test all equipment, verify data transmission system (DTS) operation, place the integrated system in service and test the integrated system. Ground rods installed by the Contractor shall be tested as specified in IEEE Std 142. The Contractor shall deliver a report describing results of functional tests, diagnostics and calibrations including written certification to the Government that the installed complete system has been calibrated, tested and is ready to begin performance verification testing. The report shall also include a copy of the approved performance verification test procedure.

3.3.3 Performance Verification Test

The Contractor shall demonstrate that the completed system complies with the specified requirements. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The performance verification test, as specified, shall not be started until receipt by the Contractor of written permission from the Government, based on the Contractor's written request. This shall include certification of successful completion of testing as specified in paragraph Contractor's Field Testing and upon successful completion of training as specified. Upon successful completion of the performance verification test, the Contractor shall deliver test reports and other documentation to the Government, as specified. The Contractor will not be held responsible for failures in system performance resulting from the following:

(1) An outage of the main power in excess of the capability of any backup power source, provided that the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the system performed as specified.

(2) Failure of a Government furnished communications link, provided that the failure was not due to Contractor furnished equipment, installation, or software.

(3) Failure of existing Government owned equipment, provided that the failure was not due to Contractor furnished equipment, installation or software.

(4) The occurrence of specified nuisance alarms.

(5) The occurrence of specified environmental alarms.

End Of Section

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SECTION 13851

FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S3.41	(1990; R 1996) Audible Emergency Evacuation Signal

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41	(1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1221	(1999) Installation, Maintenance and Use of Public Fire Service Communication Systems
NFPA 70	(2002) National Electrical Code
NFPA 72	(2002) National Fire Alarm Code
NFPA 90A	(1999) Installation of Air Conditioning and Ventilating Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)

UL 1242	(1996; Rev Mar 1998) Intermediate Metal Conduit
UL 1971	(1995; Rev thru Apr 1999) Signaling Devices for the Hearing Impaired
UL 228	(1997; Rev Jan 1999) Door Closers-Holders, With or Without Integral Smoke Detectors
UL 268	(1996; Rev thru Jan 1999) Smoke Detectors for Fire Protective Signaling Systems
UL 268A	(1998) Smoke Detectors for Duct Application
UL 38	(1999) Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems

UL 464	(1996; Rev thru May 1999) Audible Signal Appliances
UL 521	(1999) Heat Detectors for Fire Protective Signaling Systems
UL 6	(1997) Rigid Metal Conduit
UL 797	(1993; Rev thru Mar 1997) Electrical Metallic Tubing
UL 864	(1996; Rev thru Mar 1999) Control Units for Fire Protective Signaling Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government (RE for Resident Engineer). The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fire Alarm Reporting System; G, RE

Detail drawings, prepared and signed by a Registered Professional Engineer or a NICET Level 3 Fire Alarm Technician, consisting of a complete list of equipment and material, including manufacturer's descriptive and technical literature, catalog cuts, and installation instructions. Note that the contract drawings show layouts based on typical detectors. The Contractor shall check the layout based on the actual detectors to be installed and make any necessary revisions in the detail drawings. The detail drawings shall also contain complete wiring and schematic diagrams for the equipment furnished, equipment layout, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Detailed point-to-point wiring diagram shall be prepared and signed by a Registered Professional Engineer or a NICET Level 3 Fire Alarm Technician showing points of connection. Diagram shall include connections between system devices, appliances, control panels, supervised devices, and equipment that is activated or controlled by the panel.

SD-03 Product Data

Storage Batteries; G, RE

Substantiating battery calculations for supervisory and alarm power requirements. Ampere-hour requirements for each system component and each panel component, and the battery recharging period shall be included.

Voltage Drop; G, RE

Voltage drop calculations for notification appliance circuits to indicate that sufficient voltage is available for proper appliance operation.

Special Tools and Spare Parts; G, RE

Spare parts data for each different item of material and equipment specified, not later than 3 months prior to the date of beneficial occupancy. Data shall include a complete list of parts and supplies with the current unit prices and source of supply and a list of the parts recommended by the manufacturer to be replaced after 1 year of service.

Technical Data and Computer Software; G, RE

Technical data which relates to computer software.

Training; G, RE

Lesson plans, operating instructions, maintenance procedures, and training data, furnished in manual format, for the training courses. The operations training shall familiarize designated government personnel with proper operation of the fire alarm system. The maintenance training course shall provide the designated government personnel adequate knowledge required to diagnose, repair, maintain, and expand functions inherent to the system.

Testing; G, RE

Detailed test procedures, prepared and signed by a Registered Professional Engineer or a NICET Level 3 Fire Alarm Technician, for the fire detection and alarm system 60 days prior to performing system tests.

SD-06 Test Reports

Testing; G, RE

Test reports, in booklet form, showing field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall document readings, test results and indicate the final position of controls. The Contractor shall include the NFPA 72 Certificate of Completion and NFPA 72 Inspection and Testing Form, with the appropriate test reports.

SD-07 Certificates

Equipment; G, RE

Certified copies of current approvals or listings issued by an independent test lab if not listed by UL, FM or other nationally recognized testing laboratory, showing compliance with specified NFPA standards.

Qualifications; G, RE

Proof of qualifications for required personnel. The installer shall submit proof of experience for the Professional Engineer, fire alarm technician, and the installing company.

SD-10 Operation and Maintenance Data

Technical Data and Computer Software; G, RE

Six copies of operating manual outlining step-by-step procedures required for system startup, operation, and shutdown. The manual shall include the manufacturer's name, model number, service manual, parts list, and complete description of equipment and their basic operating features. Six copies of maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manuals shall include conduit layout, equipment layout and simplified wiring, and control diagrams of the system as installed. The manuals shall include complete procedures for system revision and expansion, detailing both equipment and software requirements. Original and backup copies of all software delivered for this project shall be provided, on each type of media utilized. Manuals shall be approved prior to training.

1.3 GENERAL REQUIREMENTS

1.3.1 Standard Products

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that can provide service within 24 hours of notification.

1.3.2 Nameplates

Major components of equipment shall have the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a noncorrosive and nonheat-sensitive plate which is securely attached to the equipment.

1.3.3 Keys and Locks

Locks shall be keyed alike. Four keys for the system shall be provided.

1.3.4 Tags

Tags with stamped identification number shall be furnished for keys and locks.

1.3.5 Verification of Dimensions

After becoming familiar with details of the work, the Contractor shall verify dimensions in the field and shall advise the Contracting Officer of any discrepancy before performing the work.

1.3.6 Compliance

The fire detection and alarm system and the central reporting system shall be configured in accordance with NFPA 72; exceptions are acceptable as directed by the Contracting Officer. The equipment furnished shall be compatible and be UL listed, FM approved, or approved or listed by a nationally recognized testing laboratory in accordance with the applicable NFPA standards.

1.3.7 Qualifications

1.3.7.1 Engineer and Technician

a. Registered Professional Engineer with verification of experience and at least 4 years of current experience in the design of the fire protection and detection systems.

b. National Institute for Certification in Engineering Technologies (NICET) qualifications as an engineering technician in fire alarm systems program with verification of experience and current NICET certificate.

c. The Registered Professional Engineer may perform all required items under this specification. The NICET Fire Alarm Technician shall perform only the items allowed by the specific category of certification held.

1.3.7.2 Installer

The installing Contractor shall provide the following: NICET Fire Alarm Technicians to perform the installation of the system. A NICET Level 3 Fire Alarm Technician shall supervise the installation of the fire alarm system. NICET Level 2 or higher Fire Alarm Technician shall install and terminate fire alarm devices, cabinets and panels. An electrician or NICET Level 1 Fire Alarm Technician shall install conduit for the fire alarm system. The Fire Alarm technicians installing the equipment shall be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

1.3.7.3 Design Services

Installations requiring designs or modifications of fire detection, fire alarm, or fire suppression systems shall require the services and review of a qualified fire protection engineer. For the purposes of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting one of the following conditions:

a. An engineer having a Bachelor of Science or Masters of Science Degree in Fire Protection Engineering from an accredited university engineering program, plus a minimum of 2 years' work experience in fire protection engineering.

b. A registered professional engineer (P.E.) in fire protection engineering.

c. A registered PE in a related engineering discipline and member grade status in the National Society of Fire Protection Engineers.

d. An engineer with a minimum of 10 years' experience in fire protection engineering and member grade status in the National Society of Fire Protection Engineers.

1.4 SYSTEM DESIGN

1.4.1 Operation

The fire alarm and detection system shall be a complete, addressable, supervised fire alarm reporting system. The system shall be activated into the alarm mode by actuation of any alarm initiating device. The system shall remain in the alarm mode until the initiating device is reset and the fire alarm control panel is reset and restored to normal. The system shall be a Class A, Style D addressable device system. Alarm initiating devices shall be connected to signal line circuits (SLC), Style 6, in accordance with NFPA 72. Alarm notification appliances shall be connected to notification appliance circuits (NAC), Style Z in accordance with NFPA 72. A looped conduit system shall be provided so that if the conduit and all conductors within are severed at any point, all NAC and SLC will remain functional. The conduit loop requirement is not applicable to the signal transmission link from the local panels (at the protected premises) to the Supervising Station (fire station, fire alarm central communication center). Textual, audible, and visual appliances and systems shall comply with NFPA 72. Fire alarm system components requiring power, except for the control panel power supply, shall operate on 24 Volts dc. Addressable system shall be microcomputer (microprocessor or microcontroller) based with a minimum word size of eight bits and shall provide the following features:

a. Sufficient memory to perform as specified and as shown for addressable system.

b. Individual identity of each addressable device for the following conditions: alarm; trouble; open; short; and appliances missing/failed remote detector - sensitivity adjustment from the panel for smoke detectors

c. Capability of each addressable device being individually disabled or enabled from the panel.

d. Each SLC shall be sized to provide 40 percent addressable expansion without hardware modifications to the panel.

1.4.2 Operational Features

The system shall have the following operating features:

a. Monitor electrical supervision of SLC, and NAC. Smoke detectors shall have combined alarm initiating and power circuits.

b. Monitor electrical supervision of the primary power (ac) supply, battery voltage, placement of alarm zone module (card, PC board) within the control panel, and transmitter tripping circuit integrity.

c. A trouble buzzer and trouble LED/LCD (light emitting diode/liquid crystal diode) to activate upon a single break, open, or ground fault condition which prevents the required normal operation of the

system. The trouble signal shall also operate upon loss of primary power (ac) supply, low battery voltage, removal of alarm zone module (card, PC board), and disconnection of the circuit used for transmitting alarm signals off-premises. A trouble alarm silence switch shall be provided which will silence the trouble buzzer, but will not extinguish the trouble indicator LED/LCD. Subsequent trouble and supervisory alarms shall sound the trouble signal until silenced. After the system returns to normal operating conditions, the trouble buzzer shall again sound until the silencing switch returns to normal position, unless automatic trouble reset is provided.

d. A one person test mode. Activating an initiating device in this mode will activate an alarm for a short period of time, then automatically reset the alarm, without activating the transmitter during the entire process.

e. A transmitter disconnect switch to allow testing and maintenance of the system without activating the transmitter but providing a trouble signal when disconnected and a restoration signal when reconnected.

f. Evacuation alarm silencing switch which, when activated, will silence alarm devices, but will not affect the zone indicating LED/LCD nor the operation of the transmitter. This switch shall be over-ridden upon activation of a subsequent alarm from an unalarmed device and the NAC devices will be activated.

g. Electrical supervision for circuits used for supervisory signal services (i.e., sprinkler systems, valves, etc.). Supervision shall detect any open, short, or ground.

h. Confirmation or verification of all smoke detectors. The control panel shall interrupt the transmission of an alarm signal to the system control panel for a factory preset period. This interruption period shall be adjustable from 1 to 60 seconds and be factory set at 20 seconds. Immediately following the interruption period, a confirmation period shall be in effect during which time an alarm signal, if present, will be sent immediately to the control panel. Fire alarm devices other than smoke detectors shall be programmed without confirmation or verification.

i. The fire alarm control panel shall provide supervised addressable relays for HVAC shutdown. An override at the HVAC panel shall not be provided.

j. Provide one person test mode - Activating an initiating device in this mode will activate an alarm for a short period of time, then automatically reset the alarm, without activating the transmitter during the entire process.

k. The fire alarm control panel shall provide the required monitoring and supervised control outputs needed to accomplish elevator recall.

l. The fire alarm control panel shall monitor the fire sprinkler system, or other fire protection extinguishing system.

m. The control panel and field panels shall be software reprogrammable to enable expansion or modification of the system without replacement of hardware or firmware. Examples of required changes are: adding or deleting devices or zones; changing system responses to particular input signals; programming certain input signals to activate auxiliary devices.

1.4.3 Alarm Functions

An alarm condition on a circuit shall automatically initiate the following functions:

a. Transmission of signals over radio fire reporting system. The signal shall be common for any device.

b. Visual indications of the alarmed devices on the fire alarm control panel display and on the remote audible/visual display.

c. Continuous sounding or operation of alarm notification appliances throughout the building as required by ANSI S3.41.

d. Closure of doors held open by electromagnetic devices.

e. Operation of the smoke control system.

f. Deactivation of the air handling units serving the alarmed area.

g. Shutdown of power to the data processing equipment in the alarmed area.

h. Automatic discharge of the designated fire suppression systems. A 15 second maximum delay shall be provided for the deluge system, a 30 second delay for the wet pipe system.

1.4.4 Operation Matrix

The system shall operate in accordance with the attached Operation Matrix.

1.4.5 Primary Power

Operating power shall be provided as required by paragraph Power Supply for the System. Transfer from normal to emergency power or restoration from emergency to normal power shall be fully automatic and not cause transmission of a false alarm. Loss of ac power shall not prevent transmission of a signal via the fire reporting system upon operation of any initiating circuit.

1.4.6 Battery Backup Power

Battery backup power shall be through use of rechargeable, sealed-type storage batteries and battery charger.

1.4.7 Interface With Other Equipment

Interfacing components shall be furnished as required to connect to subsystems or devices which interact with the fire alarm system, such as

supervisory or alarm contacts in suppression systems, operating interfaces for smoke control systems, door releases, etc.

1.5 TECHNICAL DATA AND COMPUTER SOFTWARE

Technical data and computer software (meaning technical data which relates to computer software) which is specifically identified in this project, and which may be defined/required in other specifications, shall be delivered, strictly in accordance with the CONTRACT CLAUSES, and in accordance with the Contract Data Requirements List, DD Form 1423. Data delivered shall be identified by reference to the particular specification paragraph against which it is furnished. Data to be submitted shall include complete system, equipment, and software descriptions. Descriptions shall show how the equipment will operate as a system to meet the performance requirements of this contract. The data package shall also include the following:

(1) Identification of programmable portions of system equipment and capabilities.

(2) Description of system revision and expansion capabilities and methods of implementation detailing both equipment and software requirements.

(3) Provision of operational software data on all modes of programmable portions of the fire alarm and detection system.

(4) Description of Fire Alarm Control Panel equipment operation.

(5) Description of auxiliary and remote equipment operations.

(6) Library of application software.

(7) Operation and maintenance manuals as specified in SD-19 of the Submittals paragraph.

1.6 DELIVERY AND STORAGE

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt, dust, and any other contaminants.

1.7 VOLTAGE DROP

Provide voltage drop calculations for notification appliance circuits to indicate that sufficient voltage is available for proper appliance operation.

1.8 EQUIPMENT

Provide certified copies of current approvals or listings issued by an independent test lab if not listed by UL, FM or other nationally recognized testing laboratory, showing compliance with specified NFPA standards.

PART 2 PRODUCTS

2.1 CONTROL PANEL

Control Panel shall comply with the applicable requirements of UL 864. Panel shall be modular, installed in a surface mounted steel cabinet with hinged door and cylinder lock. Control panel shall be a clean, uncluttered, and orderly assembled panel containing components and equipment required to provide the specified operating and supervisory functions of the system. The panel shall have prominent rigid plastic, phenolic or metal identification plates for LED/LCDs, SLC, controls, meters, fuses, and switches. Nameplates for fuses shall also include ampere rating. The LED/LCD displays shall be located on the exterior of the cabinet door or be visible through the cabinet door. Control panel switches shall be within the locked cabinet. A suitable means (single operation) shall be provided for testing the control panel visual indicating devices (meters or LEDs/LCDs). Meters and LEDs shall be plainly visible when the cabinet door is closed. Signals and LEDs/LCDs shall be provided to indicate by zone any alarm, supervisory or trouble condition on the system. Each IDC shall be powered and supervised so that a signal on one zone does not prevent the receipt of signals from other devices. Loss of power, including batteries, shall not require the manual reloading of a program. Upon restoration of power, startup shall be automatic, and shall not require any manual operation. The loss of primary power or the sequence of applying primary or emergency power shall not affect the transmission of alarm, supervisory or trouble signals. Visual annunciation shall be provided for LED/LCD visual display as an integral part of the control panel and shall identify with a word description and id number each device. Cabinets shall be provided with ample gutter space to allow proper clearance between the cabinet and live parts of the panel equipment. If more than one modular unit is required to form a control panel, the units shall be installed in a single cabinet large enough to accommodate units. Cabinets shall be painted red.

2.1.1 Remote System Audible/Visual Display

Audible appliance shall have a minimum sound level output rating of 85 dBA at 10 feet (3.05 m) and operate in conjunction with the panel integral display. The audible device shall be silenced by a system silence switch on the remote system. The audible device shall be silenced by the system silence switch located at the remote location, but shall not extinguish the visual indication. The remote LED/LCD visual display shall provide identification, consisting of the word description and id number for each device as displayed on the control panel. A rigid plastic, phenolic or metal identification sign which reads "Fire Alarm System Remote Display" shall be provided at the remote audible/visual display. The remote visual appliance located with the audible appliance shall not be extinguished until the trouble or alarm has been cleared.

2.1.2 Circuit Connections

Circuit conductors entering or leaving the panel shall be connected to screw-type terminals with each conductor and terminal marked for identification.

2.1.3 System Expansion and Modification Capabilities

Any equipment and software needed by qualified technicians to implement future changes to the fire alarm system shall be provided as part of this contract.

2.1.4 Addressable Control Module

The control module shall be capable of operating as a relay (dry contact form C) for interfacing the control panel with other systems, and to control door holders or initiate elevator fire service. The module shall be UL listed as compatible with the control panel. The indicating device or the external load being controlled shall be configured as a Style Y notification appliance circuits. The system shall be capable of supervising, audible, visual and dry contact circuits. The control module shall have both an input and output address. The supervision shall detect a short on the supervised circuit and shall prevent power from being applied to the circuit. The control model shall provide address setting means compatible with the control panel's SLC supervision and store an internal identifying code. The control module shall contain an integral LED that flashes each time the control module is polled.

2.1.5 Addressable Monitor Initiating Device Circuits Module

The initiating device being monitored shall be configured as a Style D initiating device circuits. The system shall be capable of defining any module as an alarm module and report alarm trouble, loss of polling, or as a supervisory module, and reporting supervisory short, supervisory open or loss of polling. The module shall be UL listed as compatible with the control panel. The monitor module shall provide address setting means compatible with the control panel's SLC supervision and store an internal identifying code. Monitor module shall contain an integral LED that flashes each time the monitor module is polled. Pull stations with a monitor module in a common backbox are not required to have an LED.

2.2 STORAGE BATTERIES

Storage batteries shall be provided and shall be 24 Vdc sealed, lead-calcium type requiring no additional water. The batteries shall have ample capacity, with primary power disconnected, to operate the fire alarm system for a period of 72 hours. Following this period of battery operation, the batteries shall have ample capacity to operate all components of the system, including all alarm signaling devices in the total alarm mode for a minimum period of 15 minutes. Batteries shall be located at the bottom of the panel. Batteries shall be provided with overcurrent protection in accordance with NFPA 72. Separate battery cabinets shall have a lockable, hinged cover similar to the fire alarm panel. The lock shall be keyed the same as the fire alarm control panel. Cabinets shall be painted to match the fire alarm control panel.

2.3 BATTERY CHARGER

Battery charger shall be completely automatic, 24 Vdc with high/low charging rate, capable of restoring the batteries from full discharge (18 Volts dc) to full charge within 48 hours. A pilot light indicating when batteries are manually placed on a high rate of charge shall be provided as part of the

unit assembly, if a high rate switch is provided. Charger shall be located in control panel cabinet or in a separate battery cabinet.

2.4 ADDRESSABLE MANUAL FIRE ALARM STATIONS

Addressable manual fire alarm stations shall conform to the applicable requirements of UL 38. Manual stations shall be connected into signal line circuits. Stations shall be installed on flush mounted outlet boxes. Manual stations shall be mounted at 48 inches (1220 mm). Stations shall be double action type. Stations shall be finished in red, with raised letter operating instructions of contrasting color. Stations requiring the breaking of glass or plastic panels for operation are not acceptable. Stations employing glass rods are not acceptable. The use of a key or wrench shall be required to reset the station. Gravity or mercury switches are not acceptable. Switches and contacts shall be rated for the voltage and current upon which they operate. Addressable pull stations shall be capable of being field programmed, shall latch upon operation and remain latched until manually reset. Stations shall have a separate screw terminal for each conductor. Surface mounted boxes shall be matched and painted the same color as the mounting surface.

2.5 FIRE DETECTING DEVICES

Fire detecting devices shall comply with the applicable requirements of NFPA 72, NFPA 90A, UL 268, UL 268A, and UL 521. The detectors shall be provided as indicated. Detector base shall have screw terminals for making connections. No solder connections will be allowed. Detectors located in concealed locations (above ceiling, raised floors, etc.) shall have a remote visible indicator LED/LCD. Addressable fire detecting devices, except flame detectors, shall be dynamically supervised and uniquely identified in the control panel. All fire alarm initiating devices shall be individually addressable, except where indicated. Installed devices shall conform to NFPA 70 hazard classification of the area where devices are to be installed.

2.5.1 Heat Detectors

Heat detectors shall be designed for detection of fire by combination fixed temperature and rate-of-rise principle. Heat detector spacing shall be rated in accordance with UL 521. Detectors located in areas subject to moisture, exterior atmospheric conditions, or hazardous locations as defined by NFPA 70, shall be types approved for such locations. Heat detectors located in attic spaces or similar concealed spaces below the roof shall be intermediate temperature rated.

2.5.1.1 Combination Fixed-Temperature and Rate-of-Rise Detectors

Detectors shall be designed for surface outlet box mounting and supported independently of wiring connections. Contacts shall be self-resetting after response to rate-of-rise principle. Under fixed temperature actuation, the detector shall have a permanent external indication which is readily visible. Detector units located in boiler rooms, showers, or other areas subject to abnormal temperature changes shall operate on fixed temperature principle only. The UL 521 test rating for the fixed temperature portion shall be 135 degrees F (57.2 degrees C). The UL 521 test rating for the Rate-of-Rise detectors shall be rated for 50 by 50 ft (15 by 15 m).

2.5.1.2 Fixed Temperature Detectors

Detectors shall be designed for surface outlet box mounting and supported independently of wiring connections. Detectors shall be designed to detect high heat. The detectors shall have a specific temperature setting of 135 degrees F (57.2 degrees C). The UL 521 test rating for the fixed temperature detectors shall be rated for 15 by 15 ft (4.57 by 4.57 m).

2.5.2 Smoke Detectors

Smoke detectors shall be designed for detection of abnormal smoke densities. Smoke detectors shall be photoelectric type. Detectors shall contain a visible indicator LED/LCD that shows when the unit is in alarm condition. Detectors shall not be adversely affected by vibration or pressure. Detectors shall be the plug-in type in which the detector base contains terminals for making wiring connections. Detectors that are to be installed in concealed (above false ceilings, etc.) locations shall be provided with a remote indicator LED/LCD suitable for mounting in a finished, visible location.

2.5.2.1 Photoelectric Detectors

Detectors shall operate on a light scattering concept using an LED light source. Failure of the LED shall not cause an alarm condition. Detectors shall be factory set for sensitivity and shall require no field adjustments of any kind. Detectors shall have an obscuration rating in accordance with UL 268. Addressable smoke detectors shall be capable of having the sensitivity being remotely adjusted by the control panel.

2.5.2.2 Duct Detectors

Duct-mounted photoelectric smoke detectors shall be furnished and installed where indicated and in accordance with NFPA 90A. Units shall consist of a smoke detector as specified in paragraph Photoelectric Detectors, mounted in a special housing fitted with duct sampling tubes. Detector circuitry shall be mounted in a metallic enclosure exterior to the duct. Detectors shall have a manual reset. Detectors shall be rated for air velocities that include air flows between 500 and 4000 fpm (2.5 and 20 m/s). Detectors shall be powered from the fire alarm panel. Sampling tubes shall run the full width of the duct. The duct detector package shall conform to the requirements of NFPA 90A, UL 268A, and shall be UL listed for use in air-handling systems. The control functions, operation, reset, and bypass shall be controlled from the fire alarm control panel. Lights to indicate the operation and alarm condition; and the test and reset buttons shall be visible and accessible with the unit installed and the cover in place. Detectors mounted above 6 feet (1.83 m) and those mounted below 6 feet (1.83 m) that cannot be easily accessed while standing on the floor, shall be provided with a remote detector indicator panel containing test and reset switches. Remote lamps and switches as well as the affected fan units shall be properly identified in etched plastic placards. Detectors shall have auxiliary contacts to provide control, interlock, and shutdown functions specified in Section 15910 DIRECT DIGITAL CONTROL SYSTEMS. The detectors shall be supplied by the fire alarm system manufacturer to ensure complete system compatibility.

2.5.2.3 Projected Beam Detectors

Furnish and install where indicated on the Drawings. The detectors shall be UL Listed No. 268. The detectors shall consist of separate transmitter and receiver, and shall be capable of long-range coverage of up to 238 feet (100 meters), and have seven sensitivity settings. Automatic compensation for lens contamination shall be incorporated. The detectors shall include a normal status indicator (green pulsing LED, an alarm indicator (red LED), and a trouble indicator (amber LED).

2.6 NOTIFICATION APPLIANCES

Audible appliances shall conform to the applicable requirements of UL 464. Devices shall be connected into notification appliance circuits. Devices shall have a separate screw terminal for each conductor. Audible appliances shall generate a unique audible sound from other devices provided in the building and surrounding area. Surface mounted audible appliances shall be painted red. Recessed audible appliances shall be installed with a grill that is painted red.

2.6.1 Alarm Horns

Horns shall be surface mounted, with the matching mounting back box surface mounted grille and vibrating type suitable for use in an electrically supervised circuit. Horns shall produce a sound rating of at least 95 dBA at 10 feet (3.05 m). Horns used in exterior locations shall be specifically listed or approved for outdoor use and be provided with metal housing and protective grilles.

2.6.2 Visual Notification Appliances

Visual notification appliances shall conform to the applicable requirements of UL 1971 and the contract drawings. Appliances shall have clear high intensity optic lens, xenon flash tubes, and output white light. Strobe flash rate shall be between 1 to 3 flashes per second and a minimum of 75 candela. Strobe shall be surface mounted.

2.6.3 Combination Audible/Visual Notification Appliances

Combination audible/visual notification appliances shall provide the same requirements as individual units except they shall mount as a unit in standard backboxes. Units shall be factory assembled. Any other audible notification appliance employed in the fire alarm systems shall be approved by the Contracting Officer.

2.7 FIRE DETECTION AND ALARM SYSTEM PERIPHERAL EQUIPMENT

2.7.1 Electromagnetic Door Hold-Open Devices

Devices shall be attached to the walls unless otherwise indicated. Devices shall comply with the appropriate requirements of UL 228. Devices shall operate on 24 Volt dc power. Compatible magnetic component shall be attached to the door. Under normal conditions, the magnets shall attract and hold the doors open. When magnets are de-energized, they shall release the doors. Magnets shall have a holding force of 25 pounds (111.2 N). Devices shall be UL or FM approved. Housing for devices shall be brushed aluminum or stainless steel. Operation shall be fail safe with no moving

parts. Electromagnetic door hold-open devices shall not be required to be held open during building power failure.

2.7.2 Conduit

Conduit and fittings shall comply with NFPA 70, UL 6, UL 1242, and UL 797.

2.7.3 Wiring

Wiring shall conform to NFPA 70. Wiring for 120 Vac power shall be No. 12 AWG minimum. The SLC wiring shall be copper cable in accordance with the manufacturers requirements. Wiring for fire alarm dc circuits shall be No. 14 AWG minimum. Voltages shall not be mixed in any junction box, housing, or device, except those containing power supplies and control relays. Wiring shall conform to NFPA 70. System field wiring shall be solid copper and installed in metallic conduit or electrical metallic tubing, except that rigid plastic conduit may be used under slab-on-grade. Conductors shall be color coded. Conductors used for the same functions shall be similarly color coded. Wiring code color shall remain uniform throughout the circuit. Pigtail or T-tap connections to initiating device circuits, supervisory alarm circuits, and notification appliance circuits are prohibited.

2.7.4 Special Tools and Spare Parts

Software, connecting cables and proprietary equipment, necessary for the maintenance, testing, and reprogramming of the equipment shall be furnished to the Contracting Officer. Two spare fuses of each type and size required shall be furnished. Two percent of the total number of each different type of detector, but no less than two each, shall be furnished. Spare fuses shall be mounted in the fire alarm panel. All locks for system components shall be operable with "211"keys.

2.8 TRANSMITTERS

2.8.1 Radio Alarm Transmitters

Transmitters shall be compatible with the King-Fisher central supervising station receiving equipment. Each radio alarm transmitter shall be the manufacturer's recognized commercial product, completely assembled, wired, factory tested, and delivered ready for installation and operation. Transmitters shall be provided in accordance with applicable portions of NFPA 72, NFPA 1221, and 47 CFR 15. Transmitter electronics module shall be contained within the physical housing as an integral, removable assembly. At the contractors option, and if UL listed, the transmitter may be housed in the same panel as the fire alarm control panel.

2.8.1.1 Transmitter Power Supply

Each radio alarm transmitter shall be powered by a combination of locally available 120-volt ac power and a sealed, lead-calcium battery.

a. Operation: Each transmitter shall operate from 120-volt ac power. In the event of 120-volt ac power loss, the transmitter shall automatically switch to battery operation. Switchover shall be accomplished with no interruption of protective service, and shall automatically transmit a trouble message. Upon restoration of ac power, transfer back to normal ac power supply shall also be automatic.

b. Battery Power: Transmitter standby battery capacity shall provide sufficient power to operate the transmitter in a normal standby status for a minimum of 72 hours and be capable of transmitting alarms during that period.

2.8.1.2 Radio Alarm Transmitter Housing

Transmitter housing shall be NEMA Type 1. The housing shall contain a lock that is keyed identical to the fire alarm system for the building. Radio alarm transmitter housing shall be factory painted with a suitable priming coat and not less than two coats of a hard, durable weatherproof enamel.

2.8.1.3 Antenna

The Contractor shall provide antennas as required for radio alarm transmitters with a driving point impedance to match transmitter output. The antenna and antenna mounts shall be corrosion resistant and designed to withstand wind velocities of 100 mph (161 km/h). Antennas shall not be mounted to any portion of the building roofing system. Install antenna in accordance with Fort Lewis Public Works standards; see attached Public Works reference drawing, Plate TR1, at the end of this section.

PART 3 EXECUTION

3.1 INSTALLATION

All work shall be installed as shown, and in accordance with NFPA 70 and NFPA 72, and in accordance with the manufacturer's diagrams and recommendations, unless otherwise specified. Smoke detectors shall not be installed until construction is essentially complete and the building has been thoroughly cleaned.

3.1.1 Power Supply for the System

A single dedicated circuit connection for supplying power from a branch circuit to each building fire alarm system shall be provided. The power shall be supplied as shown on the drawings. The power supply shall be equipped with a locking mechanism and marked in red with the words "FIRE ALARM CIRCUIT CONTROL".

3.1.2 Wiring

Conduit size for wiring shall be in accordance with NFPA 70. Wiring for the fire alarm system shall not be installed in conduits, junction boxes, or outlet boxes with conductors of lighting and power systems. Not more than two conductors shall be installed under any device screw terminal. The wires under the screw terminal shall be straight when placed under the terminal then clamped in place under the screw terminal. The wires shall be broken and not twisted around the terminal. Circuit conductors entering or leaving any mounting box, outlet box enclosure, or cabinet shall be connected to screw terminals with each terminal and conductor marked in accordance with the wiring diagram. Connections and splices shall be made using screw terminal blocks. The use of wire nut type connectors in the system is prohibited. Wiring within any control equipment shall be readily accessible without removing any component parts. The fire alarm equipment

manufacturer's representative shall be present for the connection of wiring to the control panel.

3.1.3 Control Panel

The control panel and its assorted components shall be mounted so that no part of the enclosing cabinet is less than 12 inches (300 mm) nor more than 78 inches (2000 mm) above the finished floor. Manually operable controls shall be between 36 and 42 inches (900 and 1100 mm) above the finished floor. Panel shall be installed to comply with the requirements of UL 864.

3.1.4 Detectors

Detectors shall be located and installed in accordance with NFPA 72. Detectors shall be connected into signal line circuits or initiating device circuits as indicated on the drawings. Detectors shall be at least 12 inches (300 mm) from any part of any lighting fixture. Detectors shall be located at least 3 feet (900 mm) from diffusers of air handling systems. Each detector shall be provided with appropriate mounting hardware as required by its mounting location. Detectors which mount in open space shall be mounted directly to the end of the stubbed down rigid conduit drop. Conduit drops shall be firmly secured to minimize detector sway. Where length of conduit drop from ceiling or wall surface exceeds 3 feet (900 mm), sway bracing shall be provided. Detectors installed in concealed locations (above ceiling, raised floors, etc.) shall have a remote visible indicator LED/LCD in a finished, visible location.

3.1.5 Notification Appliances

Notification appliances shall be mounted 80 inches (2003 mm) above the finished floor or 6 inches (150 mm) below the ceiling, whichever is lower.

3.1.6 Annunciator Equipment

Annunciator equipment shall be mounted where indicated on the drawings.

3.1.7 Addressable Initiating Device Circuits Module

The initiating device circuits module shall be used to connect supervised conventional initiating devices (water flow switches, water pressure switches, manual fire alarm stations, high/low air pressure switches, and tamper switches). The module shall mount in an electrical box adjacent to or connected to the device it is monitoring and shall be capable of supervised wiring to the initiating device. In order to maintain proper supervision, there shall be no T-taps allowed. Addressable initiating device circuits modules shall monitor only one initiating device each. Contacts in suppression systems and other fire protection subsystems shall be connected to the fire alarm system to perform supervisory and alarm functions as specified in Section 13930 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION NFPA 72, as indicated on the drawings and as specified herein.

3.1.8 Addressable Control Module

Addressable and control modules shall be installed in the outlet box or adjacent to the device they are controlling. If a supplementary suppression releasing panel is provided, then the monitor modules shall he mounted in a common enclosure adjacent to the suppression releasing panel and both this

enclosure and the suppression releasing panel shall be in the same room as the releasing devices. All interconnecting wires shall be supervised unless an open circuit or short circuit abnormal condition does not affect the required operation of the fire alarm system. If control modules are used as interfaces to other systems, such as HVAC or elevator control, they shall be within the control panel or immediately adjacent to it. Control modules that control a group of notification appliances shall be adjacent to the first notification appliance in the notification appliance circuits. Control modules that connect to devices shall supervise the notification appliance circuits. Control modules that connect to auxiliary systems or interface with other systems (non-life safety systems) and where not required by NFPA 72, shall not require the secondary circuits to be supervised. Contacts in suppression systems and other fire protection subsystems shall be connected to the fire alarm system to perform required alarm functions as specified in Section 13930 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION NFPA 72, as indicated on the drawings and as specified herein.

3.2 OVERVOLTAGE AND SURGE PROTECTION

3.2.1 Power Line Surge Protection

All equipment connected to alternating current circuits shall be protected from surges per IEEE C62.41 B3 combination waveform and NFPA 70. Fuses shall not be used for surge protection. The surge protector shall be rated for a maximum let thru voltage of 350 Volts ac (line-to-neutral) and 350 Volt ac (neutral-to-ground).

3.2.2 Low Voltage DC Circuits Surge Protection

All IDC, except fiber optics, shall have surge protection installed at each point where it exits or enters a building. Equipment shall be protected from surges per IEEE C62.41 B3 combination waveform and NFPA 70. The surge protector shall be rated to protect the 24 Volt dc equipment. The maximum dc clamping voltages shall be 36 V (line-to-ground) and 72 Volt dc (line-to-line).

3.2.3 Signal Line Circuit Surge Protection

All SLC cables/conductors, except fiber optics, shall have surge protection/isolation circuits installed at each point where it exits or enters a building. The circuit shall be protected from surges per IEEE C62.41 B3 combination waveform and NFPA 70. The surge protector/isolator shall be rated to protect the equipment.

3.3 GROUNDING

Grounding shall be provided by connecting to building ground system.

3.4 TESTING

The Contractor shall notify the Contracting Officer at least 10 days before the preliminary and acceptance tests are to be conducted. The tests shall be performed in accordance with the approved test procedures in the presence of the Contracting Officer. The control panel manufacturer's representative shall be present to supervise tests. The Contractor shall furnish instruments and personnel required for the tests.

3.4.1 Preliminary Tests

Upon completion of the installation, the system shall be subjected to functional and operational performance tests including tests of each installed initiating and notification appliance, when required. Tests shall include the meggering of system conductors to determine that the system is free from grounded, shorted, or open circuits. The megger test shall be conducted prior to the installation of fire alarm equipment. If deficiencies are found, corrections shall be made and the system shall be retested to assure that it is functional. After completing the preliminary testing the Contractor shall complete and submit the NFPA 72, Certificate of Completion.

3.4.2 Acceptance Test

Acceptance testing shall not be performed until the Contractor has completed and submitted the Certificate of Completion. Testing shall be in accordance with NFPA 72. The recommended tests in NFPA 72 shall be considered mandatory and shall verify that previous deficiencies have been corrected. The Contractor shall complete and submit the NFPA 72, Inspection and Testing Form. The test shall include all requirements of NFPA 72 and the following:

a. Test of each function of the control panel.

b. Test of each circuit in both trouble and normal modes.

c. Tests of each alarm initiating devices in both normal and trouble conditions.

d. Tests of each control circuit and device.

e. Tests of each alarm notification appliance.

f. Tests of the battery charger and batteries.

g. Complete operational tests under emergency power supply.

h. Visual inspection of wiring connections.

i. Opening the circuit at each alarm initiating device and notification appliance to test the wiring supervisory feature.

j. Ground fault

k. Short circuit faults

l. Stray voltage

m. Loop resistance

3.5 TRAINING

Training course shall be provided for the operations and maintenance staff. The course shall be conducted in the building where the system is installed or as designated by the Contracting Officer. The training period for systems operation shall consist of 1 training days (8 hours per day) and

shall start after the system is functionally completed but prior to final acceptance tests. The training period for systems maintenance shall consist of 2 training days (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests. The instructions shall cover items contained in the operating and maintenance instructions. In addition, training shall be provided on performance of expansions or modifications to the fire detection and alarm system. The training period for system expansions and modifications shall consist of at least 1 training days (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests.

3.6 RESPONSE TIME

During the warranty period, response times shall be within 48 hours for alarm conditions, and within 72 hours for trouble or supervisory conditions.

End of Section

SECTION 15515

LOW PRESSURE WATER HEATING BOILERS (OVER 800,000 BTU/HR OUTPUT)

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z83.3	(1971; Addenda 1972 and 1976, R 1989) Gas Utilization Equipment in Large Boilers

ASME INTERNATIONAL (ASME)

ASME CSD-1	(1995) Controls and Safety Devices for Automatically Fired Boilers
ASME BPVC IV	(1995; Addenda 1995 and 1996) Boiler and Pressure Vessel Code: Section IV Heating Boilers

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1996) Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 37	(2002) Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 85C	(1991) Prevention of Furnace Explosions in Fuel Oil- and Natural Gas-Fired Single Burner Boiler-Furnaces
NFPA 211	(1996) Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances

UNDERWRITERS LABORATORIES (UL)

UL 795	(1994; R 1996) Commercial-Industrial Gas Heating Equipment

1.2 DEFINITION

a. Year 2000 compliant - means computer controlled facility components that accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations.

1.3 RELATED REQUIREMENTS

Section 15050, "Basic Mechanical Materials and Methods," applies to this section, with the additions and modifications specified herein.

1.4 DESIGN REQUIREMENTS

Boiler shall be suitable for installation in the space shown with ample room for opening doors and cleaning and removal and replacement of tubes. Refer to Boiler Schedules on Drawings for actual capacities. Boiler shall have an efficiency of not less than required by the applicable military specification. Boiler shall be designed, tested, and installed in accordance with ASME BPVC IV and ASME CSD-1. Boiler shall be complete with an explosion-relief door, located in accordance with manufacturer's recommendations. Paint boiler in accordance with manufacturer's standard requirements. Provide a thermostatically controlled three-way mixing valve on the water supply to the boiler suitable for operating conditions of the boiler.

1.4.1 Detail Drawings

Submit fuel trains schematic and wiring diagrams.

1.4.2 Safety Standards

Hot water boilers, burners, and any supplementary control devices, safety interlocks, or limit controls required under this specification shall meet requirements of the following standards as applicable:

a. Gas-Fired Units: UL 795, NFPA 85C, or ANSI Z83.3.

b. All Units: ASME BPVC IV and ASME CSD-1.

Controls not covered by the above shall have a UL label, UL listing mark, or shall be listed in the Factory Mutual Approval Guide.

1.5 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Fuel trains; G

Wiring diagrams; G

Stacks, breeching, and supports; G

SD-03 Product Data

Boilers; G: power output, efficiency, ASME certification, allowable working pressure, model number

Boiler trim and control equipment; G

Burners and control equipment; G

Stacks, breeching, and supports; G

Equipment installation; G

SD-06 Test Reports

Operational tests; G

SD-07 Certificates

Boilers; G

Burners and control equipment; G

Boiler trim and control equipment; G

Year 2000 (Y2K) Compliance Warranty; G

Boilers; G

Boiler trim and control equipment; G

Burners and control equipment; G

Boiler manufacturer's certificate of boiler performance including evidence that the burners provided shall be a make, model, and type certified and approved by the manufacturer of the boiler being provided.

SD-08 Manufacturer's Instructions

Boilers; G

Feedwater treatment system; G

SD-10 Operation and Maintenance Data

Boilers, Data Package 4

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

SD-11 Closeout Submittals

Posted operating instructions for heating water boilers

1.6 WARRANTY

1.6.1 Year 2000 (Y2K) Compliance Warranty

For each product, component and system specified in this section as a "computer controlled facility component" provide a statement of Y2K compliance warranty for the specific equipment. The contractor warrants that each hardware, software, and firmware product delivered under this contract and listed below shall be able to accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing)

from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations to the extent that other computer controlled components, used in combination with the computer controlled component being acquired, properly exchange data and time data with it. If the contract requires that specific listed products must perform as a system in accordance with the foregoing warranty, then that warranty shall apply to those listed products as a system. The duration of this warranty and the remedies available to the Government for breach of this warranty shall be defined in, and subject to, the terms and limitations of the contractor's standard commercial warranty or warranties contained in this contract, provided that, notwithstanding any provisions to the contrary, in such commercial warranty or warranties, the remedies available to the Government under this warranty shall include repair or replacement of any listed product whose non-compliance is discovered and made known to the contractor in writing within one year (365 days) after acceptance. Nothing in this warranty shall be construed to limit any rights or remedies the Government may otherwise have under this contract, with respect to defects other that Year 2000 performance.

PART 2 PRODUCTS

2.1 Y2K COMPLIANT PRODUCTS

Provide computer controlled facility components, specified in this section, that are Year 2000 compliant (Y2K). Computer controlled facility components refers to software driven technology and embedded microchip technology. This includes, but in not limited to, telecommunications switches, programmable thermostats, HVAC controllers, utility monitoring and control systems, alarms, security systems, and other facilities control systems utilizing microcomputer, minicomputer, or programmable logic controllers.

2.2 BOILERS

Hot-water boilers shall be horizontal firetube, 4-pass, modified scotch-type of the dry type, packaged units mounted on a skid-type structural steel base. Provide each boiler complete burner and fuel system, a forced or induced draft fan, an automatic electronic control system complete with combustion and flame safeguard controls, firing sequence programmer, safety interlocks, limit controls and central control panel, and such trim and appurtenances as are peculiar to water units as specified herein. Units shall be factory-wired and assembled except for such readily installed appurtenances as safety valves, water columns, and pressure gages. Units shall be complete and ready for operation when connected to water, fuel, and electrical supplies. Boiler shall be provided with equipment for 4:1 turndown minimum with full burner modulation.

2.3 BURNERS AND CONTROL EQUIPMENT

2.3.1 Gas-Fired Power Burner

Gas-fired, automatic recycling. Interrupted pilot type ignition system, and pilot shall be electrode-ignited natural gas type. The combustion control system shall be the metering type. Design burner and combustion control system to be capable for firing on either natural gas having a specific gravity of .6 and a heating value of approximately 1,000 BTU per cubic foot (37,000 KJ per cubic meter) and propane vapor that has a heating value of approximately 2,500 BTU per cubic foot (25 Watts-hour/L) with a specific

gravity of 1.52 and be an integral part of the boiler. Boiler to be supplied with a combination propane vapor and natural gas burner that includes dual canister burner, second gas train with IRI block and bleed configuration, and a separate cam and linkage assembly for flow control and electrical selector switch. ~~Design burner and combustion-control equipment for firing natural gas having a specific gravity of 0.6 and a heating value of approximately 1000 BTU per cubic foot (37,300 kJ per cubic meter) and be an integral part of the boiler.~~ Mount controls; including operating switches, indicating lights, gages, alarms, motor starters, fuses, and circuit elements of control systems on a single control panel or cabinet designed for separate mounting not on the burner. Locate flame scanner such that testing and cleaning of scanner can be accomplished without disassembly of burner. Where vents are required on pressure regulators extend vent lines per code to exterior of building. ~~Provide IRI fuel train.~~ Boiler shall be suitable for single point electrical connection. Gas pressure available: refer to Schedule on Drawings.

2.4 BOILER TRIM AND CONTROL EQUIPMENT

Boiler trim shall comply with ASME BPVC IV and additional appurtenances specified below. Non-recycling control interlocks shall have the reset located on control interlock. Boilers controls shall be capable of firing with a low fire hold with an extended dead-band.

2.4.1 Emergency Disconnect Switch

Provide and locate on wall inside and outside boiler room entrance or just inside door, when boiler room door is on the building exterior to allow rapid and complete shutdown of the boiler in the event of an emergency. Emergency switch shall be a 15-amp. fuse-type safety switch. Switch shall be red and furnished with a label indicating function of switch.

2.4.2 Relief Valves

Provide relieving capacity for the full output of boiler installed. Relief-valve piping shall conform to ASTM A 53, schedule 40 steel pipe and be piped full size to 6 inches (150 mm) above floor drain.

2.4.3 Pressure Gage

Provide with a scale equivalent to 1.5 time outlet water pressure with a 6 inch (150 mm) diameter. Locate one on supply water piping and one on the return water piping.

2.4.4 Thermometers

Provide thermometers with a scale equivalent to 1.5 times the outlet water temperature. Provide one located on supply water piping and one on return water piping.

2.4.5 Drain Tapping

Provide drain valve and piping to a floor drain to 6 inches (150 mm) above floor.

2.4.6 Stack Thermometer

Provide flue gas-dial type thermometer with scale calibrated from 150 to 750 degrees F (66 to 399 degrees C) and mount in flue gas outlet.

2.4.7 Air Vent Valve

Provide with screwed connections, stainless steel disk, and stainless steel seats to vent entrapped air from boiler.

2.4.8 Feedwater Treatment System

Provide shot-type feeder (manual, intermittent feed).

2.4.9 Combustion Regulator

Provide adjustable temperature, thermostatic immersion type that shall limit boiler water temperature to a maximum of 250 degrees F (121 degrees C). Control shall actuate burner through an electric relay system to maintain boiler water temperature within normal prescribed limits at loads within rated capacity of boiler.

2.4.10 High Temperature Limit Switch

Provide immersible aquastat type with a temperature setting above that of the combustion regulator and below that of the lowest relief valve setting. Aquastat shall function to cause a safety shutdown by closing fuel valves, shutting down burner equipment, activating a red indicating light, and sounding an alarm in the event that boiler water temperature rises to the high temperature limit setting. A safety shutdown due to high temperature shall require manual reset before operation can resume and shall prevent recycling of the burner equipment.

2.4.11 Low Water Pressure Control

Provide mercury switch type. Control shall have a main scale, adjusting screws at the top of the case, and have an internal or external bellows. Control shall be of the type which will open an electric circuit on a drop in pressure below a set minimum. Control shall be set and installed to cause a safety shutdown by closing fuel valves, shutting down burner equipment, activating a red indicating light, and sounding an alarm in the event that water pressure in the system drops below 15 psig (104 kPa (gage) 12 psi. A safety shutdown due to low water pressure shall require manual reset before operation can resume and prevent recycling of burner equipment.

2.4.12 Low Water Level Cutoff Switch

Provide float actuated type. Low water level cutoff shall cause a safety shutdown by closing fuel valves, shutting down burner equipment, activating a red indicating light, and sounding an alarm in the event that water level drops below the lowest safe permissible water level established by the boiler manufacturer and ASME BPVC IV. A safety shutdown due to low water level shall require manual reset before operation can resume and prevent recycling of burner equipment.

2.4.13 Flow Switch Interlock

Provide a blade type flow switch to be interlocked with the boiler. Switch shall be a snap type with sensitivity adjustment.

2.4.14 Boiler Safety Control Circuits

Provide boiler safety control circuits, including control circuits for burner and draft fan, shall be single-phase, two-wire one-side grounded, and not over 120 volts. Provide safety control switching in ungrounded conductors. Provide overcurrent protection. In addition to circuit grounds, ground metal parts which do not carry current to a grounding conductor.

2.4.15 Indicating Lights

Provide indicating lights as follows. Each safety interlock requiring a manual reset shall have an individually-labeled indicating light. Non-recycling controls/interlocks shall have the reset located on control/interlock itself. Indicating lights shall have colors as follows:

a. Amber: Ignition on

b. Blue: Draft

c. Green: Main fuel safety shut-off valves open

d. Red (One for Each): Safety lockout flame failure and low water pressure, low water level, and high temperature , low gas pressure, and high gas pressure.

2.4.16 Alarm Bell

Provide alarm bell not less than 4 inches (100 mm) in diameter, electrically operated, with a manual disconnect. Disconnect switch shall be type and wired so that switching off alarm following a safety shutdown will not prevent alarm from sounding again upon recurrence of a subsequent safety shutdown condition.

2.4.17 Post-Combustion Purge

Provide a post-combustion purge in addition to the operating sequence. Provide controls and wiring necessary to assure operation of draft fan for a period of not less than 15 seconds or of sufficient duration to provide eight complete air changes in the boiler combustion chamber (whichever is greater) following shutdown of burner upon satisfaction of heat demand. Upon completion of post-combustion purge period, draft fan shall automatically shutdown until next restart.

2.4.18 Draft

Comply with boiler manufacturer's recommendations.

2.4.19 Stacks, Breeching, and Supports

a. Description: Double-wall metal stacks complying with NFPA 211, suitable for use with building heating equipment burning gas, solid, or liquid fuels.

b. Construction: Inner and outer metal shells separated by 1-inch bonded fiber insulation, with positive sealing joints.

c. Inner Shell: Type 304 stainless steel of the following thickness:

1. 6- to 36-Inch (152- to 914-mm) Size: 0.035 inch (0.89 mm) thick.

d. Outer Jacket: 304 stainless steel of the following thickness:

1. 6- to 24-Inch (152- to 610-mm) Size: 0.025 inch (0.64 mm) thick.

e. Accessories: All of the following accessories shall be provided by the same manufacturer: Tees, elbows, increasers, draft hood connectors, termination, adjustable roof flashing, storm collar, support assembly, thimbles, firestop spacers, and fasteners; fabricated of similar materials and designs as vent-pipe straight sections.

1. Termination: Exit cone.

2. Drain section incorporated into riser located just above the boiler connection.

f. This factory-built modular exhaust system and published skin temperatures shall be laboratory tested and Listed by Underwriters Laboratories, Inc. (UL) for use with building heating equipment and appliances which produce exhaust flue gases at a temperature not exceeding 1400F under continuous operating conditions. These exhaust systems shall be designed to compensate for all flue gas induced thermal expansions.

g. The inner pipe joints shall be sealed by use of overlapping type Vee Bands (P-OVB) with a premixed 2000F sealant (P-2000E). The outer channel bands shall be sealed with a 600F sealant (P-600) where exposed to weather.

h. Exhaust piping must terminate as required by local code, or as required by NFPA 37 and NFPA 211.

i. The system shall be installed as designed by the manufacturer and in accordance with the terms of the manufacturer's ten (10) year warranty.

2.5 ELECTRIC MOTORS

Motors which are an integral part of the packaged boiler system shall be the highest efficiency available by the manufacturer of the packaged boiler.

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION

Install equipment in accordance with the manufacturer's installation instructions. Grout equipment mounted on concrete foundations before installing piping. Install piping in such a manner as not to place a strain on equipment. Do not bolt flanged joints tight unless they match. Grade, anchor, guide, and support piping without low pockets. Feedwater treatment feeders shall be mounted so that the top of the feeder is not higher than 48 inches (1219 mm) above the finished floor.

3.2 EQUIPMENT FOUNDATIONS

Locate equipment foundations as indicated, designed, and made of sufficient size and weight to preclude shifting of equipment under operating conditions or under any abnormal conditions that could be imposed upon the equipment. Foundations shall meet requirements of the equipment manufacturer.

3.3 MANUFACTURER'S FIELD SERVICES

Furnish the services of an engineer or technician approved by the boiler manufacture for installation inspection, startup, and tests of equipment as specified below. After installation of equipment the engineer or technician shall provide a signed certificate or certified written statement that the equipment is installed in accordance with the manufacturer's recommendations. Services of more than one engineer or technician may be required based on types of specific equipment. One engineer or technician as appointed by the Contractor shall supervise and be responsible for the overall installation, start-up, test, and check out of systems. This person shall remain on the job until each unit has been in successful operation for 3 days and accepted.

3.4 BOILER CLEANING

Before being placed in service, boiler shall be boiled out for a period of 24 hours at a pressure not exceeding 12 psig (83 kPa (gage)). Solution to be used in the boiler for the boiling out process shall consist of two pounds of trisodium phosphate per 100 gallons (379 liters) of water. Upon completion of boiling out, flush out boiler with potable water, drain, and charge with chemically treated water. Protect boiler and appurtenances against internal corrosion until testing is completed and boiler is accepted. Professional services are required for cleaning/treatment process.

3.5 INSTALLATION OF MANUFACTURED BREECHINGS, CHIMNEYS, AND STACKS

a. Install according to manufacturer's written instructions. Locate to comply with minimum clearances from combustibles.

b. Install, support, and restrain according to requirements of seismic zone.

c. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.

d. Support vents at intervals recommended by the manufacturer to support weight of vent and all accessories, without exceeding loading of appliances.

1. Where maximum unsupported lengths of stack are exceeded, support chimneys as follows:

a. Guy wires.
b. Rigid pipe braces.
c. Rigid angle-iron braces.

e. Extend drain lines from drain section in riser to nearest floor drain.

3.6 CLEANING

a. After completing system installation, including terminals, inspect exposed finishes. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

b. Clean breechings internally, during and on completion of installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth.

c. Provide temporary closures at ends of breechings and chimneys that are not completed or connected to equipment.

3.7 FIELD QUALITY CONTROL

Perform and furnish everything required for inspections and tests as specified herein to demonstrate that boiler and auxiliary equipment, as installed, are in compliance with contract requirements. Start up and operate the system. During this time, clean strainers until no further accumulation of foreign material occurs. Exercise care to minimum loss of water occurs when strainers are cleaned. Adjust safety and automatic control instruments as necessary to place them in proper operation and sequence. During startup and during tests, factory-trained engineers or technicians employed by individual suppliers of such components as the burner, flame safeguard and combustion controls, and other auxiliary equipment shall be present as required, to insure proper functioning, adjustment, and testing of individual components and systems. Test instrumentation shall be calibrated and have full scale reading from 1.5 to 2 times test values.

3.7.1 Operational Tests

Operate each boiler and appurtenances prior to final testing and insure that necessary adjustments have been made. Provide testing equipment required to perform tests. During this testing period, provide operating instructions and training to persons tasked with operation of the boiler. Tests shall be accomplished with both fuel on duel fuel units and include the following:

3.7.1.1 Preliminary Operational Test

Operate boilers continuously for a period of at least 8 hours to demonstrate proper operability of the combustion control, flame safeguard control, and safety interlocks.

3.7.1.2 Acceptance Operational Test and Inspection

Conduct a preliminary operational test prior to requesting an acceptance operational test and inspection by Contracting Officer.

3.8 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of inch-pound measurements, and not on metric measurements commonly agreed on by the manufacturers or other parties. The inch-pound and metric measurements shown are as follows:

Products	Inch-Pound	Metric
a. Pressure Gage		
Diameter	= 6 inches	= 150 mm
b. Stack Thermometer		
Scale Range	= 150-750 degrees F	= 66-399 degrees C
c. Alarm Bell		
Diameter	= 4 inches	= 100 mm

End of Section

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SECTION 15895

AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

ARI 410	(1991) Forced-Circulation Air-Cooling and Air-Heating Coils
ARI 430	(1999) Central-Station Air-Handling Units

ASTM INTERNATIONAL (ASTM)

ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM C 916	(1985; R 1996el) Adhesives for Duct Thermal Insulation
ASTM C 1071	(2000) Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)
ASTM E 84	(2001) Surface Burning Characteristics of Building Materials

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.1	(1992) Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter
ASHRAE 70	(1991) Method of Testing for Rating the Performance of Air Outlets and Inlets

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A	(1999) Installation of Air Conditioning and Ventilating Systems

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA HVAC Duct Const Stds	(1995; Addenda Nov 1997; 6th Printing 2001) HVAC Duct Construction Standards - Metal and Flexible

SMACNA Install Fire Damp HVAC	(1992; 2th Printing 1996) Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems
SMACNA Leakage Test Mnl	(1985; 6th Printing 1997) HVAC Air Duct Leakage Test Manual

UNDERWRITERS LABORATORIES (UL)

UL 181	(1996; Rev thru Dec 1998) Factory-Made Air Ducts and Air Connectors
UL 214	(1997; Rev thru Aug 2001) Tests for Flame-Propagation of Fabrics and Films
UL 555	(1999; Rev thru Jan 2002) Fire Dampers
UL 723	(1996; Rev thru Sep 2001) Test for Surface Burning Characteristics of Building Materials
UL Bld Mat Dir	(1999) Building Materials Directory
UL Elec Const Dir	(2001) Electrical Construction Equipment Directory
UL Fire Resist Dir	(2001) Fire Resistance Directory (2 Vol.)

1.2 COORDINATION OF TRADES

Ductwork, piping offsets, fittings, and accessories shall be furnished as required to provide a complete installation and to eliminate interference with other construction.

1.3 DELIVERY AND STORAGE

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, all pipes shall either be capped or plugged until installed.

1.4 FIELD MEASUREMENTS

After becoming familiar with all details of the work, the Contractor shall verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Drawings; G

Installation; G

Drawings showing equipment layout, including assembly and installation details and electrical connection diagrams; ductwork layout showing the location of all supports and hangers, typical hanger details, gauge reinforcement, reinforcement spacing rigidity classification, and static pressure and seal classifications; and piping layout showing the location of all guides and anchors, the load imposed on each support or anchor, and typical support details. Drawings shall include any information required to demonstrate that the system has been coordinated and will properly function as a unit and shall show equipment relationship to other parts of the work, including clearances required for operation and maintenance.

SD-03 Product Data

Components and Equipment; G

Manufacturer's catalog data included with the detail drawings for the following items. The data shall be highlighted to show model, size, options, etc., that are intended for consideration. Data shall be adequate to demonstrate compliance with contract requirements for the following:

a. Piping Components

b. Ductwork Components

c. Air Systems Equipment

d. Air Handling Units

e. Terminal Units

Ductwork Leak Test Procedures; G

Pamper Acceptance Test

Proposed test procedures for ductwork leak test, and performance tests of systems, at least 2 weeks prior to the start of related testing.

Diagrams; G

Proposed diagrams, at least 2 weeks prior to start of related testing. System diagrams that show the layout of equipment, piping, and ductwork, and typed condensed operation manuals explaining preventative maintenance procedures, methods of checking the system for normal, safe operation, and procedures for safely starting and stopping the system shall be framed under glass or laminated plastic. After approval, these items shall be posted where directed.

Manufacturer's Experience; G

Statement demonstrating successful completion of similar services on at least 5 projects of similar size and scope, at least 2 weeks prior to submittal of other items required by this section.

Performance Tests; G

Proposed test schedules for hydrostatic test of piping, ductwork leak test, and performance tests, at least 2 weeks prior to the start of related testing.

Field Training; G

Proposed schedule for field training, at least 2 weeks prior to the start of related training.

SD-06 Test Reports

Performance Tests; G
Testing, Adjusting, and Balancing; G

Test reports for the piping hydrostatic test, ductwork leak test, and performance tests in booklet form, upon completion of testing. Reports shall document phases of tests performed including initial test summary, repairs/adjustments made, and final test results.

SD-10 Operation and Maintenance Data

Operating and Maintenance Instructions; G

Six manuals listing step-by-step procedures required for system startup, operation, shutdown, and routine maintenance, at least 2 weeks prior to field training. The manuals shall include the manufacturer's name, model number, parts list, list of parts and tools that should be kept in stock by the owner for routine maintenance including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization (including address and telephone number) for each item of equipment. Each service organization submitted shall be capable of providing 4 hour onsite response to a service call on an emergency basis.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS

Components and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of products that are of a similar material, design and workmanship. The standard products shall have been in satisfactory commercial or industrial use for 2 years before bid opening. The 2-year manufacturer's experience shall include applications of components and equipment under similar circumstances and of similar size. The 2 years must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of

satisfactory field operation, for not less than 6000 hours exclusive of the manufacturer's factory tests, can be shown. The equipment items shall be supported by a service organization.

2.2 ASBESTOS PROHIBITION

Asbestos and asbestos-containing products shall not be used.

2.3 NAMEPLATES

Equipment shall have a nameplate installed by the manufacturer that identifies the manufacturer's name, address, type or style, model or serial number, and catalog number.

2.4 EQUIPMENT GUARDS AND ACCESS

Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts exposed to personnel contact shall be fully enclosed or guarded according to OSHA requirements. High temperature equipment and piping exposed to contact by personnel or where it creates a potential fire hazard shall be properly guarded or covered with insulation of a type specified.

2.5 DUCTWORK COMPONENTS

2.5.1 Metal Ductwork

All aspects of metal ductwork construction, including all fittings and components, shall comply with SMACNA HVAC Duct Const Stds unless otherwise specified. Under no conditions shall DUCTWORK thinner than 26 ga be allowed on this project. Elbows shall be radius type with a centerline radius of 1.5 times the width or diameter of the duct where space permits. Otherwise, elbows having a minimum radius equal to the width or diameter of the duct or square elbows with factory fabricated turning vanes may be used. All return, exhaust, and supply ductwork downstream of the VAV boxes shall be constructed to a pressure class of 2-inch w.g. (Class 500 pa) and shall meet the requirements of seal class C. All supply ductwork from the air handlers to the VAV terminal boxes shall be constructed to 6-inch w.g. (Class 1500) and shall meet the requirements of seal class A. Sealants shall conform to fire hazard classification specified in THERMAL INSULATION FOR MECHANICAL SYSTEMS and shall be suitable for the range of air distribution and ambient temperatures that it will be exposed to. Pressure sensitive tape shall not be used as a sealant. Spiral lock seam duct, and flat oval shall be made with duct sealant and locked with not less than 3 equally spaced drive screws or other approved methods indicated in SMACNA HVAC Duct Const Stds. The sealant shall be applied to the exposed male part of the fitting collar so that the sealer will be on the inside of the joint and fully protected by the metal of the duct fitting. One brush coat of the sealant shall be applied over the outside of the joint to at least 2 inch (50 mm) band width covering all screw heads and joint gap. Dents in the male portion of the slip fitting collar will not be acceptable. Outdoor air intake ducts and plenums shall be fabricated with watertight soldered or brazed joints and seams.

2.5.1.1 Transitions

Diverging air flow transitions shall be made with each side pitched out a maximum of 15 degrees, for an included angle of 30 degrees. Transitions for converging air flow shall be made with each side pitched in a maximum of 30 degrees, for an included angle of 60 degrees, or shall be as indicated. Factory-fabricated reducing fittings for systems using round duct sections when formed to the shape of the ASME short flow nozzle, need not comply with the maximum angles specified.

2.5.1.2 Insulated Nonmetallic Flexible Duct Runouts

Flexible duct runouts shall be used only where indicated. Runout length shall be as shown on the drawings, but shall in no case exceed 3 feet (1 m). Runouts shall be preinsulated, factory fabricated, and shall comply with NFPA 90A and UL 181. Either field or factory applied vapor barrier shall be provided. Where coil induction or high velocity units are supplied with vertical air inlets, a streamlined and vaned and mitered elbow transition piece shall be provided for connection to the flexible duct or hose. The last elbow to these units, other than the vertical air inlet type, shall be a die-stamped elbow and not a flexible connector. Insulated flexible connectors may be used as runouts. The insulated material and vapor barrier shall conform to the requirements of Section 15080 THERMAL INSULATION FOR MECHANICAL SYSTEMS. The insulation material surface shall not be exposed to the air stream.

2.5.1.3 General Service Duct Connectors

A flexible duct connector approximately 6 inches (150 mm) in width shall be provided where sheet metal connections are made to fans or where ducts of dissimilar metals are connected. For round/oval ducts, the flexible material shall be secured by stainless steel or zinc-coated, iron clinch-type draw bands. For rectangular ducts, the flexible material locked to metal collars shall be installed using normal duct construction methods. The composite connector system shall comply with UL 214 and be classified as "flame-retarded fabrics" in UL Bld Mat Dir.

2.5.1.4 High Temperature Service Duct Connections

Material shall be approximately 3/32 inch (2.38 mm) thick, 35 to 40-ounce per square yard (1.2 to 1.36 kg per square meter) weight, plain weave fibrous glass cloth with, nickel/chrome wire reinforcement for service in excess of 1200 degrees F (650 degrees C).

2.5.2 Ductwork Accessories

2.5.2.1 Duct Access Doors

Access doors shall be provided in ductwork and plenums where indicated and at all air flow measuring primaries, automatic dampers, fire dampers, coils, thermostats, and other apparatus requiring service and inspection in the duct system, and unless otherwise shown, shall conform to SMACNA HVAC Duct Const Stds. Access doors shall be provided upstream and downstream of air flow measuring primaries and heating and cooling coils. Doors shall be minimum 15 x 18 inches (375 x 450 mm), unless otherwise shown. Where duct size will not accommodate this size door, the doors shall be made as large as practicable. Doors 24 x 24 inches (600 x 600 mm) or larger shall be

provided with fasteners operable from both sides. Doors in insulated ducts shall be the insulated type.

2.5.2.2 Smoke/Fire Dampers

a. Ratings:

1. Fire Resistance: 1-1/2 hours in accordance with UL555.

2. Smoke Rating: Leakage Class I Smoke Damper in accordance with UL555S. A Class l smoke damper leaks no more than 8 cubic feet per minute (.23 m3/min) at 4 in. wg. (1 kPa) differential pressure. Damper shall be rated for vertical or horizontal applications.

3. Air Flow Rating: 2000 fpm/610 (M/min).

b. Construction:

1. Frame: 5 inches x minimum 16 gage (127 x minimum 1.6 mm) roll formed, galvanized steel hat-shaped channel, reinforced at corners. Structurally equivalent to 13 gage (2.3 mm) U-channel type frame.

2. Blades:

a) Style: True airfoil-shaped, single piece, double skin.

b) Action: Opposed.

c) Orientation: Horizontal.

d) Material: Minimum 14 gage (2.0 mm) equivalent thickness, galvanized steel.

e) Width: Maximum 6 inches (152 mm).

3. Bearings: Self-lubricating stainless steel sleeve, turning in extruded hole in frame.

4. Seals:

a) Blade: Inflatable silicone fiberglass material to maintain smoke leakage rating to a minimum of 450 degrees F (232 degrees C) and galvanized steel for flame seal to 1,900 degrees F (1,038 degrees C). Mechanically attached to blade edge (glue-on or grip type seals are not acceptable).

b) Jamb: Stainless steel, flexible metal compression type.

5. Linkage: Concealed in frame.

6. Axles: Minimum 1/2 inch (13) diameter plated steel, hex-shaped, mechanically attached to blade.

7. Temperature Release Device: Heat-Actuated, Quick Detect.

a) Close (in a controlled manner) and lock damper during test, smoke detection, power failure, or fire conditions through actuator

closure spring. At no time shall actuator disengage from damper blades.

b) Allow damper to be automatically and remotely reset after test or power failure conditions. After exposure to high temperature or fire, inspect damper before reset to ensure proper operation.

c) Controlled closing and locking of damper in 7 to 15 seconds to allow duct pressure to equalize. Instantaneous closure is not acceptable.

8. Release Temperature:

a) 165 degrees F (74 degrees C).

9. Actuator: Electric 120 V, 60 Hz, two-position, fail close. With external mounting.

10. Duct Transition Connection: Provide duct transition as required.

c. Accessories:

1. Duct Smoke Detector: Provide a factory mounted duct smoke detector completely wired into the damper assembly. The duct smoke detector shall be capable of detecting smoke in the ductwork from 0-2000 FPM. The detector shall utilize the Ionization method for smoke detection.

2. Mounting Angles: Provide factory fabricated mounting angles. The exact configuration is the contractor choice.

3. Factory Sleeve:

a) Minimum 16 gage (1.0 mm) thickness, minimum 17 inches (432 mm) long.

b) Silicone caulk factory applied to sleeve at damper frame to comply with leakage rating requirements.

d. Source Quality Controls:

a. Factory Tests: Factory cycle damper and actuator assembly to assure proper operation.

2.5.2.3 Fire Dampers

Fire dampers shall be 1-1/2 hour fire rated unless otherwise indicated. Fire dampers shall conform to the requirements of NFPA 90A and UL 555. Fire dampers shall be automatic operating type and shall have a dynamic rating suitable for the maximum air velocity and pressure differential to which it will be subjected. Fire dampers shall be approved for the specific application, and shall be installed according to their listing. Fire dampers shall be equipped with a steel sleeve or adequately sized frame installed in such a manner that disruption of the attached ductwork, if any, will not impair the operation of the damper. Sleeves or frames shall be equipped with perimeter mounting angles attached on both sides of the wall

or floor opening. Ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce the ceiling of the assemblies shall be constructed in conformance with UL Fire Resist Dir. Fire dampers shall be curtain type with damper blades out of the air stream. Dampers shall not reduce the duct or the air transfer opening cross-sectional area. Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition or floor slab depth or thickness. Unless otherwise indicated, the installation details given in SMACNA Install Fire Damp HVAC and in manufacturer's instructions for fire dampers shall be followed.

2.5.2.4 Splitters and Manual Balancing Dampers

Splitters and manual balancing dampers shall be furnished with accessible operating mechanisms. Where operators occur in finished portions of the building, operators shall be chromium plated with all exposed edges rounded. Splitters shall be operated by quadrant operators or 3/16 inch (5 mm) rod brought through the side of the duct with locking setscrew and bushing. Two rods are required on splitters over 8 inches (200 mm). Manual volume control dampers shall be operated by locking-type quadrant operators. Dampers and splitters shall be 2 gauges heavier than the duct in which installed. Unless otherwise indicated, multileaf dampers shall be opposed blade type with maximum blade width of 12 inches (300 mm). Access doors or panels shall be provided for all concealed damper operators and locking setscrews. Unless otherwise indicated, the locking-type quadrant operators for dampers, when installed on ducts to be thermally insulated, shall be provided with stand-off mounting brackets, bases, or adapters to provide clearance between the duct surface and the operator not less than the thickness of the insulation. Stand-off mounting items shall be integral with the operator or standard accessory of the damper manufacturer. Volume dampers shall be provided where indicated.

2.5.2.5 Air Deflectors and Branch Connections

Air deflectors shall be provided at duct mounted supply outlets, at takeoff or extension collars to supply outlets, at duct branch takeoff connections, and at 90 degree elbows, as well as at locations as indicated on the drawings or otherwise specified. Conical branch connections or 45 degree entry connections may be used in lieu of deflectors or extractors for branch connections. All air deflectors, except those installed in 90 degree elbows, shall be provided with an approved means of adjustment. Adjustment shall be made from easily accessible means inside the duct or from an adjustment with sturdy lock on the face of the duct. When installed on ducts to be thermally insulated, external adjustments shall be provided with stand-off mounting brackets, integral with the adjustment device, to provide clearance between the duct surface and the adjustment device not less than the thickness of the thermal insulation. Air deflectors shall be factory-fabricated units consisting of curved turning vanes or louver blades designed to provide uniform air distribution and change of direction with minimum turbulence or pressure loss. Air deflectors shall be factory or field assembled. Blade air deflectors, also called blade air extractors, shall be approved factory fabricated units consisting of equalizing grid and adjustable blade and lock. Adjustment shall be easily made from the face of the diffuser or by position adjustment and lock external to the duct. Stand-off brackets shall be provided on insulated ducts and are described herein. Fixed air deflectors, also called turning vanes, shall be provided in 90 degree elbows.

2.5.3 Duct Sleeves, Framed Prepared Openings, Closure Collars

2.5.3.1 Duct Sleeves

Duct sleeves shall be provided for round ducts 15 inches (375 mm) in diameter or less passing through floors, walls, ceilings, or roof, and installed during construction of the floor, wall, ceiling, or roof. Round ducts larger than 15 inches (375 mm) in diameter and square, rectangular, and oval ducts passing through floors, walls, ceilings, or roof shall be installed through framed prepared openings. The Contractor shall be responsible for the proper size and location of sleeves and prepared openings. Sleeves and framed openings are also required where grilles, registers, and diffusers are installed at the openings. Framed prepared openings shall be fabricated from 20 gauge (1.0 mm) galvanized steel, unless otherwise indicated. Where sleeves are installed in bearing walls or partitions, black steel pipe, ASTM A 53/A 53M, Schedule 20 shall be used. Sleeve shall provide 1 inch (25 mm) clearance between the duct and the sleeve or 1 inch (25 mm) clearance between the insulation and the sleeve for insulated ducts.

2.5.3.2 Framed Prepared Openings

Openings shall have 1 inch (25 mm) clearance between the duct and the opening or 1 inch (25 mm) clearance between the insulation and the opening for insulated ducts.

2.5.3.3 Closure Collars

Collars shall be fabricated of galvanized sheet metal not less than 4 inches (100 mm) wide, unless otherwise indicated, and shall be installed on exposed ducts on each side of walls or floors where sleeves or prepared openings are provided. Collars shall be installed tight against surfaces. Collars shall fit snugly around the duct or insulation. Sharp edges of the collar around insulated duct shall be ground smooth to preclude tearing or puncturing the insulation covering or vapor barrier. Collars for round ducts 15 inches (375 mm) in diameter or less shall be fabricated from 20 gauge (1.0 mm) galvanized steel. Collars for round ducts larger than 15 inches (375 mm) and square, and rectangular ducts shall be fabricated from 18 gauge (1.3 mm) galvanized steel. Collars shall be installed with fasteners on maximum 6 inch (150 mm) centers, except that not less than 4 fasteners shall be used.

2.5.4 Sound Attenuation Equipment

a. Acoustical Duct Liner:

Acoustical duct lining shall be fibrous glass designed exclusively for lining ductwork and shall conform to the requirements of ASTM C 1071, Type I and II. Liner composition may be uniform density, graduated density, or dual density, as standard with the manufacturer. Lining shall be coated, not less than 1 inch (25 mm) thick. Where acoustical duct liner 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 in THERMAL INSULATION FOR MECHANICAL SYSTEMS. Duct sizes shown shall be increased to compensate for the thickness of the lining used. In lieu of sheet metal duct with field-applied acoustical lining, acoustically equivalent lengths of fibrous glass duct or factory fabricated double-walled

internally insulated duct with perforated liner may be provided. Net insertion loss value, static pressure drop, and air flow velocity capacity data shall be certified by a nationally recognized independent acoustical laboratory.

2.5.5 Diffusers, Registers, and Grilles

Units shall be factory-fabricated of steel, corrosion-resistant steel, or aluminum and shall distribute the specified quantity of air evenly over space intended without causing noticeable drafts, air movement faster than 50 fpm (0.25 m/s) in occupied zone, or dead spots anywhere in the conditioned area. Outlets for diffusion, spread, throw, and noise level shall be as required for specified performance. Performance shall be certified according to ASHRAE 70. Inlets and outlets shall be sound rated and certified according to ASHRAE 70. Sound power level shall be as indicated. Diffusers and registers shall be provided with volume damper with accessible operator, unless otherwise indicated; or if standard with the manufacturer, an automatically controlled device will be acceptable. Volume dampers shall be opposed blade type for all diffusers and registers, except linear slot diffusers. Linear slot diffusers shall be provided with round or elliptical balancing dampers. Where the inlet and outlet openings are located less than 7 feet (2 m) above the floor, they shall be protected by a grille or screen according to NFPA 90A.

2.5.5.1 Diffusers

Diffuser types shall be as indicated. Ceiling mounted units shall be furnished with anti-smudge devices, unless the diffuser unit minimizes ceiling smudging through design features. Diffusers shall be provided with air deflectors of the type indicated. Air handling troffers or combination light and ceiling diffusers shall conform to the requirements of UL Elec Const Dir for the interchangeable use as cooled or heated air supply diffusers or return air units. Ceiling mounted units shall be installed with rims tight against ceiling. Sponge rubber gaskets shall be provided between ceiling and surface mounted diffusers for air leakage control. Suitable trim shall be provided for flush mounted diffusers. Duct collar connecting the duct to diffuser shall be airtight and shall not interfere with volume controller. Return or exhaust units shall be similar to supply diffusers.

2.5.5.2 Registers and Grilles

Units shall be four-way directional-control type, except that return and exhaust registers may be fixed horizontal or vertical louver type similar in appearance to the supply register face. Registers shall be provided with sponge-rubber gasket between flanges and wall or ceiling. Wall supply registers shall be installed at least 6 inches (150 mm) below the ceiling unless otherwise indicated. Return and exhaust registers shall be located 6 inches (150 mm) above the floor unless otherwise indicated. Four-way directional control may be achieved by a grille face which can be rotated in 4 positions or by adjustment of horizontal and vertical vanes. Grilles shall be as specified for registers, without volume control damper.

2.5.6 Air Vents, Penthouses, and Goosenecks

Air vents, penthouses, and goosenecks shall be fabricated from galvanized steel sheets with galvanized structural shapes. Sheet metal thickness,

reinforcement, and fabrication shall conform to SMACNA HVAC Duct Const Stds. Louver blades shall be accurately fitted and secured to frames. Edges of louver blades shall be folded or beaded for rigidity and baffled to exclude driving rain. Air vents, penthouses, and goosenecks shall be provided with bird screen.

2.6 AIR SYSTEMS EQUIPMENT

2.6.1 Fans

2.6.1.1 Centrifugal Type Power Wall Ventilators

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 building surface and for discharge and condensate drippage away from building surface. Housing shall be constructed of heavy gauge aluminum. Unit shall be as scheduled with an airtight and liquid-tight metallic wall sleeve. Motor enclosure shall be dripproof type. Lubricated bearings shall be provided.

2.6.1.2 Centrifugal Type Power Roof Ventilators

Fans shall be spun aluminum V-belt driven with backward inclined, non-overloading wheel. Motor compartment housing shall be hinged or removable and weatherproof, constructed of heavy gauge aluminum. Fans shall be provided as scheduled. Motors enclosure shall be dripproof type. Lubricated bearings shall be provided.

2.6.2 Air Filters

2.6.2.1 Cartridge Type Filters

Filters shall be 2 inch (50mm) depth, sectional, replaceable dry media type of the size as required and shall have an average efficiency of 30 percent when tested according ASHRAE 52.1. Initial resistance shall not exceed .28 inches (7mm) at 500 FPM (2.54 /s) Filters shall be UL class 1. Media shall be pleated micro-glass paper media with corrugated aluminum separators, sealed inside the filter cell to form a totally rigid filter assembly. Fluctuations in filter face velocity or turbulent air flow will have no effect on filter integrity of performance.

Filters shall be 12 inch (305 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 500 feet per minute (2.54 m/s) shall not exceed 0.56 inches (14 mm), water gauge. Filters shall be UL class 1. Media shall be pleated microglass paper media with corrugated aluminum separators, sealed inside the filter cell to form a totally rigid filter assembly. Fluctuations in filter face velocity or turbulent airflow will have no effect on filter integrity or performance. Each filter shall be installed with an extended surface pleated media panel filter as a prefilter in a factory preassembled side access housing, or a factory-made sectional frame bank, as indicated.

2.6.2.2 Holding Frames

Frames shall be fabricated from not lighter than 16 gauge (1.6 mm) sheet steel with rust-inhibitor coating. Each holding frame shall be equipped

with suitable filter holding devices. Holding frame seats shall be gasketed. All joints shall be airtight. Frames to be constructed so air pressure assists in sealing filters to frames.

2.6.2.3 Filter Gauges

Filter gauges shall be dial type, diaphragm actuated draft and shall be provided for all filter stations, including those filters which are furnished as integral parts of factory fabricated air handling units. Gauges shall be at least 3-7/8 inches (98 mm) in diameter, shall have white dials with black figures, and shall be graduated in 0.01 inch (0.0025 kPa mm), and shall have a minimum range of 1 inch (0.25 kPa) beyond the specified final resistance for the filter bank on which each gauge is applied. Each gauge shall incorporate a screw operated zero adjustment and shall be furnished complete with two static pressure tips with integral compression fittings, two molded plastic vent valves, two 5 foot (1.5 m) minimum lengths of 1/4 inch (6.35 mm) diameter vinyl tubing, and all hardware and accessories for gauge mounting.

2.7 AIR HANDLING UNITS

2.7.1 Factory-Fabricated Air Handling Units

Units shall be variable air volume or constant volume as indicated in schedule, roof mounted, draw through, scheduled as indicated. Units shall include fans, coils, airtight insulated casing, prefilters, final filter sections, adjustable V-belt drives, mixing box vibration-isolators, and appurtenances required for specified operation. Vibration isolators shall be as indicated. Each air handling unit shall have physical dimensions suitable to fit space allotted to the unit and shall have the capacity indicated. Air handling unit shall have published ratings based on tests performed according to ARI 430. Unit shall come complete with all wiring suitable for single point electrical connection, including approved disconnects and breakers for ancillary loads.

2.7.1.1 Casings

Casing of each air handler shall have a complete stand alone welded steel tube frame with a welded steel channel base. Panels shall be 4-inch (100 mm) thick, insulated, double wall, steel panels, bolted and gasketed to the frame. Units shall be fabricated to allow removal of panels for access to internal parts and components, if necessary. Joints between sections shall be sealed air-tight, during assembly. Casing shall be rated for 8 inches (200 mm) water column differential pressure. Units shall be constructed with additional bracing and supports as required for the pressure rating, without sound or vibration problems. Casing sections shall be as indicated, galvanized steel, or 16 gauge (1.6 mm) steel outer casing protected with a factory baked enamel finish according to paragraph FACTORY PAINTING. Inner casing of double-wall units shall be minimum 18 gauge (1.0 mm) solid galvanized steel and perforated steel as scheduled. Casing shall be designed and constructed with an integral insulated structural steel frame such that exterior panels are non-load bearing. Casings shall be provided with inspection doors, access sections, and access doors as indicated. Inspection and access doors shall be insulated, fully gasketed, double-wall type, of a minimum 16 gauge (1.3 mm) outer and 18 gauge (1.0 mm) inner panels. Doors shall be rigid and provided with heavy duty hinges and latches. Access doors shall be minimum 24 inches (600 mm) wide and shall be

the full height of the unit casing or a minimum of 6 foot (1800 mm), whichever is less. A minimum 8 by 8 inches (200 by 200 mm) sealed glass. Access Sections shall be according to paragraph AIR HANDLING UNITS. Drain pan shall be double-wall insulated type constructed of 16 gauge (1.4 mm) stainless steel, double pitched to the drain connection. Drain pans shall be welded water tight, treated to prevent corrosion, and designed for positive condensate drainage. When 2 or more cooling coils are used, with one stacked above the other, condensate from the upper coils shall not flow across the face of lower coils. Intermediate drain pans or condensate collection channels and downspouts shall be provided, as required to carry condensate to the unit drain pan out of the air stream and without moisture carryover. Drain pan shall be constructed so that the pan may be visually inspected easily including underneath the coil without removal of the coil and so that the pan may be physically cleaned completely and easily underneath the coil without removal of the coil. Casing insulation shall conform to NFPA 90A Single-wall casing sections handling conditioned air shall be insulated with not less than 1 inch (25 mm) thick, 1-1/2 pound density (24 kg per cubic meter) coated fibrous glass material having a thermal conductivity not greater than 0.23 Btu/hr-sf-F (100 mm). Double-wall casing sections handling conditioned air shall be insulated with not less than 0.23 Btu/hr-sf-F (100 mm) of insulation. Foil-faced insulation shall not be an acceptable substitute for use with double wall casing. Double wall insulation must be completely sealed by inner and outer panels. 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. Air handling unit casing insulation shall be uniform over the entire casing. Duct liner material, coating, and adhesive shall conform to fire-hazard requirements specified in Section 15080 THERMAL INSULATION FOR MECHANICAL SYSTEMS. 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 1071. A latched and hinged inspection door, shall be provided in the fan and coil sections. Additional inspection doors, access doors and access sections shall be provided where indicated.

Floor shall be insulated double wall galvanized steel, sloped to drain. Provide 10 ga aluminum tread plate floor material with ample cross members (maximum 18-inch (457 mm) spacing) to support foot traffic. Floor to be welded water tight. Provide for four 3/4 inch (18 mm) anchor bolts for seismic anchoring. Locate one bolt in each corner of the air handler.

Provide two spare 1 inch (25 mm) conduit running the full length interior of each side of the Air Handling unit with a 4-inch by 4-inch (100 mm by 100 mm) junction box in each section suitable for control wiring. Conduit and junction boxes shall be located so as not to interfere with the normal function of the Air Handling unit including the removal of heating and cooling coils. Provide a junction box at one end at the exterior of the Air Handling Unit that will allow wiring to pass to the spare conduit on the interior of the Air Handling Unit.

Provide weather proof lights located in each section of the Air Handling Unit. Lights shall be completely wired to a single light switch located on the exterior of the Air Handling Unit and terminated in a junction box. Provide at least one 120v service receipt.

2.7.1.2 Cooling Coils

Coils shall be constructed of not less than 5/8 inch (16 mm) outside diameter seamless copper tubing, with copper or aluminum fins mechanically bonded or soldered to the tubes. Coils shall be provided with not less than 5/8 inch (16 mm) outside diameter flare or sweat connectors, accessory piping package with thermal connections suitable for connection to the type of control valve supplied, and manual air vent. Coils shall be tested hydrostatically at 300 psi (2000 kPa) or under water at 250 psi (1700 kPa) air pressure and suitable for 200 psi (1400 kPa) working pressure. Provisions shall be made for coil removal.

2.7.1.3 Air Filters

Air filters shall be as specified in paragraph AIR SYSTEMS EQUIPMENT for types and thickness indicated.

2.7.1.4 Fans

a. Testing Requirements: The following factory tests are required:

1. General: Sound power level ratings shall comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data" and shall be the result of tests made in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.

2. Unit's fans performance ratings for flow rate, pressure, power, air density, speed of rotation, and efficiency shall be factory tested and ratings established in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

b. Fan Section Construction: Fan section shall be equipped with a welded steel channel base for integral mounting of fan, motor, and casing panels. The fan scroll, wheel, shaft, bearings, and motor shall be mounted on a structural steel frame with frame mounted on base with vibration isolators. Vibration springs shall have 2-inch (12-mm) deflection and seismic restraints.

c. Supply air fans shall be belt drive plenum fans with airfoil wheel. Drive shall be rated for 150 percent of scheduled motor horsepower or two full motor sizes whichever is greater. Centrifugal fans shall be supplied as shown in the plans and in the fan schedule. Fan shall be rigidly braced and reinforced with integral spring isolation on fan base to help prevent vibrations or pulsation. Wheel diameter and outlet areas shall be in accordance with the Airfoil standard sizes adopted by AMCA for non-overloading fans. Airfoil blades shall be continuously welded to both rim and backplate and shall be capable of Class III duty. The wheel inlet and fan inlet cone shall be fabricated of aluminum and carefully matched for optimal sound and air performance. Turned, ground and polished steel shafts shall be sized so the final critical speed is at least 25 percent over the maximum speed for each pressure class.

d. Shaft Bearings: Grease-lubricated ball bearings selected for 200,000 hours average life, with grease fittings extended to an accessible location outside the fan section. Provide permanent drive shaft

grounding to prevent electrical currents eroding the bearings and drive shaft of fans.

e. Provide airflow traverse probes mounted in the fan inlets capable of continuously measuring the air handling capacity (air volume) of the fan. The fan inlet airflow traverse probes shall contain multiple total and static pressure sensors places at concentric area centers along the exterior surface of the cylindrical probes and internally connected to their respective averaging manifolds. Sensors shall not protrude beyond the surface of the probe, nor be adversely affected by particle contamination normally present in building system airflows. The fan inlet airflow traverse probes shall be symmetrical averaging signal takeoffs, and shall be of aluminum construction with hard anodized finish with galvanized steel mounting hardware. The probes shall be capable of producing steady, non-pulsating signals of standard total and static pressure, without need for flow corrections or factors, with an accuracy of 3 percent of actual flow over a fan operating range of 6 to 1 capacity turndown. Provide a multi-line digital display transmitter suitable for use with the air flow monitoring system. Transmitter shall be capable of displaying the actual CFM, static and velocity pressure for the system. Transmitter shall be capable of providing a calibrated output signal of 0-10 VDC or 4-20maDC. Transmitter shall be factory mounted on the outside of the AHU. Coordinate the installation with the Owner.

f. Fan Discharge Safety Enclosure: The safety enclosure to be expanded metal screen with a heavy steel frame which completely encloses the fan wheel. The top portion of the enclosure is removable to allow access to and removal of the wheel. Cataloged performance is based on fan without safety screen enclosure.

2.7.1.5 Access Sections and Filter/Mixing Boxes

Access sections shall be provided where indicated and shall be furnished with access doors as shown. Access sections and filter/mixing boxes shall be constructed in a manner identical to the remainder of the unit casing and shall be equipped with access doors.

2.7.1.6 Dampers

General: Leakage rate when tested in accordance with AMCA Standard 500 - Test Method for Louvers, Dampers and Shutters, shall not exceed 2 percent of air quantity calculated at 2,000 fpm face velocity through damper and 4 inches (100 mm) w.g. pressure differential.

a. Damper operators shall be electrically operated.

2.7.1.7 Dampers

Dampers shall be as specified in paragraph CONTROLS.

2.7.1.8 Variable Frequency Drives

Variable frequency drives shall be as specified in Section 15910, DIRECT DIGITAL CONTROL SYSTEMS.

2.7.1.9 Extra Materials and Work

a. Provide Two (2) complete spare sets of belts for each air handler in addition to the belts on furnished with each fan.

b. Provide Three (3) complete sets of filters for each air handler. Do not run the air handlers during the construction phase of the project without pre-filter and final filters in place. If the air handlers are operated during the construction phase of the project the contractor shall furnish the filters. The three (3) filters sets are intended to be used as follows:

1. During the final phase of construction for system check out and balancing and prior to occupancy.

2. The filters shall be changed prior to an owner directed two (2) week flush of the system immediately prior to occupancy. The contractor shall perform a flush of the building using 100% outside air for a period of not less than 14 days. During that time all of the VAV boxes shall be at a minimum of 50% open. This shall be coordinated with the owner to minimize energy usage during that time as well as avoid the possibility of freezing or overheating any systems that may be online in the building at that time.

3. The final set of filters shall be spares turned over to the owner at the beginning of occupancy.

2.8 TERMINAL UNITS

2.8.1 Variable Air Volume (VAV) and Dual Duct Terminal Units

2.8.1.1 Variable Volume, Single Duct

Variable volume, single duct, terminal units shall be provided with a calibrated air volume sensing device, air valve or damper, actuator, and accessory relays. Units shall control air volume to within plus or minus 5 percent of each air set point volume as determined by the thermostat with variations in inlet pressures from 3/4 to 6 inch water gauge (200 to 1500 Pa). Internal resistance of units shall not exceed 0.4 inch water gauge (100 Pa) at maximum flow range. External differential pressure taps separate from the control pressure taps shall be provided for air flow measurement with a 0 to 1 inch water gauge (0 to 250 Pa) range. Unit volume controller shall be normally open upon loss of electrical power.

2.8.1.2 Variable Volume, Single Duct, Fan-Powered

Variable volume, single duct, fan-powered terminal units shall be provided with a calibrated air volume sensing device, air valve or damper, actuator, fan and motor, and accessory relays. Units shall control primary air volume to within plus or minus 5 percent of each air set point as determined by the thermostat with variations in inlet pressure from 3/4 to 6 inch water gauge (200 to 1500 Pa). Unit fan shall be centrifugal, direct-driven, double-inlet type with forward curved blades. Fan motor shall be either single speed with speed controller or three-speed, permanently lubricated, permanent split-capacitor type. Fan/motor assembly shall be isolated from the casing to minimize vibration transmission. Fan control shall be factory furnished and wired into the unit control system. A factory-mounted

pressure switch shall be furnished to operate the unit fan whenever pressure exists at the unit primary air inlet or when the control system fan operates. Fan wheels shall be furnished with an anti-rotation device to prevent backwards rotation of fan due to primary air flow.

2.8.1.3 Reheat Units

a. Hot Water Coils: Hot-water coils shall be fin-and-tube type constructed of seamless copper tubes and copper or aluminum fins mechanically bonded or soldered to the tubes. Where required, coils shall be minimum of 2 rows. Headers shall be constructed of cast iron, welded steel or copper. Casing and tube support sheets shall be 16 gauge (1.6 mm), galvanized steel, formed to provide structural strength. Tubes shall be correctly circuited for proper water velocity without excessive pressure drop and they shall be drainable where required or indicated. At the factory, each coil shall be tested at not less than 250 psi (1700 kPa) air pressure and shall be suitable for 200 psi (1400 kPa) working pressure. Drainable coils shall be installed in the air handling units with a pitch of not less than 1/8 inch per foot (10 mm per m) of tube length toward the drain end. Coils shall conform to the provisions of ARI 410.

PART 3 EXECUTION

3.1 INSTALLATION

Work shall be installed as shown and according to the manufacturer's diagrams and recommendations.

3.1.1 Equipment and Installation

Frames and supports shall be provided for pumps, air handling units, fans, coils, dampers, and other similar items requiring supports. Air handling units shall be floor mounted or ceiling hung, as indicated. The method of anchoring and fastening shall be as detailed. Floor-mounted equipment, unless otherwise indicated, shall be set on not less than 6 inch (150 mm) concrete pads or curbs doweled in place. Concrete foundations for circulating pumps shall be heavy enough to minimize the intensity of the vibrations transmitted to the piping and the surrounding structure, as recommended in writing by the pump manufacturer. In lieu of a concrete pad foundation, a concrete pedestal block with isolators placed between the pedestal block and the floor may be provided. The concrete foundation or concrete pedestal block shall be of a mass not less than three times the weight of the components to be supported. Lines connected to the pump mounted on pedestal blocks shall be provided with flexible connectors. Foundation drawings, bolt-setting information, and foundation bolts shall be furnished prior to concrete foundation construction for all equipment indicated or required to have concrete foundations.

3.1.2 Access Panels

Access panels shall be provided for concealed valves, vents, controls, dampers, and items requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced and maintained or completely removed and replaced. Access panels shall be as specified in Section 05500 MISCELLANEOUS METALS.

3.1.3 Flexible Connectors

Pre-insulated flexible connectors and flexible duct shall be attached to other components in accordance with the latest printed instructions of the manufacturer to ensure a vapor tight joint. Hangers, when required to suspend the connectors, shall be of the type recommended by the connector or duct manufacturer and shall be provided at the intervals recommended.

3.1.4 Sleeved and Framed Openings

Space between the sleeved or framed opening and the duct or the duct insulation shall be packed as specified in Section 07840 FIRESTOPPING for fire rated penetrations. For non-fire rated penetrations, the space shall be packed as specified in Section 07900 JOINT SEALING.

3.1.5 Metal Ductwork

Installation shall be according to SMACNA HVAC Duct Const Stds unless otherwise indicated. Duct supports for sheet metal ductwork shall be according to SMACNA HVAC Duct Const Stds, unless otherwise specified. Friction beam clamps indicated in SMACNA HVAC Duct Const Stds shall not be used. Risers on high velocity ducts shall be anchored in the center of the vertical run to allow ends of riser to move due to thermal expansion. Supports on the risers shall allow free vertical movement of the duct. Supports shall be attached only to structural framing members and concrete slabs. Supports shall not be anchored to metal decking unless a means is provided and approved for preventing the anchor from puncturing the metal decking. Where supports are required between structural framing members, suitable intermediate metal framing shall be provided. Where C-clamps are used, retainer clips shall be provided.

3.1.6 Exposed Ductwork

Exposed ductwork shall be fabricated from minimum 18 gauge (1.3 mm), Type 304L or 316L, stainless steel with continuously welded joints and seams. Ducts shall be pitched to drain at hoods and low points indicated. Surface finish shall match hoods.

3.1.7 Acoustical Duct Lining

Lining shall be applied in cut-to-size pieces attached to the interior of the duct with nonflammable fire resistant adhesive conforming to ASTM C 916, Type I, NFPA 90A, UL 723, and ASTM E 84. Top and bottom pieces shall lap the side pieces and shall be secured with welded pins, adhered clips of metal, nylon, or high impact plastic, and speed washers or welding cup-head pins installed according to SMACNA HVAC Duct Const Stds. Welded pins, cup-head pins, or adhered clips shall not distort the duct, burn through, nor mar the finish or the surface of the duct. Pins and washers shall be flush with the surfaces of the duct liner and all breaks and punctures of the duct liner coating shall be sealed with the nonflammable, fire resistant adhesive. Exposed edges of the liner at the duct ends and at other joints where the lining will be subject to erosion shall be coated with a heavy brush coat of the nonflammable, fire resistant adhesive, to prevent delamination of glass fibers. Duct liner may be applied to flat sheet metal prior to forming duct through the sheet metal brake. Lining at the top and bottom surfaces of the duct shall be additionally secured by welded pins or

adhered clips as specified for cut-to-size pieces. Other methods indicated in SMACNA HVAC Duct Const Stds to obtain proper installation of duct liners in sheet metal ducts, including adhesives and fasteners, will be acceptable.

3.1.8 Dust Control

To prevent the accumulation of dust, debris and foreign material during construction, temporary dust control protection shall be provided. The distribution system (supply and return) shall be protected with temporary seal-offs at all inlets and outlets at the end of each day's work. Temporary protection shall remain in place until system is ready for startup.

3.1.9 Insulation

Thickness and application of insulation materials for ductwork, piping, and equipment shall be according to THERMAL INSULATION FOR MECHANICAL SYSTEMS.

3.1.10 Duct Test Holes

Holes with closures or threaded holes with plugs shall be provided in ducts and plenums as indicated or where necessary for the use of pitot tube in balancing the air system. Extensions, complete with cap or plug, shall be provided where the ducts are insulated.

3.1.11 Power Roof Ventilator Mounting

Foamed 1/2 inch (13 mm) thick, closed-cell, flexible elastomer insulation shall cover width of roof curb mounting flange. Where wood nailers are used, holes shall be pre-drilled for fasteners.

3.1.12 Power Transmission Components Adjustment

V-belts and sheaves shall be tested for proper alignment and tension prior to operation and after 72 hours of operation at final speed. Belts on drive side shall be uniformly loaded, not bouncing. Alignment of direct driven couplings shall be to within 50 percent of manufacturer's maximum allowable range of misalignment.

3.1.13 Smoke-Fire and Fire Damper Installation

a. Install dampers at locations indicated on the Drawings and in accordance with manufacturer's UL approved installation instructions.

b. Install dampers square and free from racking with blades running horizontally.

c. Do not compress or stretch damper frame into duct or opening.

d. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.

e. Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

3.2 DUCTWORK LEAK TEST

Ductwork leak test shall be performed for the entire air distribution and exhaust system, including fans, coils. Test procedure, apparatus, and report shall conform to SMACNA Leakage Test Mnl. The maximum allowable leakage rate is 2 percent. Ductwork leak test shall be completed with satisfactory results prior to applying insulation to ductwork exterior.

3.3 DAMPER ACCEPTANCE TEST

All fire dampers and smoke dampers shall be operated under normal operating conditions, prior to the occupancy of a building to determine that they function properly. Fire dampers equipped with fusible links shall be tested by having the fusible link cut in place. Dynamic fire dampers shall be tested with the air handling and distribution system running. All fire dampers shall be reset with the fusible links replaced after acceptance testing. To ensure optimum operation and performance, the damper must be installed so it is square and free from racking.

3.4 TESTING, ADJUSTING, AND BALANCING

Testing, adjusting, and balancing shall be as specified in Section 15990 TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS. Testing, adjusting, and balancing shall begin only when the air supply and distribution, including controls, has been completed, with the exception of performance tests.

3.5 PERFORMANCE TESTS

After testing, adjusting, and balancing has been completed as specified, each system shall be tested as a whole to see that all items perform as integral parts of the system and temperatures and conditions are evenly controlled throughout the building. Corrections and adjustments shall be made as necessary to produce the conditions indicated or specified. Capacity tests and general operating tests shall be conducted by an experienced engineer. Tests shall cover a period of not less than 3 days for each system and shall demonstrate that the entire system is functioning according to the specifications. Coincidental chart recordings shall be made at points indicated on the drawings for the duration of the time period and shall record the temperature at space thermostats or space sensors, the humidity at space humidistats or space sensors and the ambient temperature and humidity in a shaded and weather protected area.

3.6 CLEANING AND ADJUSTING

Pipes shall be cleaned free of scale and thoroughly flushed of foreign matter. A temporary bypass shall be provided for water coils to prevent flushing water from passing through coils. Strainers and valves shall be thoroughly cleaned. Prior to testing and balancing, air shall be removed from water systems by operating the air vents. Temporary measures, such as piping the overflow from vents to a collecting vessel shall be taken to avoid water damage during the venting process. Air vents shall be plugged or capped after the system has been vented. Inside of air terminal units, ducts, plenums, and casing shall be thoroughly cleaned of debris and blown free of small particles of rubbish and dust and then shall be vacuum cleaned before installing outlet faces. Equipment shall be wiped clean, with traces of oil, dust, dirt, or paint spots removed. Temporary filters shall be provided prior to startup of all fans that are operated during construction,

and new filters shall be installed after all construction dirt has been removed from the building, and the ducts, plenums, casings, and other items specified have been vacuum cleaned. System shall be maintained in this clean condition until final acceptance. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to proper tension. Control valves and other miscellaneous equipment requiring adjustment shall be adjusted to setting indicated or directed. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.7 FIELD TRAINING

The Contractor shall conduct a training course for operating and maintenance personnel as designated by the Contracting Officer. Training shall be provided for a period of 24 hours of normal working time and shall start after the system is functionally complete but prior to the performance tests. The field instruction shall cover all of the items contained in the approved Operating and Maintenance Instructions.

End of Section

This Section 16264 added by Amendment R0002

SECTION 16264

DIESEL-GENERATOR SET, STATIONARY 15-300 KW, STANDBY APPLICATIONS

PART 1 GENERAL

1.1 BID FORM INFORMATION

The hardware and work of this Section shall be supplied under Option 0013.

1.2 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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.11	(1987; R 1993) Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
ANSI C39.1	(1981; R 1992) Requirements for Electrical Analog Indicating Instruments

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53/A 53M	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 106	(1999el) Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A 135	(1997c) Electric-Resistance-Welded Steel Pipe
ASTM A 181/A 181M	(2000) Carbon Steel Forgings for General-Purpose Piping
ASTM A 234/A 234M	(2000) Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM D 975	(1998b) Diesel Fuel Oils

ASME INTERNATIONAL (ASME)

ASME B16.3	(1998) Malleable Iron Threaded Fittings
ASME B16.5	(1996; B16.5a) Pipe Flanges and Flanged Fittings NPS 1/2 thru NPS 24
ASME B16.11	(1996) Forged Fittings, Socket-Welding and Threaded

ASME B31.1	(1998) Power Piping
ASME BPVC SEC IX	(1998) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS5	(1994; CS5a-1995) Cross-Linked Polyethylene Insulated Shielded Power Cables Rated 5 Through 46 kV
AEIC CS6	(1996) Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 Through 69 kV

ELECTRICAL GENERATING SYSTEMS ASSOCIATION (EGSA)

EGSA 101P	(1995a) Engine Driven Generator Sets

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(1997) National Electrical Safety Code
IEEE Std 1	(1986; R 1992) General Principles for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation
IEEE Std 48	(1998) Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV
IEEE Std 100	(1997) IEEE Standard Dictionary of Electrical and Electronics Terms
IEEE Std 120	(1989) Electrical Measurements in Power Circuits
IEEE Std 404	(1993) Cable Joints for Use with Extruded Dielectric Cable Rated 5000 V Through 138 000 V and Cable Joints for Use with Laminated Dielectric Cable Rated 2500 V Through 500 000 V
IEEE Std 519	(1992) Harmonic Control in Electrical Power Systems

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(1993) Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(1996) Pipe Hangers and Supports - Selection and Application

MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA AB 1	(1993) Molded Case Circuit Breakers and Molded Case Switches
NEMA ICS 2	(1993) Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures
NEMA WC 74	(2000) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy
NEMA MG 1	(1998) Motors and Generators
NEMA PB 1	(1995) Panelboards
NEMA SG 3	(1995) Power Switching Equipment

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 30	(1996; Errata TIA 96-2) Flammable and Combustible Liquids Code
NFPA 37	(1998) Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 70	(2002) National Electrical Code

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE ARP 892	(1965; R 1994) D-C Starter-Generator, Engine
SAE J 537	(1996) Storage Batteries

UNDERWRITERS LABORATORIES (UL)

UL 489	(1996; Rev thru Dec 1998) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 891	(1994; Rev thru Jan 1995) Dead-Front Switchboards
UL 1236	(1994; Rev thru Mar 1999) Battery Chargers for Charging Engine-Starter Batteries

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Operation Manual; G

a. Base-mounted equipment, complete with base and attachments including anchor bolt template and recommended clearances for maintenance and operation.

b. Starting system.

c. Fuel system.

d. Cooling system.

e. Exhaust system.

f. Electric wiring of relays, breakers, programmable controllers, and switches including single line and wiring diagrams.

g. Lubrication system, including piping, pumps, strainers, filters, heat exchangers for lube oil and turbocharger cooling, electric heater, controls and wiring.

h. Location, type, and description of vibration isolation devices.

i. The safety system, including wiring schematics.

j. One-line schematic and wiring diagrams of the generator, exciter, regulator, governor, and all instrumentation.

k. Panel layouts.

l. Mounting and support for each panel and major piece of electrical equipment.

m. Engine-generator set rigging points and lifting instructions.

Acceptance; G

Drawings which accurately depict the as-built configuration of the installation, upon acceptance of the diesel-generator set installation. Layout drawings shall be revised to reflect the as-built conditions and submitted with the as-built drawings.

SD-03 Product Data

Performance Tests; G

Calculations of the engine and generator output power capability, including efficiency and parasitic load data.

Sound Limitations; G

Sound power level data for the packaged unit operating at 100% load in a free field environment. The data should demonstrate compliance with the sound limitation requirements of this specification.

Generator; G

Each generator KW rating and short circuit capacity (both symmetric and asymmetric).

Integral Main Fuel Storage Tank; G

Calculations for the capacity of each storage tank, including allowances for recirculated fuel, usable tank capacity, and duration of fuel supply.

Power Factor; G

Generator capability curve showing generator kVA output (kW vs. kvar) for both leading and lagging power factors ranging from 0 to 1.0.

Time-Delay on Alarms; G

The magnitude of monitored values which define alarm or action setpoints, and the tolerance (plus and/or minus) at which the device activates the alarm or action.

Cooling System; G

a. The maximum and minimum allowable inlet temperatures of the cooling air.

b. The maximum allowable temperature rise in the cooling air across the engine.

c. The minimum allowable inlet fuel temperature.

Manufacturer's Catalog; G

Manufacturer's standard catalog data describing and depicting each engine-generator set and all ancillary equipment in sufficient detail to demonstrate specification compliance.

Vibration Isolation; G

Vibration isolation system performance data for the range of frequencies generated by the engine-generator set during operation

from no load to full load and the maximum vibration transmitted to the floor. Description of seismic qualification of the engine-generator mounting, base, and vibration isolation.

Instructions; G

Instructions including: the manufacturer's pre-start checklist and precautions; startup procedures for test mode, manual-start mode, and automatic-start mode, (as applicable); running checks, procedures, and precautions; and shutdown procedures, checks, and precautions. Instructions shall include procedures for interrelated equipment (such as heat recovery systems, co-generation, load-shedding, and automatic transfer switches). Instructions shall be weatherproof, laminated in plastic, framed, and posted where directed. Posted data shall include wiring and control diagrams showing the key mechanical and electrical control elements, and a diagrammatic layout of the system.

Experience; G

Statement showing that each component manufacturer has a minimum of 3 years experience in the manufacture, assembly and sale of components used with stationary diesel-engine generator sets for commercial and industrial use.

Statement showing that the engine-generator set manufacturer/assembler has a minimum of 3 years experience in the manufacture, assembly and sale of stationary diesel engine-generator sets for commercial and industrial use.

Field Engineer; G

A letter listing the qualifications, schools, formal training, and experience of the field engineer.

Site Welding; G

A letter listing the welder qualifying procedures for each welder, complete with supporting data such as test procedures used, what was tested to, and a list of the names of all welders and their qualifications symbols.

General Installation; G

A complete copy of the manufacturer's installation procedures. A detailed description of the manufacturer's recommended break-in procedure.

SD-06 Test Reports

Onsite Inspection and Tests; G

a. A letter giving notice of the proposed dates of all onsite inspections and tests at least 14 days prior to beginning tests.

b. A detailed description of the Contractor's proposed procedures for onsite tests including the test including the test

plan and a listing of equipment necessary to perform the tests. Submission shall be at least 20 days prior to beginning tests.

c. Six copies of the onsite test data described below in 8-1/2 x 11 inch (216 x 279 mm) 3-ring binders with a separate section for each test. Sections shall be separated by dividers with tabs. Data plots shall be full size 8-1/2 x 11 inches (216 x 279 mm) minimum), showing all grid lines, with full resolution.

(1) A description of the procedures for onsite tests.

(2) A list of equipment used, with calibration certifications.

(3) A copy of measurements taken, with required plots and graphs.

(4) The date of testing.

(5) The parameters verified.

(6) The condition specified for the parameter.

(7) The test results, signed and dated.

(8) A description of all adjustments made.

SD-07 Certificates

Vibration Isolation; G

Torsional analysis including prototype testing or calculations which certify and demonstrate that no damaging or dangerous torsional vibrations will occur when the prime mover is connected to the generator, at synchronous speeds, plus/minus 10%.

General Requirements; G

a. Prototype Tests: Manufacturer's standard certification that prototype tests were performed for the generator model proposed.

b. Reliability and Durability: Documentation which cites engines and generators in similar service to demonstrate compliance with the requirements of this specification. Certification does not exclude annual technological improvements made by a manufacturer in the basic standard model set on which experience was obtained, provided parts interchangeability has not been substantially affected and the current standard model meets all the performance requirements of this specification. For each different set, 2 like sets shall have performed satisfactorily in a stationary power application, independent and separate from the physical location of the manufacturer's and assembler's facilities, for a minimum of 2 consecutive years without any failure to start, including periodic exercise. The certification shall state that for the set proposed to meet this specification, there were no failures resulting in downtime for repairs in excess of 72 hours or any failure due to overheating during 2 consecutive years of service. Like sets are of the same model, speed, bore, stroke, number and configuration of

cylinders, and output power rating. Like generators are of the same model, speed, pitch, cooling, exciter, voltage regulator and output power rating. A list shall be provided with the name of the installations, completion dates, and name and telephone number of a point of contact.

c. Flywheel Balance: Manufacturer's certification that the flywheel has been statically and dynamically balanced and is capable of being rotated at 125% of rated speed without vibration or damage.

Emissions; G

A certification from the engine manufacturer stating that the engine exhaust emissions meet federal, state, and local regulations and restrictions specified. At a minimum, this certification shall include emission factors for criteria pollutants including nitrogen oxides, carbon monoxide, particulate matter, sulfur dioxide, non-methane hydrocarbon, and for hazardous air pollutants (HAPs).

Sound limitations; G

A certification from the manufacturer stating that the sound emissions meet the specification.

Materials and Equipment; G

A letter stating that where materials or equipment are specified to comply with requirements of UL, or other standards, written proof of such compliance has been obtained. The label or listing of the specified agency, or a written certificate from an approved, nationally recognized testing organization equipped to perform such services, stating that the items have been tested and conform to the requirements and testing methods of the specified agency are acceptable as proof.

Factory Inspection and Tests; G

A certification that each engine generator set passed the factory tests and inspections and a list of the test and inspections.

Inspections; G

A letter certifying that all facilities are complete and functional, that each system is fully functional, and that each item of equipment is complete, free from damage, adjusted, and ready for beneficial use.

Cooling System; G

Certification that the engine-generator set and cooling system function properly in the ambient temperatures specified.

1.4 SYSTEM DESCRIPTION

Each engine-generator set shall be provided and installed complete and totally functional, with all necessary ancillary equipment to include air

filtration; starting system; generator controls, protection, and isolation; instrumentation; lubrication; fuel system; cooling system; and engine exhaust system. Each engine generator set shall satisfy the requirements specified in the Engine Generator Parameter Schedule.

1.4.1 Engine-Generator Parameter Schedule

ENGINE GENERATOR PARAMETER SCHEDULE

Service Load	400 kVA
Power Factor	0.8 lagging
Motor Starting kVA (maximum)	33 kVA
Maximum Speed	1800 rpm
Engine-Generator Application	stand-alone
Engine Cooling Type	water/ethylene glycol
Heat Exchanger Type	fin-tube
Governor Type	Droop
Frequency Regulation (droop) (No load to full load)	3% (max.)
Frequency Bandwidth (steady state)	±0.25%
Voltage Regulation (No load to full load)	± 2% (max.)
Voltage Bandwidth (steady state)	±2%
Frequency	60 Hz
Voltage	480 volts
Phases	3 Phase, Wye
Minimum Generator Reactance	0.16 per unit Subtransient
Nonlinear Loads	150 kVA
Max Time to Start and be Ready to Assume Load	10 seconds
Max Summer Outdoor Temp (Ambient)	110 degrees F
Min Winter Outdoor Temp (Ambient)	18 degrees F

Installation Elevation	322 feet (98 meters) above sea level

1.4.2 Output Capacity

Generator set shall provide power equal to the sum of service load plus the machine's efficiency loss and associated ancillary equipment loads. Rated output capacity shall also consider engine and/or generator oversizing required to meet requirements in paragraph Engine-Generator Parameter Schedule.

1.4.3 Power Rating

Standby ratings shall be in accordance with EGSA 101P.

1.5 GENERAL REQUIREMENTS

1.5.1 Engine-Generator Set

Each set shall consist of one engine, one generator, and one exciter, mounted, assembled, and aligned on one base; and all other necessary ancillary equipment which may be mounted separately. Sets shall be assembled and attached to the base prior to shipping. Set components shall be environmentally suitable for the locations shown and shall be the manufacturer's standard product offered in catalogs for commercial or industrial use. A generator strip heater shall be provided for moisture control when the generator is not operating.

1.5.2 Nameplates

Each major component of this specification shall have the manufacturer's name, type or style, model or serial number, and rating number on a plate secured to the equipment. As a minimum, nameplates shall be provided for: Engines; Relays; Generators; Transformers (CT & PT); Regulators; Pumps and pump motors; Governors; Generator Breaker.

Engines	Relays
Generators	Transformers (CT & PT)
Regulators	Pumps and pump motors
Governors	Generator Breaker

Where the following equipment is provided as a standard component by the diesel-engine generator set manufacturer, the nameplate information may be provided in the maintenance manual in lieu of nameplates.

Battery charger	Heaters
Exhaust mufflers	Exciters
Switchgear	Silencers
Battery	

1.5.3 Personnel Safety Device

Exposed moving parts, parts that produce high operating temperatures, parts which may be electrically energized, and parts that may be a hazard to

operating personnel during normal operation shall be insulated, fully enclosed, guarded, or fitted with other types of safety devices. The safety devices shall be installed so that proper operation of the equipment is not impaired.

1.5.4 Verification of Dimensions

Before performing work, the premises shall be visited and details of the work verified. The Contracting Officer shall be advised in writing of any discrepancies before performing any work.

1.5.5 Conformance to Codes and Standards

Where equipment is specified to conform to requirements of any code or standard such as UL, the design, fabrication and installation shall conform to the code.

1.5.6 Site Welding

Structural members shall be welded in accordance with Section 05090A WELDING, STRUCTURAL. For all other welding, procedures and welders shall be qualified in accordance with ASME BPVC SEC IX. Welding procedures qualified by others, and welders and welding operators qualified by a previously qualified employer may be accepted as permitted by ASME B31.1. Welder qualification tests shall be performed for each welder whose qualifications are not in compliance with the referenced standards. The Contracting Officer shall be notified 24 hours in advance of qualification tests. The qualification tests shall be performed at the work site if practical. The welder or welding operator shall apply the assigned personal symbol near each weld made as a permanent record

1.5.7 Engine Generator Set Enclosure

<LST INDENT=-0.33>a. Provide each engine generator assembly with a walk-around type, corrosion-resistant, weatherproof enclosure, Enclosure size and arrangement shall permit all operation and servicing of engine generator set from inside. Provide 30-inch (76.2 cm) minimum walkway width, or as necessary for code-required electric clearances. Provide step with hand rail at entrance.

<LST INDENT=-0.33>b. Formed steel, 14-gauge minimum. Base/anchoring frame shall be galvanized angle-type and shall facilitate removal of enclosure from concrete foundation as a complete unit. Provide lifting eyes. Side panels and doors (full height) shall not exceed 36 inches (76.2 cm) in width. All fasteners, hinges (greasable), and hardware shall be stainless steel. Provide one-piece, welded, pitched roof with provisions for support and mounting of muffler and exhaust pipe. Provide perimeter drip edge. All doors shall be provided with keyed locksets.

<LST INDENT=-0.33>c. Provide sound attenuating construction to limit sound levels to those described in this specification section Paragraph 2.6, Sound Limitations.

<LST INDENT=-0.33>d. Provide switched interior incandescent lighting, duplex receptacles (one each side, minimum), motorized 120V ac inlet and discharge air dampers with blade and side seals, oil and water drain provisions, and fume vent provisions. All electrical loads shall be prewired to the

distribution panelboard. Route all wiring in code-size conduit. Provide equipment grounding conductors in all circuits.

<LST INDENT=-0.33>e. Coating: Phosphate cleaned, two coats of rust-inhibitive primer, two finish coats, ANSI 61, light grey.

<LST INDENT=-0.33>f. Provide power distribution panelboard to serve all engine generator set and enclosure loads; service shall be 60 amp, 208/120V ac, 3-phase.

1.5.8 Vibration Isolation

The engine-generator set shall be provided with vibration-isolation in accordance with the manufacturer's standard recommendation.

1.5.9 Experience

Each component manufacturer shall have a minimum of 3 years experience in the manufacture, assembly and sale of components used with stationary diesel engine-generator sets for commercial and industrial use. The engine-generator set manufacture/assembler shall have a minimum of 3 years experience in the manufacture, assembly and sale of stationary diesel engine-generator sets for commercial and industrial use.

1.5.10 Field Engineer

The engine-generator set manufacturer or assembler shall furnish a qualified field engineer to supervise the complete installation of the engine-generator set, assist in the performance of the onsite tests, and instruct personnel as to the operational and maintenance features of the equipment. The field engineer shall have attended the engine-generator manufacturer's training courses on installation and operation and maintenance for engine generator sets.

1.6 STORAGE AND INSTALLATION

The Contractor shall properly protect material and equipment in accordance with the manufacturers recommended storage procedures, before, during, and after installation. Stored items shall be protected from the weather and contamination. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

1.7 OPERATION AND MAINTENANCE MANUALS

The operation and maintenance manuals shall be submitted and approved prior to commencing onsite tests.

1.7.1 Operation Manual

Three copies of the operation manual in 8-1/2 x 11 inch (216 x 279 mm) three-ring binders shall be provided. Sections shall be separated by heavy plastic dividers with tabs which identify the material in the section. Drawings shall be folded blue lines, with the title block visible, and placed in 8-1/2 x 11 inch (216 x 279 mm) plastic pockets with reinforced holes. The manual shall include:

a. Step-by-step procedures for system startup, operation, and shutdown;

b. Drawings, diagrams, and single-line schematics to illustrate and define the electrical, mechanical, and hydraulic systems with their controls, alarms, and safety systems;

c. Procedures for interface and interaction with related systems to include automatic transfer switches.

1.7.2 Maintenance Manual

Three copies of the manufacturers standard maintenance manual.

1.8 SPECIAL TOOLS AND FILTERS

Two sets of special tools and two sets of filters required for maintenance shall be provided. Special tools are those that only the manufacturer provides, for special purposes, or to reach otherwise inaccessible parts. One handset shall be provided for each electronic governor when required to indicate and/or change governor response settings. Two complete sets of filters shall be supplied in a suitable storage box. these filters shall be in addition to filters replaced after testing.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials and equipment shall be as specified.

2.1.1 Circuit Breakers, Low Voltage

NEMA AB 1, UL 489, and NEMA SG 3.

2.1.2 Filter Elements (Fuel-oil, Lubricating-oil, and Combustion-air)

Manufacturer's standard.

2.1.3 Instrument Transformers

ANSI C12.11.

2.1.4 Pipe (Sleeves, Fuel/Lube-oil, Compressed-Air, Coolant and Exhaust)

ASTM A 53/A 53M, ASTM A 106 or ASTM A 135, steel pipe. Pipe smaller than 2 inches (50 mm) shall be Schedule 80. Pipe 2 inches (50 mm) and larger shall be Schedule 40.

2.1.5 Pipe Flanges and Fittings

a. Pipe Flanges and Flanged Fittings: ASTM A 181/A 181M, Class 60, or ASME B16.5, Grade 1, Class 150.

b. Pipe Welding Fittings: ASTM A 234/A 234M, Grade WPB or WPC, Class 150, or ASME B16.11, 3000 lb (1360.7 kg).

c. Threaded Fittings: ASME B16.3, Class 150.

d. Valves: MSS SP-80, Class 150.

e. Gaskets: Manufacturers Standard.

2.1.6 Pipe Hangers

MSS SP-58 and MSS SP-69.

2.1.7 Electrical Enclosures

2.1.7.1 General

NEMA ICS 6.

2.1.7.2 Panelboards

NEMA PB 1.

2.1.8 Electric Motors

Electric motors shall conform to the requirements of NEMA MG 1. Motors shall have sealed ball bearings, a maximum speed of 1800 rpm and integral automatic or manual reset thermal overload protectors. Motors used indoors shall have drip proof frames; those used outside shall be totally enclosed. AC motors larger than 1/2 Hp (373 W) shall be of the squirrel cage induction type for standard voltage of 460 volts, 60 Hz three phase power. AC motors 1/2 Hp (373 W) or smaller, shall be for standard voltage 115 volts, 60 Hz, single phase power.

2.1.9 Motor Controllers

Motor controllers and starters shall conform to the requirements of NFPA 70 and NEMA ICS 2.

2.2 ENGINE

Each engine shall operate on No. 2-D diesel conforming to ASTM D 975, shall be designed for stationary applications and shall be complete with ancilliaries. The engine shall be a standard production model described in the manufacturer's catalog. The engine shall be naturally aspirated, scavenged, supercharged or turbocharged. The engine shall be two- or four-stroke-cycle and compression-ignition type. The engine shall be vertical inline, V-, or opposed-piston type, with a solid cast block or individually cast cylinders. The engine shall have a minimum of two cylinders. Opposed-piston type engines shall have no less than four cylinders. Each block shall have a coolant drain port. Each engine shall be equipped with an overspeed sensor.

2.3 FUEL SYSTEM

The fuel system for each engine generator set shall conform to the requirements of NFPA 30 and NFPA 37 and contain the following elements.

2.3.1 Pumps

2.3.1.1 Main Pump

Each engine shall be provided with an engine driven pump. The pump shall supply fuel at a minimum rate sufficient to provide the amount of fuel required to meet the performance indicated within the parameter schedule. The fuel flow rate shall be based on meeting the load requirements and all necessary recirculation.

2.3.2 Filter

A minimum of one full flow fuel filter shall be provided for each engine. The filter shall be readily accessible and capable of being changed without disconnecting the piping or disturbing other components. The filter shall have inlet and outlet connections plainly marked.

2.3.3 Relief/Bypass Valve

A relief/bypass valve shall be provided to regulate pressure in the fuel supply line, return excess fuel to a return line, and prevent the build-up of excessive pressure in the fuel system.

2.3.4 Integral Main Fuel Storage Tank

Each engine shall be provided with an integral main fuel tank. Each tank shall be factory installed and provided as an integral part of the diesel generator manufacturer's product. Each tank shall be provided with connections for fuel supply line, fuel return line, local fuel fill port, gauge, vent line, and float switch assembly. A fuel return line cooler shall be provided as recommended by the manufacturer and assembler. The temperature of the fuel returning to the tank shall be below the flash point of the fuel. Each engine-generator set provided with weatherproof enclosures shall have its tank mounted within the enclosure. The fuel fill line shall be accessible without opening the enclosure.

2.3.4.1 Capacity

Each tank shall have capacity to supply fuel to the engine for an uninterrupted 12-hour period at 100% rated load without being refilled.

2.3.4.2 Local Fuel Fill

Each local fuel fill port on the day tank shall be provided with a screw-on cap.

2.3.4.3 Fuel Level Controls

a. Each tank shall have a float-switch assembly to perform the following functions:

(1) Activate the "Low Fuel Level" alarm at 70% of the rated tank capacity.

(2) Activate the "Overfill Fuel Level" alarm at 95% of the rated tank capacity.

2.3.4.4 Arrangement

Integral tanks may allow gravity flow into the engine. Gravity flow tanks and any tank that allows a fuel level above the fuel injectors shall be provided with an internal or external factory installed valve located as near as possible to the shell of the tank. The valve shall close when the engine is not operating. Integral day tanks shall be provided with any necessary pumps to supply fuel to the engine as recommended by the generator set manufacturer. The fuel supply line from the tank to the manufacturer's standard engine connection shall be welded pipe.

2.4 LUBRICATION

Each engine shall have a separate lube-oil system conforming to NFPA 30 and NFPA 37. Each system shall be pressurized by engine-driven oil pumps. Each system shall be furnished with a relief valve for oil pressure regulation (for closed systems) and a dip-stick for oil level indications. The crankcase shall be vented in accordance with the manufacturer's recommendation except that it shall not be vented to the engine exhaust system. Crankcase breathers, if provided on engines installed in buildings or enclosures, shall be piped to vent to the outside. The system shall be readily accessible for service such as draining, refilling, etc. Each system shall permit addition of oil and have oil-level indication with the set operating. The system shall utilize an oil cooler as recommended by the engine manufacturer.

2.4.1 Filter

One full-flow filter shall be provided for each pump. The filter shall be readily accessible and capable of being changed without disconnecting the piping or disturbing other components. The filter shall have inlet and outlet connections plainly marked.

2.4.2 Lube-Oil Sensors

Each engine shall be equipped with lube-oil pressure sensors. Pressure sensors shall be located downstream of the filters and provide signals for required indication and alarms.

2.5 COOLING SYSTEM

Each engine cooling system shall operate automatically while the engine is running. Each cooling system shall be sized for the maximum summer outdoor design temperature and site elevation. Water-cooled system coolant shall use a combination of water and ethylene-glycol sufficient for freeze protection at the minimum winter outdoor temperature specified. The maximum temperature rise of the coolant across the engine shall be no more than that recommended and submitted in accordance with paragraph SUBMITTALS.

2.5.1 Coolant Pumps

Coolant pumps shall be the centrifugal type. Each engine shall have an engine-driven primary pump. Secondary pumps shall be electric motor driven and have automatic controllers.

2.5.2 Heat Exchanger

Each heat exchanger shall be of a size and capacity to limit the maximum allowable temperature rise in the coolant across the engine to that recommended and submitted in accordance with paragraph SUBMITTALS for the maximum summer outdoor design temperature and site elevation. Each heat exchanger shall be corrosion resistant, suitable for service in ambient conditions of application.

2.5.2.1 Fin-Tube-Type Heat Exchanger (Radiator)

Heat exchanger may be factory coated with corrosive resistant film providing that corrosion measures are taken to restore the heat rejection capability of the radiator to the initial design requirement via oversizing, or other compensating methods. Internal surfaces shall be compatible with liquid fluid coolant used. Materials and coolant are subject to approval by the Contracting Officer. Heat exchangers shall be pressure type incorporating a pressure valve, vacuum valve and a cap. Caps shall be designed for pressure relief prior to removal. Each heat exchanger and the entire cooling system shall be capable of withstanding a minimum pressure of 7 psi (48 kPa gauge) . Each heat exchanger shall be protected with a strong grille or screen guard. Each heat exchanger shall have at least two tapped holes. One tapped hole in the heat exchanger shall be equipped with a drain cock, the rest shall be plugged.

2.5.3 Temperature Sensors

Each engine shall be equipped with coolant temperature sensors. Temperature sensors shall provide signals for pre-high and high indication and alarms.

2.6 SOUND LIMITATIONS

The noise generated by the diesel generator set operating at 100 percent load shall not exceed the following sound pressure levels in any of the indicated frequencies when measured in a free field at a radial distance of 22.9 feet (7 meters) at 45 degrees apart in all directions.

Frequency Band (Hz)	Maximum Acceptable Pressure Level (Decibels)
31	87
63	87
125	77
250	70
500	64
1,000	61
2,000	60
4,000	60
8,000	60

The noise generated by the installed diesel generator set operating at 100 percent load shall not exceed the following sound pressure levels in any of the indicated frequencies when measured at a distance of 75 feet (23 m) from the end of the exhaust and air intake piping directly along the path of intake and discharge for horizontal piping.

Frequency Band (Hz)	Maximum Acceptable Pressure Level (Decibels)
31	87
63	87
125	77
250	70
500	64
1,000	61
2,000	60
4,000	60
8,000	60

2.7 AIR INTAKE EQUIPMENT

Filters and silencers shall be provided in locations that are convenient for servicing. The silencer shall be of the high-frequency filter type, located in the air intake system as recommended by the engine manufacturer. Silencer shall be capable of reducing the noise level at the air intake to a point below the maximum acceptable levels specified in paragraph SOUND LIMITATIONS. A combined filter-silencer unit meeting requirements for the separate filter and silencer items may be provided. Expansion elements in air-intake lines shall be rubber.

2.8 EXHAUST SYSTEM

The system shall be separate and complete for each engine. Piping shall be supported so as to minimize vibration. Where a V-type engine is provided, a V-type connector with necessary flexible sections and hardware shall connect the engine exhaust outlets.

2.8.1 Flexible Sections and Expansion Joints

A flexible section at each engine and an expansion joint at each muffler shall be provided. Flexible sections and expansion joints shall have flanged connections. Flexible sections shall be made of convoluted seamless tube without joints or packing. Expansion joints shall be the bellows type. Expansion and flexible elements shall be stainless steel suitable for diesel-engine exhaust gas at the maximum exhaust temperature that is specified by the engine manufacturer. Expansion and flexible elements shall be capable of absorbing vibration from the engine and compensation for thermal expansion and contraction.

2.8.2 Exhaust Muffler

A chamber type exhaust muffler shall be provided. The muffler shall be constructed of welded steel and designed for outside horizontal mounting. Eyebolts, lugs, flanges, or other items shall be provided as necessary for support in the location and position indicated. Pressure drop through the muffler shall not exceed the recommendations of the engine manufacturer. Outside mufflers shall be zinc coated or painted with high temperature 400 degrees F (204 degrees C) resisting paint. The muffler and exhaust piping together shall reduce the noise level to less than the maximum acceptable level listed for sound limitations in paragraph SOUND LIMITATIONS. The muffler shall have a drain valve, nipple, and cap at the low-point of the muffler.

2.8.3 Exhaust Piping

Horizontal sections of exhaust piping shall be sloped downward away from the engine to a condensate trap and drain valve. Changes in direction shall be long-radius. Exhaust piping, mufflers and silencers installed inside any building shall be insulated in accordance with paragraph THERMAL INSULATION and covered to protect personnel. Vertical exhaust piping shall be provided with a hinged, gravity operated, self-closing, rain cover. Exhaust piping shall be sized at a gas velocity of less than 5,000 feet per minute (25.4 meters per second).

2.9 EMISSIONS

The finished installation shall comply with Federal, state, and local regulations and restrictions regarding the limits of emissions.

2.10 STARTING SYSTEM

The starting system for engine generator sets used in non-emergency applications shall be as follows.

2.10.1 Controls

An engine control switch shall be provided with functions including: run/start (manual), off/reset, and automatic mode. Start-stop logic shall be provided for adjustable cycle cranking and cool down operation. The logic shall be arranged for manual starting and fully automatic starting in accordance with paragraph AUTOMATIC ENGINE-GENERATOR SET SYSTEM OPERATION. Electrical starting systems shall be provided with an adjustable cranking limit device to limit cranking periods from 1 second up to the maximum duration.

2.10.2 Capacity

The starting system shall be of sufficient capacity, at the maximum outdoor summer temperature specified to crank the engine without damage or overheating. The system shall be capable of providing a minimum of three cranking periods with 15-second intervals between cranks. Each cranking period shall have a maximum duration of 15 seconds.

2.10.3 Functional Requirements

Starting system shall be manufacturers recommended dc system utilizing a negative circuit ground. Starting motors shall be in accordance with SAE ARP 892.

2.10.4 Battery

A starting battery system shall be provided and shall include the battery, battery rack, intercell connectors, and spacers. The battery shall be in accordance with SAE J 537. Critical system components (rack, protection, etc.) shall be sized to withstand the seismic acceleration forces specified. The battery shall be lead-acid type, with sufficient capacity, at the minimum outdoor winter temperature specified to provide the specified cranking periods. Valve-regulated lead-acid batteries are not acceptable.

2.10.5 Battery Charger

A current-limiting battery charger, conforming to UL 1236, shall be provided and shall automatically recharge the batteries. The charger shall be capable of an equalize charging rate for recharging fully depleted batteries within 24 hours and a float charge rate for maintaining the batteries in prime starting condition. An ammeter shall be provided to indicate charging rate. A timer shall be provided for the equalize charging rate setting. A battery is considered to be fully depleted when the output voltage falls to a value which will not operate the engine generator set and its components.

2.10.6 Starting Aids

The manufacturer shall provide the following methods to assist engine starting.

2.10.6.1 Glow Plugs

Glow plugs shall be designed to provide sufficient heat for combustion of fuel within the cylinders to guarantee starting at an ambient temperature of minus 25 degrees F (minus 32 degrees C).

2.10.6.2 Jacket-Coolant Heaters

A thermostatically controlled electric heater shall be mounted in the engine coolant jacketing to automatically maintain the coolant within plus or minus 3 degrees of the control temperature. The heater shall operate independently of engine operation so that starting times are minimized. The control temperature shall be the temperature recommended by the engine manufacturer to meet the starting time specified.

2.11 GOVERNOR

Each engine shall be provided with a governor which maintains the frequency within a bandwidth of the rated frequency, over a steady-state load range of zero to 100% of rated output capacity. The governor shall be configured for safe manual adjustment of the speed/frequency during operation of the engine generator set, without special tools, from 90 to 110 % of the rated speed/frequency, over a steady state load range of zero to 100% of rated capacity. Droop governors shall maintain the midpoint of the frequency bandwidth linearly for steady-state loads over the range of zero to 100% of rated output capacity, with 3% droop.

2.12 GENERATOR

Each generator shall be of the synchronous type, one or two bearing, conforming to NEMA MG 1, equipped with winding terminal housings in accordance with NEMA MG 1, equipped with an amortisseur winding, and directly connected to the engine. Insulation shall be Class F. Generator design shall protect against mechanical, electrical and thermal damage due to vibration, 25 percent overspeeds, or voltages and temperatures at a rated output capacity of 100 percent. Generator ancillary equipment shall meet the short circuit requirements of NEMA MG 1. Frames shall be the drip-proof type.

2.12.1 Current Balance

At 100 percent rated load, and load impedance equal for each of the three phases, the permissible current difference between any two phases shall not exceed 2 percent of the largest current on either of the two phases.

2.12.2 Voltage Balance

At any balanced load between 75 and 100 percent of rated load, the difference in line-to-neutral voltage among the three phases shall not exceed 1 percent of the average line-to-neutral voltage. For a single-phase load condition, consisting of 25 percent load at unity power factor placed between any phase and neutral with no load on the other two phases, the maximum simultaneous difference in line-to-neutral voltage between the phases shall not exceed 3 percent of rated line to neutral voltage. The single-phase load requirement shall be valid utilizing normal exciter and regulator control. The interpretation of the 25 percent load for single phase load conditions means 25 percent of rated current at rated phase voltage and unity power factor.

2.12.3 Waveform

The deviation factor of the line-to-line voltage at zero load and at balanced full rated load at 0.8 power factor shall not exceed 10%. The RMS of all harmonics shall be less than 5.0% and that of any one harmonic less than 3.0% at full rated load. Each engine-generator shall be designed and configured to meet the total harmonic distortion limits of IEEE Std 519.

2.13 EXCITER

The generator exciter shall be of the brushless type. Semiconductor rectifiers shall have a minimum safety factor of 300% for peak inverse voltage and forward current ratings for all operating conditions, including 110% generator output at 104 degrees F (40 degrees C) ambient. The exciter and regulator in combination shall maintain generator-output voltage within the limits specified.

2.14 VOLTAGE REGULATOR

Each generator shall be provided with a solid-state voltage regulator, separate from the exciter. The regulator shall maintain the voltage within a bandwidth of the rated voltage, over a steady-state load range of zero to 100% of rated output capacity. Regulator shall be configured for safe manual adjustment of the engine generator voltage output without special tools, during operation from 90 to 110% of the rated voltage over the steady state load range of zero to 100% of rated output capacity. Regulation drift shall not exceed plus or minus 0.5% for an ambient temperature change of 36 degrees F (20 degrees C).

2.14.1 Steady State Performance (Regulation or Voltage Droop).

The voltage regulator shall have a maximum droop of 2% of rated voltage over a load range from 0 to 100% of rated output capacity and automatically maintain the generator output voltage within the specified operational bandwidth.

2.15 GENERATOR PROTECTION

Short circuit and overload protection for the generator shall be provided. The generator circuit breaker (IEEE Device 52) ratings shall be consistent with the generator rated voltage and frequency, with continuous, short circuit and interrupting current ratings to match the generator capacity. The manufacturer shall determine the short circuit current interrupting rating of the breaker. The breaker shall be engine generator base mounted by the engine-generator set manufacturer. Molded case breakers shall be provided with shunt trip. Surge protection shall be provided for each phase of the generator, to be mounted at the generator terminals.

2.15.1 Main Circuit Breaker

<LST INDENT=-0.33>a. Type: Molded case.

<LST INDENT=-0.33>b. Current Rating: 600 amp.

<LST INDENT=-0.33>c. Interrupt Rating 42,000 amps rms symmetrical at 480 volts.

<LST INDENT=-0.33>d. Trips:

1) Solid state, rums sensing.

2) Adjustable Functions: Long-time current pickup; long-time delay; normal range instantaneous short-time pickup; short-time delay with I2t function; ground fault pickup; ground fault delay.

<LST INDENT=-0.33>e. Enclosure:

1) Rating: NEMA 250, Type 12.

2) Mounted with vibration isolation from Engine Generator Set.

2.15.2 Panelboards

Panelboards shall be metal-enclosed, general purpose, 3-phase, 4-wire, 600 volt rated, with neutral bus and continuous ground bus, conforming to NEMA PB 1 and UL 891. Neutral bus and ground bus capacity shall be full capacity. Enclosure designs, construction, materials and coatings shall be suitable for the application and environment. Bus continuous current rating shall be as indicated. Current withstand rating (short circuit rating) shall match the generator capacity. Buses shall be copper.

2.15.3 Devices

Switches, circuit breakers, switchgear, fuses, relays, and other protective devices shall be as specified in Section 16415A ELECTRICAL WORK, INTERIOR.

2.16 SAFETY SYSTEM

Devices, wiring, remote panels, local panels, etc., shall be provided and installed as a complete system to automatically activate the appropriate signals and initiate the appropriate actions. The safety system shall be provided with a self-test method to verify its operability. Alarm signals shall have manual acknowledgement and reset devices. The alarm signal

systems shall reactivate for new signals after acknowledgment is given to any signal. The systems shall be configured so that loss of any monitoring device shall be dealt with as an alarm on that system element.

2.16.1 Audible Signal

The audible alarm signal shall sound at a frequency of 70 Hz at a volume of 75 dB at 10 feet (3.1 m). The sound shall be continuously activated upon alarm and silenced upon acknowledgment. Signal devices shall be located as shown.

2.16.2 Visual Signal Signal

The visual alarm signal shall be a panel light. The light shall be normally off, activated to be blinking upon alarm. The light shall change to continuously light upon acknowledgement. If automatic shutdown occurs, the display shall maintain activated status to indicate the cause of failure and shall not be reset until cause of alarm has been cleared and/or restored to normal condition. Shutdown alarms shall be red; all other alarms shall be amber.

2.16.3 Alarms and Action Logic

2.16.3.1 Shutdown

Simultaneous activation of the audible signal, activation of the visual signal, stopping the engine, and opening the generator main circuit breakers shall be accomplished.

2.16.3.2 Problem

Activation of the visual signal shall be accomplished.

2.16.4 Local Alarm Panel

Device/Condition/ Function	Action/Location/ Function	No. of Manufacturers Offering
Low Coolant Level	SD/CP VA	3
Overvoltage Protection Shutdown	SD/CP VA O	3
Underfrequency	SD/CP VA	1
Undervoltage	SD/CP VA	1
Magnetic Pickup Failure	SD/CP VA	1
Overcurrent	SD/CP VA	1
Short Circuit	SD/CP VA	1
Auxiliary Fault Alarm	CP VA	1
Audible Alarm	CP AA	1
Overcurrent	CP VA	1
Oil Pressure Sender Fault	CP VA	1
Weak Battery	CP VA	1

A local alarm panel shall be provided with the following shutdown and alarm functions as indicated and including the listed Corps of Engineers requirements, mounted either on or adjacent to the engine generator set.

Device/ Condition/ Required	What/Where/Size	NFPA 110 Level 2	Corps of Engrs Function
Shutdowns W/Alarms			
High engine temperature	Automatic/ jacket water/ cylinder	SD/CP VA	SD VA
Low lube-oil pressure	Automatic/ pressure/ level	SD/CP VA	SD VA
Overspeed shutdown $ alarm	(110% (± 2%) of rated speed	SD/CP VA	SD VA
Overcrank failure to start	Automatic/ Failure to to start		SD/CP VA
Air shutdown damper (200-600kW)	When used		SD/CP VA
Red emergency stop switch	Manual Switch		SD VA
Failure to crank	Corps of Engrs. Required		
Integral Main Fuel Tank low fuel limit Device/ Condition/ indication (70% volume remaining)	Corps of Engrs. Required		
Alarms			
Low lube-oil pressure	Pressure/ level	CP VAO	CP VA
Low fuel level	Main tank, 3 hours remaining	CP VAO	
High fuel level	Integral Main Fuel Storage Tank 95% Volume		CP VA

Low coolant	Jacket water	CP VA	
Pre-high temperature	Jacket water/ cylinder	CP VAO	CP VA
Pre-low lube-oil pressure			CP VA
Low coolant level		SD/CP VA	
High battery voltage		CP VAO	
Low battery voltage		CP VAO	
Battery charger AC failure	AC supply not available	CP VAO	
Control switch not in AUTO		CP VAO	
Low starting air pressure		CP VAO	
Low starting hydraulic pressure		CP VAO	

SD - Shut Down
CP - On Control Panel
VA - Visual Alarm
AA - Audible Alarm
O - Optional

2.16.5 Time-Delay on Alarms

For startup of the engine-generator set, time-delay devices shall be installed bypassing the low lubricating oil pressure alarm during cranking, and the coolant-fluid outlet temperature alarm. The lube-oil time-delay device shall return its alarm to normal status after the engine starts. The coolant time-delay device shall return its alarm to normal status 5 minutes after the engine starts.

2.16.6 Remote Alarm Panel

A remote alarm panel (located in electrical room) shall be provided as follows:

Device/Condition/ Function	What/Where/Size	NFPA 110 Level 2
Remote annunciator panel	Battery powered	

Loads on genset		
Battery charger malfunction		
Low lube-oil	Pressure/level	AAO
Low Temperature	Jacket water	AAO
High Temperature	Jacket water/ cylinder	AAO
Low fuel level	Main tank, 3 hr remaining	AAO
Overcrank	Failure to start	AAO
Overspeed		AAO
Pre-high temperature	Jacket water/ cylinder	
Control switch not in AUTO		
Common alarm contacts for local & remote common alarm		X
Audible alarm silencing switch		O
Air shutdown damper	When used	AAO
Common fault alarm		AA

X - Required
SD - Shut Down
CP - On Control Panel
VA - Visual Alarm
AA - Audible Alarm
O - Optional

2.17 ENGINE GENERATOR SET CONTROLS AND INSTRUMENTATION

Devices, wiring, remote panels, local panels, etc., shall be provided and installed as a complete system to automatically activate the appropriate signals and initiate the appropriate actions.

2.17.1 Controls

A local control panel shall be provided with controls in accordance with NFPA 110 level 2 and as follows mounted either on or adjacent to the engine generator set. A remote control panel shall be provided with devices as indicated.

Device/Condition/ Function	Corps Requirement	NFPA 110 Level 2
Controls		
Switch: run/start - off/set - auto	CP	
Emergency stop switch & alarm	CP	
Lamp test/indicator test	CP	CP VA
Common alarm contacts/ fault relay		X
Panel lighting	CP	
Audible alarm & silencing/reset switch	CP	
Voltage adjust for voltage Regulator	CP	
Pyrometer display w/selector switch	CP	
Remote emergency stop switch		CP VA
Remote fuel shutoff switch		
Remote lube-oil shutoff switch		

2.17.2 Engine Generator Set Metering and Status Indication

A local panel shall be provided with devices in accordance with NFPA 110 level 2 and as follows mounted either on or adjacent to the engine generator set. A remote control panel shall be provided with devices as indicated.

Device/Condition/ Function	Corps Requirement	NFPA 110 Level 2
Genset Status & Metering		
Genset supplying load		CP VAO
System ready		
Engine oil pressure	CP	
Engine coolant temperature	CP	
Engine RPM (Tachometer)	CP	
Engine run hours	CP	
Pyrometer display w/selector switch	CP	
AC volts (generator), 3-phase	CP	
AC amps (generator),	CP	

3-phase	
Generator frequency	CP
Phase selector switches (amps & volts)	CP
Watts/kW	
Voltage Regulator Adjustment	CP

CP - On Control Panel
VA - Visual Alarm
AA - Audible Alarm
O - Optional
STD - Manufacturers Standard Offering

2.18 PANELS

Each panel shall be of the type necessary to provide specified functions. Panels shall be mounted in the engine generator enclosure (mounted on wall) by vibration/shock absorbing type mountings. Instruments shall be mounted flush or semiflush. Convenient access to the back of instruments shall be provided to facilitate maintenance. Instruments shall be calibrated using recognized industry calibration standards. Each panel shall be provided with a panel identification plate which clearly identifies the panel function as indicated. Each instrument and device on the panel shall be provided with a plate which clearly identifies the device and its function as indicated. Panels except the remote alarm panel can be combined into a single panel.

2.18.1 Enclosures

Enclosures shall be designed for the application and environment, conforming to NEMA ICS 6.

2.18.2 Analog

Analog electrical indicating instruments shall be in accordance with ANSI C39.1 with semiflush mounting. Switchgear, and control-room panel-mounted instruments shall have 250 degree scales with an accuracy of not less than 1 percent. Unit-mounted instruments shall be the manufacturer's standard with an accuracy of not less than 2 percent. The instrument's operating temperature range shall be minus 20 to plus 65 degrees C. Distorted generator output voltage waveform of a crest factor less than 5 shall not affect metering accuracy for phase voltages, hertz and amps.

2.18.3 Electronic

Electronic indicating instruments shall be true RMS indicating, 100 percent solid state, microprocessor controlled to provide all specified functions. Control, logic, and function devices shall be compatible as a system, sealed, dust and water tight, and shall utilize modular components with metal housings and digital instrumentation. An interface module shall be provided to decode serial link data from the electronic panel and translate alarm, fault and status conditions to set of relay contacts. Instrument

accuracy shall be not less than 2 percent for unit mounted devices and 1 percent for control room, panel mounted devices, throughout a temperature range of minus 20 to plus 65 degrees C. Data display shall utilize LED or back lit LCD. Additionally, the display shall provide indication of cycle programming and diagnostic codes for troubleshooting. Numeral height shall be 1/2 inch (13 mm).

2.18.4 Parameter Display

Indication or readouts of the lubricating-oil pressure, ac voltmeter, ac ammeter, frequency meter, and coolant temperature.

2.18.5 Exerciser

The exerciser shall be in accordance with Section 16410A AUTOMATIC TRANSFER SWITCH. Provide warning signs inside generator enclosure stating: "Warning, Engine Generator Can Start Automatically".

2.19 SURGE PROTECTION

Electrical and electronic components shall be protected from, or designed to withstand the effects of surges from switching and lightning.

2.20 AUTOMATIC ENGINE-GENERATOR-SET SYSTEM OPERATION

Fully automatic operation shall be provided for the following operations: engine-generator set starting and source transfer upon loss of preferred source; retransfer upon restoration of the preferred source; sequential starting; and stopping of each engine-generator set after cool down. Devices shall automatically reset after termination of their function.

2.20.1 Automatic Transfer Switch

Automatic transfer switches shall be in accordance with Section 16410A AUTOMATIC TRANSFER SWITCH AND BY-PASS/ISOLATION SWITCH.

2.20.2 Monitoring and Transfer

Devices shall be provided to monitor voltage and frequency for the preferred power source and each engine generator set, and control transfer from the preferred source and retransfer upon restoration of the preferred source. Functions, actuation, and time delays shall be as described in Section 16410A AUTOMATIC TRANSFER SWITCH.

2.21 MANUAL ENGINE-GENERATOR SET SYSTEM OPERATION

Complete facilities shall be provided for manual starting and testing of each set without load, loading and unloading of each set.

2.22 BASE

The base shall be constructed of steel. The base shall be designed to rigidly support the engine-generator set, ensure permanent alignment of all rotating parts, be arranged to provide easy access to allow changing of lube-oil, and ensure that alignment will be maintained during shipping and normal operation. The base shall permit skidding in any direction during installation and shall be provided with suitable holes for foundation bolts.

The base shall also withstand and mitigate the effects of synchronous vibration of the engine and generator, and shall be provided with suitable holes for anchor bolts and jacking screws for leveling.

2.23 THERMAL INSULATION

Thermal insulation shall be as specified in Section 15080A THERMAL INSULATION FOR MECHANICAL SYSTEMS.

2.24 PAINTING AND FINISHING

The engine-generator set shall be cleaned, primed and painted in accordance with the manufacturer's standard color and practice.

2.25 FACTORY INSPECTION AND TESTS

Factory inspection and tests shall be performed on each engine-generator set proposed to meet this specification section. Inspections shall be completed and necessary repairs made prior to testing. Inspectors shall look for leaks, looseness, defects in components, and proper assembly. Factory tests shall be NEMA MG 1 routine tests and the manufacturers routine tests.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

Installation shall provide clear space for operation and maintenance in accordance with NFPA 70 and IEEE C2. Installation of pipe, duct, conduit, and ancillary equipment shall be configured to facilitate easy removal and replacement of major components and parts of the engine-generator set.

3.2 PIPING INSTALLATION

3.2.1 General

Piping shall be welded. Connections at valves shall be flanged. Connections at equipment shall be flanged except that connections to the diesel engine may be threaded if the diesel-engine manufacturer's standard connection is threaded. Except as otherwise specified, flanged fittings shall be utilized to allow for complete dismantling and removal of each piping system from the facility without disconnecting or removing any portion of any other system's equipment or piping. Connections to all equipment shall be made with flexible connectors. Pipes extending through the roof shall be properly flashed. Piping shall be installed clear of windows, doors, and openings to permit thermal expansion and contraction without damage to joints or hangers, and with a 1/2 inch (15 mm) drain valve at each low point.

3.2.2 Supports

Hangers, inserts, and supports shall be of sufficient size to accommodate any insulation and shall conform to MSS SP-58 and MSS SP-69. Supports shall be spaced not more than 7 feet (2.1 m) on center for pipes 2 inches (50 mm) in diameter or less, not more than 12 feet (3.6 m) on center for pipes larger than 2 inches (50 mm) but no larger than 4 inches (100 mm), and not more than 17 feet (5.2 m) on center for pipes larger than 4 inches (100 mm)

in diameter. Supports shall be provided at pipe bends or change of direction.

3.2.2.1 Ceiling and Roof

Exhaust piping shall be supported with appropriately sized type 41 single pipe roll and threaded rods; all other piping shall be supported with appropriately sized type 1 clevis and threaded rods.

3.2.2.2 Wall

Wall supports for pipe shall be made by suspending the pipe from appropriately sized type 33 brackets with the appropriate ceiling and roof pipe supports.

3.2.3 Flanged Joints

Flanges shall be 125 pound (Class 125) type, drilled, and of the proper size and configuration to match equipment and diesel-engine connections. Gaskets shall be factory cut in one piece 1/16 inch (1.6 mm) thick.

3.2.4 Cleaning

After fabrication and before assembly, piping interiors shall be manually wiped clean of all debris.

3.2.5 Pipe Sleeves

Pipes passing through construction such as ceilings, floors, or walls shall be fitted with sleeves. Each sleeve shall extend through and be securely fastened in its respective structure and shall be cut flush with each surface. The structure shall be built tightly to the sleeve. The inside diameter of each sleeve shall be 1/2 inch (15 mm), and where pipes pass through combustible materials, 1 inch (25 mm) larger than the outside diameter of the passing pipe or pipe covering.

3.3 ELECTRICAL INSTALLATION

Electrical installation shall comply with NFPA 70, IEEE C2, and Section 16415A ELECTRICAL WORK, INTERIOR.

3.3.1 Vibration Isolation

Flexible fittings shall be provided for all conduit, cable trays, and raceways attached to engine-generator sets. Metallic conductor cables installed on the engine generator set and from the engine generator set to equipment not mounted on the engine generator set shall be flexible stranded conductor. Terminations of conductors on the engine generator set shall be crimp-type terminals or lugs.

3.4 FIELD PAINTING

Field painting shall be as specified in Section 09900 PAINTS AND COATINGS.

3.5 ONSITE INSPECTION AND TESTS

3.5.1 Test Conditions

3.5.1.1 Data

Measurements shall be made and recorded of parameters necessary to verify that each set meets specified parameters. If the results of any test step are not satisfactory, adjustments or replacements shall be made and the step repeated until satisfactory results are obtained. Unless otherwise indicated, data shall be taken during engine-generator set operation and recorded in 15 minute intervals and shall include: readings of engine-generator set meters and gauges for electrical and power parameters; oil pressure; ambient temperature; and engine temperatures available from meters and gauges supplied as permanent equipment on the engine-generator set. In the following tests where measurements are to be recorded after stabilization of an engine-generator set parameter (voltage, frequency, current, temperature, etc.), stabilization is considered to have occurred when measurements are maintained within the specified bandwidths or tolerances, for a minimum of four consecutive readings. Electrical measurements shall be performed in accordance with IEEE Std 120. Definitions and terms are in accordance with IEEE Std 100. Temperature limits in the rating of electrical equipment and for the evaluation of electrical insulation shall be in accordance with IEEE Std 1.

3.5.1.2 Power Factor

Engine-generator set operating tests shall be made utilizing a load with the power factor specified in the engine generator set parameter schedule.

3.5.1.3 Contractor Supplied Items

The Contractor shall provide all equipment and supplies required for inspections and tests including fuel, test instruments, and loadbanks at the specified power factors.

3.5.1.4 Instruments

Readings of panel gauges, meters, displays, and instruments, provided under this specification shall be verified during test runs by test instruments of precision and accuracy greater than the tested items. Test instrument accuracy shall be at least as follows: current, 1.5%; voltage, 1.5%; real power, 1.5%; reactive power, 1.5%; power factor, 3%; frequency, 0.5%. Test instruments shall be calibrated by a recognized standards laboratory within 90 days prior to testing.

3.5.1.5 Sequence

The sequence of testing shall be as specified in the approved testing plan unless variance in authorized by the Contracting Officer. Field testing shall be performed in the presence of the Contracting Officer. Tests may be scheduled and sequenced in order to optimize run-time periods; however the following general order of testing shall be followed: Construction Tests; Inspections; Safety run Tests; and Performance Tests and Final Inspection.

3.5.2 Construction Tests

Individual component and equipment functional tests for fuel piping, coolant piping, and lubricating-oil piping, electrical circuit continuity, insulation resistance, circuit protective devices, and equipment not provided by the engine-generator set manufacturer shall be performed prior to connection to the engine-generator set.

3.5.2.1 Piping Test

a. Lube-oil and fuel-oil piping shall be flushed with the same type of fluid intended to flow through the piping, until the outflowing fluid has no obvious sediment or emulsion.

b. Fuel piping which is external to the engine-generator set shall be tested in accordance with NFPA 30. All remaining piping which is external to the engine generator set shall be pressure tested with air pressure at 150% of the maximum anticipated working pressure, but in no case less than 150 psig (1 MPa), for a period of 2 hours to prove the piping has no leaks. If piping is to be insulated, the test shall be performed before the insulation is applied.

3.5.2.2 Electrical Equipment Tests

a. Low-voltage cable insulation integrity tests shall be performed for cables connecting the generator breaker to the automatic transfer switch, panelboard, main disconnect switch, and distribution bus. Low-voltage cable, complete with splices, shall be tested for insulation resistance after the cables are installed, in their final configuration, ready for connection to the equipment, and prior to energization. The test voltage shall be 500 volts dc, applied for one minute between each conductor and ground and between all possible combinations conductors in the same trench, duct, or cable, with all other conductors in the same trench, duct, or conduit. The minimum value of insulation shall be:

   R in megohms = (rated voltage in kV + 1) x 304,800/(length of cable in meters).

   (R in megohms = (rated voltage in kV + 1) x 1000/(length of cable in feet)

   Each cable failing this test shall be repaired or replaced. The repaired cable shall be retested until failures have been eliminated.

b. Medium-voltage cable insulation integrity tests shall be performed for cables connecting the generator breaker to the generator switchgear, main disconnect switch, and distribution bus. After insulation and before the operating test or connection to an existing system, the medium-voltage cable system shall be given a high potential test. Direct-current voltage shall be applied on each phase conductor of the system by connecting conductors as one terminal and connecting grounds or metallic shieldings or sheaths of the cable as the other terminal for each test. Prior to making the test, the cables shall be isolated by opening applicable protective devices and disconnecting equipment. The test shall be

conducted with all splices, connectors, and terminations in place. The method, voltage, length of time, and other characteristics of the test for initial installation shall be in accordance with NEMA WC 74 for the particular type of cable installed, except that 28kV and 35kV insulation test voltages shall be in accordance with either AEIC CS5 or AEIC CS6 as applicable, and shall not exceed the recommendations of IEEE Std 404 for cable joints and IEEE Std 48 for cable terminations unless the cable and accessory manufacturers indicate higher voltages are acceptable for testing. Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the contractor shall make necessary repairs or replace cables as directed. Repaired or replaced cables shall be retested.

c. Circuit breakers and switchgear shall be examined and tested in accordance with manufacturer's published instructions for functional testing.

3.5.3 Inspections

The following inspections shall be performed jointly by the Contracting Officer and the Contractor, after complete installation of each engine-generator set and its associated equipment, and prior to startup of the engine-generator set. Checks applicable to the installation shall be performed. The results of those which are physical inspections (I) shall be documented by the Contractor and submitted in accordance with paragraph SUBMITTALS. The Contractor shall present manufacturer's data for the inspections designated (D) at the time of inspection. Inspections shall verify that equipment type, features, accessibility, installation and condition are in accordance with the contract specification. Manufacturer's statements shall certify provision of features which cannot be verified visually.

1. Drive belts. (I)
2. Governor type and features. (I)
3. Engine timing mark. (I)
4. Starting motor. (I)
5. Starting aids. (I)
6. Coolant type and concentration. (D)
7. Radiator drains. (I)
8. Block coolant drains. (I)
9. Coolant fill level. (I)
10. Coolant line connections. (I)
11. Coolant hoses. (I)
12. Combustion air filter. (I)
13. Intake air silencer. (I)
14. Lube oil type. (D)
15. Lube oil drain. (I)
16. Lube-oil filter. (I)
17. Lube-oil-fill level. (I)
18. Lube-oil line connections. (I)
19. Lube-oil lines. (I)
20. Fuel type. (D)
21. Fuel-level. (I)
22. Fuel-line connections. (I)

23. Fuel lines. (I)
24. Fuel filter. (I)
25. Access for maintenance. (I)
26. Voltage regulator. (I)
27. Battery-charger connections. (I)
28. Wiring & terminations. (I)
29. Instrumentation. (I)
30. Hazards to personnel. (I)
31. Base. (I)
32. Nameplates. (I)
33. Paint. (I)
34. Exhaust system. (I)
35. Access provided to controls. (I)
36. Enclosure. (I)
37. Engine & generator mounting bolts (proper application). (I)

3.5.4 Safety Run Tests

a. Perform and record engine manufacturer's recommended prestarting checks and inspections.

b. Start the engine, record the starting time, make and record engine manufacturer's after-starting checks and inspections during a reasonable warm-up period.

c. Activate the manual emergency stop switch and verify that the engine stops.

d. Remove the high and pre-high lubricating oil temperature sensing elements from the engine and temporarily install temperature gauge in their normal locations on the engine (required for safety, not for recorded data). Where necessary, provide temporary wiring harness to connect the sensing elements to their permanent electrical leads.

e. Start the engine, record the starting time, make and record engine manufacturer's after-starting checks and inspections and operate the engine generator-set at no load until the output voltage and frequency stabilize. Monitor the temporarily installed temperature gauges. If temperature reading exceeds the value for an alarm condition, activate the manual emergency stop switch.

f. Immerse the elements in a vessel containing controlled-temperature hot oil and record the temperature at which the pre-high alarm activates and the temperature at which the engine shuts down. Remove the temporary temperature gauges and reinstall the temperature sensors on the engine.

g. Remove the high and pre-high coolant temperature sensing elements from the engine and temporarily seal their normal location on the engine and temporarily install temperature gauges in their normal locations on the engine (required for safety, not for recorded data). Where necessary provide temporary wiring harness to connect the sensing elements to their permanent electrical leads.

h. Start the engine, record the starting time, make and record engine manufacturer's after-starting checks and inspections and operate

the engine generator-set at no load until the output voltage and frequency stabilize.

i. Immerse the elements in a vessel containing controlled-temperature hot oil and record the temperature at which the pre-high alarm activates and the temperature at which the engine shuts down. Remove the temporary temperature gauges and reinstall the temperature sensors on the engine.

j. Start the engine, record the starting time, make and record engine manufacturer's after-starting checks and inspections during a reasonable warm-up period.

k. Operate the engine generator-set for at least 30 minutes at 100 percent of service load.

l. Verify proper operation of the governor and voltage regulator.

m. Verify proper operation and setpoints of gauges and instruments.

n. Verify proper operation of ancillary equipment.

o. Manually adjust the governor to increase engine speed past the overspeed limit. Record the RPM at which the engine shuts down.

p. Start the engine, record the starting time, make and record engine manufacturer's after-starting checks and inspections and operate the engine generator-set for at least 15 minutes at 75 percent of rated load.

q. Manually fill the day tank to a level above the overfill limit. Record the level at which the overfill alarm sounds. Verify shutdown of the fuel transfer pump. Drain the day tank down below the overfill limit.

r. Shut down the engine. Remove the time-delay low lube oil pressure alarm bypass and try to start the engine. Record the results.

s. Attach a manifold to the engine oil system (at the oil sensor pressure port) that contains a shutoff valve in series with a connection for the engine's oil pressure sensor followed by an oil pressure gauge ending with a bleed valve. The engine's oil pressure sensor shall be moved from the engine to the manifold and its normal location on the engine temporarily sealed. The manifold shutoff valve shall be open and bleed valve closed.

t. Start the engine, record the starting time, make and record all engine manufacturer's after-starting checks and inspections and operate the engine generator-set for at least 15 minutes at 75 percent of service load.

u. Close the manifold shutoff valve. Slowly allow the pressure in the manifold to bleed off through the bleed valve while watching the pressure gauge. Record the pressure at which the engine shuts down. Catch oil spillage from the bleed valve in a container. Add the oil from the container back to the engine, remove the manifold, and reinstall the engine's oil pressure sensor on the engine.

v. Start the engine, record the starting time, make and record all engine manufacturer's after-starting checks and inspections and operate the engine generator-set for at least 15 minutes at 100% of service load. Record the maximum sound level in each frequency band at a distance of 75 feet (22.9 m) from the end of the exhaust and air intake piping directly along the path of intake and discharge horizontal piping; or at a radius of 75 feet (22.9 m) from the engine at 45 degrees apart in all directions for vertical piping. The measurements should comply with the paragraph SOUND LIMITATIONS. If a sound limiting enclosure is provided, the enclosure, the muffler, and intake silencer shall be modified or replaced as required to meet the sound requirements contained within this specification.

3.5.5 Performance Tests

3.5.5.1 Continuous Engine Load Run Test

The engine-generator set and ancillary systems shall be tested at service load to: demonstrate durability; verify that heat of extended operation does not adversely affect or cause failure in any part of the system; and check all parts of the system. If the engine load run test is interrupted for any reason, the entire test shall be repeated. The engine load run test shall be accomplished principally during daylight hours, with an average ambient temperature of 86 degrees F (30 degrees C), during the month of August, or as directed by the Contracting Officer. After each change in load in the following test, measure the vibration at the end bearings (front and back of engine, outboard end of generator) in the horizontal, vertical, and axial directions. Verify that the vibration is within the allowable range. Measurements are to be recorded after stabilization of an engine-generator set parameter (voltage, frequency, current, temperature, etc.). Stabilization is considered to have occurred when measurements are maintained within the specified bandwidths or tolerances, for a minimum of four consecutive readings. Data taken at 15 minutes intervals shall include the following:

a. Electrical: Output amperes, voltage, real and reactive power, power factor, frequency.

b. Pressure: Lube-oil.

c. Temperature: Coolant.
Lube-oil.
Ambient.

(1) Perform and record engine manufacturer's recommended prestarting checks and inspections. Include as a minimum checking of coolant fluid, fuel, and lube-oil levels.

(2) Start the engine; make and record engine manufacturer's after-starting checks and inspections during a reasonable warm-up period.

(3) Operate the engine generator-set for at least 2 hours at 75 percent of service load.

(4) Increase load to 100%of service load and operate the engine generator-set for at least 2 hours.

(5) Remove load from the engine-generator set.

3.5.5.2 Load Acceptance Test

Engine manufacturer's recommended prestarting checks and inspections shall be performed and recorded. The engine shall be started, and engine manufacturer's after-starting checks and inspections made and recorded during a reasonable warm-up period. For the following steps, the output line-line and line-neutral voltages and frequency shall be recorded after performing each step instruction (after stabilization of voltage and frequency). Stabilization is considered to have occurred when measurements are maintained within the specified bandwidths or tolerances, for a minimum of four consecutive readings.

a. Apply load in steps no larger than the Maximum Step Load Increase to load the engine-generator set to 100 of Service Load.

b. Verify that the engine-generator set responds to the load addition and that the output voltage returns to and stabilizes within the rated bandwidths.

3.5.6 Automatic Operation Tests for Stand-Alone Operation

The automatic loading system shall be tested to demonstrate automatic starting, of the engine-generator set. The loads for this test shall utilize the actual loads to be served, and the loading sequence shall be the indicated sequence. Perform this test for a minimum of two successive, successful tests. Data taken shall include the following:

a. Ambient temperature (at 15 minute intervals).

b. Generator output current (before and after load changes).

c Generator output voltage (before and after load changes).

d. Generator output frequency (before and after load changes.)

1. Initiate loss of the primary power source and verify automatic sequence of operation.

2. Restore the primary power source and verify sequence of operation.

3. Verify resetting of controls to normal.

3.6 FINAL INSPECTION AND TESTING

a. Start the engine, record the starting time, make and record all engine manufacturer's after-starting checks and inspections during a reasonable warm-up period.

b. Increase the load in steps no greater than the maximum step load increase to 100% of service load, and operate the engine-generator set for at least 30 minutes. Measure the vibration at the end

bearings (front and back of engine, outboard end of generator) in the horizontal, vertical, and axial directions. Verify that the vibration is within the same range as previous measurements and is within the required range.

c. Remove load and shut down the engine-generator set after the recommended cool down period. Perform the pre-test inspections and take necessary corrective actions.

d. Remove the lube oil filter and have the oil and filter examined by the engine manufacturer for excessive metal, abrasive foreign particles, etc. Any corrective action shall be verified for effectiveness by running the engine for 4 hours at service load, then re-examining the oil and filter.

e. Remove the fuel filter and examine the filter for trash, abrasive foreign particles, etc.

f. Visually inspect and check engine and generator mounting bolts for tightness and visible damage.

g. Replace air, oil, and fuel filters with new filters.

3.7 MANUFACTURER'S FIELD SERVICE

3.7.1 Onsite Training

The Contractor shall conduct training course for operating staff as designated by the Contracting Officer. The training period shall consist of a total 4 hours of normal working time and shall start after the system is functionally completed but prior to final acceptance. The course instructions shall cover pertinent points involved in operating, starting, stopping, servicing the equipment, as well as all major elements of the operation and maintenance manuals. Additionally, the course instructions shall demonstrate all routine maintenance operations such as oil change, oil filter change, and air filter change.

3.7.2 Manufacturer's Representative

The engine generator-set manufacturer shall furnish a qualified representative to supervise the installation of the engine generator-set, assist in the performance of the onsite tests, and instruct personnel as to the operational and maintenance features of the equipment.

3.8 INSTRUCTIONS

Two sets of instructions shall be typed and framed under laminated plastic, and posted side-by-side on interior wall of enclosure where directed before acceptance. First set of instructions shall include a one-line diagram, wiring and control diagrams and a complete layout of the system. Second set of instructions shall include the condensed operating instructions describing manufacturer's pre-start checklist and precautions; start procedures for test-mode, manual-start mode, and automatic-start mode (as applicable); running checks, procedures, and precautions; and shutdown procedures, checks, and precautions. Instructions shall include procedures for interrelated equipment (such as automatic transfer switches).

3.9 ACCEPTANCE

Final acceptance of the engine-generator set will not be given until the Contractor has successfully completed all tests and after all defects in installation material or operation have been corrected.

End of Section

SECTION 16375

ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C119.1	(1986; R 1997) Sealed Insulated Underground Connector Systems Rated 600 Volts
ANSI C29.1	(1988; R 1996) Electrical Power Insulators - Test Methods
ANSI C37.121	(1989; R 1995) Switchgear, Unit Substations Requirements
ANSI C57.12.13	(1982) Conformance Requirements for Liquid-Filled Transformers Used in Unit Installations, Including Unit Substations
ANSI C57.12.27	(1982) Conformance Requirements for Liquid-Filled Distribution Transformers Used in Pad-Mounted Installations, Including Unit Substations
ANSI C80.1	(1995) Rigid Steel Conduit - Zinc Coated
ANSI O5.1	(1992) Specifications and Dimensions for Wood Poles

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(2001) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2001) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 48	(1994ae1) Gray Iron Castings
ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plates, Sheet and Strip
ASTM A 653/A 653M	(2001a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus

ASTM B 3	(1995) Soft or Annealed Copper Wire
ASTM B 496	(1999) Compact Round Concentric-Lay-Stranded Copper Conductors
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 800	(2000) 8000 Series Aluminum Alloy Wire for Electrical Purposes-Annealed and Intermediate Tempers
ASTM B 801	(1999) Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 478M	(1997) Precast Reinforced Concrete Manhole Sections (Metric)
ASTM D 1535	(1997) Specifying Color by the Munsell System
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 4059	(1996) Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography
ASTM D 923	(1997) Sampling Electrical Insulating Liquids

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS5	(1994; CS5a-1995) Cross-Linked Polyethylene Insulated Shielded Power Cables Rated 5 Through 46 kV
AEIC CS6	(1996) Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 Through 69 kV

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825a	(1998) Approval Guide Fire Protection

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code
IEEE C37.30	(1997) Requirements for High-Voltage Switches
IEEE C37.34	(1994) Test Code for High-Voltage Air Switches
IEEE C37.41	(1994; C37.41c) Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air

	Switches, Fuse Disconnecting Switches, and Accessories
IEEE C57.12.00	(1993) Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.96	(1999) Loading Dry-Type Distribution and Power Transformers
IEEE C57.98	(1993) Guide for Transformer Impulse Tests \$avail only as part of Distribution, Power, and Regulating Transformers Stds Collection
IEEE C62.1	(1989; R 1994) Surge Arresters for AC Power Circuits
IEEE C62.11	(1999) IEEE Standard Metal-Oxide Surge Arresters for AC Power Circuits
IEEE C62.2	(1987; R 1994) Guide for the Application of Gapped Silicon-Carbide Surge Arresters for Alternating Current Systems
IEEE Std 100	(1997) IEEE Standard Dictionary of Electrical and Electronics Terms
IEEE Std 242	(1986; R 1991) Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
IEEE Std 386	(1995) Separable Insulated Connector Systems for Power Distribution Systems Above 600V
IEEE Std 399	(1997) Recommended Practice for Industrial and Commercial Power Systems Analysis
IEEE Std 404	(1993) Cable Joints for Use with Extruded Dielectric Cable Rated 5000 V Through 138 000 V and Cable Joints for Use with Laminated Dielectric Cable Rated 2500 V Through 500 000 V
IEEE Std 48	(1998) Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV
IEEE Std 592	(1990; R 1996) Exposed Semiconducting Shields on Premolded High Voltage Cable Joints and Separable Insulated Connectors
IEEE Std 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1) \$31.00$\F

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C57.12.28	(1999) Pad-Mounted Equipment - Enclosure Integrity (Revision of ANSI C57.12.28-88)
NEMA FB 1	(1993) Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
NEMA LA 1	(1992) Surge Arresters
NEMA PB 2	(1995) Deadfront Distribution Switchboards
NEMA SG 2	(1993) High Voltage Fuses
NEMA ST 20	(1992) Dry-Type Transformers for General Applications
NEMA TC 5	(1990) Corrugated Polyolefin Coilable Plastic Utilities Duct
NEMA TC 6	(1990) PVC and ABS Plastic Utilities Duct for Underground Installation
NEMA TC 7	(1990) Smooth-Wall Coilable Polyethylene Electrical Plastic Duct
NEMA WC 7	(1988; Rev 3 1996) Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NEMA WC 8	(1988; Rev 3 1996) Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1072	(1995; Rev Mar 1998) Medium Voltage Power Cables
UL 1242	(1996; Rev Mar 1998) Intermediate Metal Conduit
UL 467	(1993; Rev thru Apr 1999) Grounding and Bonding Equipment
UL 486A	(1997; Rev thru Dec 1998) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486B	(1997; Rev Jun 1997) Wire Connectors for Use with Aluminum Conductors

UL 510	(1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 514A	(1996; Rev Dec 1999) Metallic Outlet Boxes
UL 6	(1997) Rigid Metal Conduit
UL 651	(1995; Rev thru Oct 1998) Schedule 40 and 80 Rigid PVC Conduit

1.2 GENERAL REQUIREMENTS

1.2.1 Terminology

Terminology used in this specification is as defined in IEEE Std 100.

1.2.2 Service Conditions

Items provided under this section shall be specifically suitable for the following service conditions. Seismic details shall conform to Section 15070, SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT .

a. Altitude: 301 feet (91.74 m)

b. Ambient Temperature: 19 degrees F (20 degrees C) winter, 86 degrees F (30 degrees C) summer

c. Frequency: 60 Hz

d. Seismic Parameters: Zone 3

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Electrical Distribution System; G

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams manufacturers standard installation drawings and other information necessary to define the installation and enable the Government to check conformity with the requirements of the contract drawings.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures shall be included with the detail drawings. Approved departures shall be made at no additional cost to the Government.

Detail drawings shall show how components are assembled, function together and how they will be installed on the project. Data and drawings for component parts of an item or system shall be

coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall consist of the following:

a. Detail drawings showing physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. All optional items shall be clearly identified as included or excluded.

b. Internal wiring diagrams of equipment showing wiring as actually provided for this project. External wiring connections shall be clearly identified.

Detail drawings shall as a minimum depict the installation of the following items:

a. Medium-voltage cables and accessories including cable installation plan.

b. Unit substation.

c. Surge arresters.

d. Manholes.

As-Built Drawings; G

The as-built drawings shall be a record of the construction as installed. The drawings shall include the information shown on the contract drawings as well as deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be a full sized set of prints marked to reflect deviations, modifications, and changes. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall provide three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within 10 calendar days from the time the drawings are returned to the Contractor.

SD-03 Product Data

Fault Current Analysis; G.

The study shall be submitted along with protective device equipment submittals. No time extensions or similar contract modifications will be granted for work arising out of the requirements for this study. Approval of protective devices proposed shall be based on recommendations of this study, The Government shall not be held responsible for any changes to equipment, device ratings, settings, or additional labor for installation of equipment or devices ordered and/or procured prior to approval of the study.

Coordination Study; G.

The study shall be submitted along with protective device equipment submittals. No time extensions or similar contract modifications will be granted for work arising out of the requirements for this study. Approval of protective devices proposed shall be based on recommendations of this study, The Government shall not be held responsible for any changes to equipment, device ratings, settings, or additional labor for installation of equipment or devices ordered and/or procured prior to approval of the study.

Nameplates; G

Catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents.

Material and Equipment; G

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

General Installation Requirements; G

As a minimum, installation procedures for transformers, substations, switchgear, and medium-voltage cable terminations and splices.

Procedures shall include cable pulling plans, diagrams, instructions, and precautions required to install, adjust, calibrate, and test the devices and equipment.

SD-06 Test Reports

Factory Tests; G

Certified factory test reports shall be submitted when the manufacturer performs routine factory tests, including tests required by standards listed in paragraph REFERENCES. Results of factory tests performed shall be certified by the manufacturer, or

an approved testing laboratory, and submitted within 7 days following successful completion of the tests. The manufacturer's pass-fail criteria for tests specified in paragraph FIELD TESTING shall be included.

Field Testing; G

A proposed field test plan, 30 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Cable Installation; G

Six copies of the information described below in 8-1/2 by 11 inch (215.9 by 279.4 mm) binders having a minimum of three rings from which material may readily be removed and replaced, including a separate section for each cable pull. Sections shall be separated by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull.

a. Site layout drawing with cable pulls numerically identified.

b. A list of equipment used, with calibration certifications. The manufacturer and quantity of lubricant used on pull.

c. The cable manufacturer and type of cable.

d. The dates of cable pulls, time of day, and ambient temperature.

e. The length of cable pull and calculated cable pulling tensions.

f. The actual cable pulling tensions encountered during pull.

SD-07 Certificates

Material and Equipment; G

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall submit proof that the items provided conform to such requirements. The label of, or listing by, UL will be acceptable as evidence that the items conform. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable as evidence that the item conforms. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable as evidence that the item conforms. In lieu of such

certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

Cable Joints; G

A certification that contains the names and the qualifications of people recommended to perform the splicing and termination of medium-voltage cables approved for installation under this contract. The certification shall indicate that any person recommended to perform actual splicing and terminations has been adequately trained in the proper techniques and have had at least three recent years of experience in splicing and terminating the same or similar types of cables approved for installation. In addition, any person recommended by the Contractor may be required to perform a practice splice and termination, in the presence of the Contracting Officer, before being approved as a qualified installer of medium-voltage cables. If that additional requirement is imposed, the Contractor shall provide short sections of the approved types of cables along with the approved type of splice and termination kits, and detailed manufacturer's instruction for the proper splicing and termination of the approved cable types.

Cable Installer Qualifications; G

The Contractor shall provide at least one onsite person in a supervisory position with a documentable level of competency and experience to supervise all cable pulling operations. A resume shall be provided showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers.

SD-10 Operation and Maintenance Data

Electrical Distribution System; G

Six copies of operation and maintenance manuals, within 7 calendar days following the completion of tests and including assembly, installation, operation and maintenance instructions, spare parts data which provides supplier name, current cost, catalog order number, and a recommended list of spare parts to be stocked. Manuals shall also include data outlining detailed procedures for system startup and operation, and a troubleshooting guide which lists possible operational problems and corrective action to be taken. A brief description of all equipment, basic operating features, and routine maintenance requirements shall also be included. Documents shall be bound in a binder marked or identified on the spine and front cover. A table of contents page shall be included and marked with pertinent contract information and contents of the manual. Tabs shall be provided to separate different types of documents, such as catalog ordering information, drawings, instructions, and spare parts data. Index sheets shall

be provided for each section of the manual when warranted by the quantity of documents included under separate tabs or dividers.

Three additional copies of the instructions manual shall be provided within 30 calendar days following the manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements. Wood poles held in storage for more than 2 weeks shall be stored in accordance with ANSI O5.1. Handling of wood poles shall be in accordance with ANSI O5.1, except that pointed tools capable of producing indentations more than 1 inch (25 mm) in depth shall not be used.

1.5 EXTRA MATERIALS

One additional spare fuse or fuse element for each furnished fuse or fuse element shall be delivered to the contracting officer when the electrical system is accepted. Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts).

PART 2 PRODUCTS

2.1 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.2 NAMEPLATES

2.2.1 General

Each major component of this specification shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a nameplate securely attached to the equipment. Nameplates shall be made of noncorrosive metal. Equipment containing liquid dielectrics shall have the type of dielectric on the nameplate. As a minimum, nameplates shall be provided for transformers, circuit breakers, meters, switches, and switchgear.

2.2.2 Liquid-Filled Transformer Nameplates

Power transformers shall be provided with nameplate information in accordance with IEEE C57.12.00. Nameplates shall indicate the number of gallons (liters) and composition of liquid-dielectric, and shall be permanently marked with a statement that the transformer dielectric to be supplied is non-polychlorinated biphenyl. If transformer nameplate is not so marked, the Contractor shall furnish manufacturer's certification for

each transformer that the dielectric is non-PCB classified, with less than 50 ppm PCB content in accordance with paragraph LIQUID DIELECTRICS. Certifications shall be related to serial numbers on transformer nameplates. Transformer dielectric exceeding the 50 ppm PCB content or transformers without certification will be considered as PCB insulated and will not be accepted.

2.3 CORROSION PROTECTION

2.3.1 Aluminum Materials

Aluminum shall not be used in contact with earth or concrete. Aluminum conductors shall not be used.

2.3.2 Ferrous Metal Materials

2.3.2.1 Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

2.3.2.2 Equipment

Equipment and component items, including but not limited to transformer stations and ferrous metal luminaries not hot-dip galvanized or porcelain enamel finished, shall be provided with corrosion-resistant finishes which shall withstand 120 hours of exposure to the salt spray test specified in ASTM B 117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch (1.6 mm)from the test mark. The scribed test mark and test evaluation shall be in accordance with ASTM D 1654 with a rating of not less than 7 in accordance with TABLE 1, (procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.

2.3.3 Finishing

Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory shall be as specified in Section 09900 PAINTS AND COATINGS.

2.4 CABLES

Cables shall be single conductor type unless otherwise indicated.

2.4.1 Medium-Voltage Cables

2.4.1.1 General

Cable construction shall be Type MV, conforming to NFPA 70 and UL 1072 Cables shall be manufactured for use in duct applications.

2.4.1.2 Ratings

Cables shall be rated for a circuit voltage of 15 kV or as otherwise indicated.

2.4.1.3 Conductor Material

Underground cables shall be soft drawn copper complying with ASTM B 3 and ASTM B 8 for regular concentric and compressed stranding or ASTM B 496 for compact stranding.

2.4.1.4 Insulation

Cable insulation shall be ethylene-propylene-rubber (EPR) insulation conforming to the requirements of NEMA WC 8 and AEIC CS6. A 133 percent insulation level shall be used on 5 kV, 15 kV and 25 kV rated cables. The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.4.1.5 Shielding

Cables rated for 2 kV and above shall have a semiconducting conductor shield, a semiconducting insulation shield, and an overall copper tape shield for each phase. The shield tape shall be sized to meet IEEE C2 requirements for a ground fault availability of 40,000 amperes.

2.4.1.6 Neutrals

Neutral conductors of shall be copper employing the same insulation and jacket materials as phase conductors, having a combined ampacity equal to the phase conductor ampacity rating.

2.4.1.7 Jackets

Cables shall be provided with a polyethylene jacket.

2.4.2 Low-Voltage Cables

Cables shall be rated 600 volts and shall conform to the requirements of NFPA 70, and must be UL listed for the application or meet the applicable section of either ICEA or NEMA standards.

2.4.2.1 Conductor Material

Underground cables shall be annealed copper complying with ASTM B 3 and ASTM B 8 or Type AA-8000 aluminum conductors complying with ASTM B 800 and ASTM B 801, as noted on the Drawings.

2.4.2.2 Insulation

Insulation must be in accordance with NFPA 70, and must be UL listed for the application or meet the applicable sections of either ICEA, or NEMA standards.

2.4.2.3 Jackets

Multiconductor cables shall have an overall PVC outer jacket.

2.4.2.4 In Duct

Cables shall be single-conductor cable, in accordance with NFPA 70. Cables in factory-installed, coilable-plastic-duct assemblies shall conform to NEMA TC 5 or NEMA TC 7.

2.5 CABLE JOINTS, TERMINATIONS, AND CONNECTORS

2.5.1 Medium-Voltage Cable Joints

Medium-voltage cable joints shall comply with IEEE Std 404 and IEEE Std 592. Medium-voltage cable terminations shall comply with IEEE Std 48. Joints shall be the standard products of a manufacturer and shall be either of the factory preformed type or of the kit type containing tapes and other required parts. Joints shall have ratings not less than the ratings of the cables on which they are installed. Splice kits may be of the heat-shrinkable type for voltages up to 15 kV, except that for voltages of 7.5 kV or less a resin pressure-filled type utilizing a plastic-tape mold is acceptable. Joints used in manholes, handholes, vaults and pull boxes shall be certified by the manufacturer for waterproof, submersible applications.

2.5.2 Medium-Voltage Separable Insulated Connectors

Separable insulated connectors shall comply with IEEE Std 386 and IEEE Std 592 and shall be of suitable construction or standard splice kits shall be used. Separable insulated connectors are acceptable for voltages up to 35 kV. Connectors shall be of the loadbreak type as indicated, of suitable construction for the application and the type of cable connected, and shall include cable shield adaptors. Separable insulated connectors shall not be used as substitutes for conventional permanent splices. External clamping points and test points shall be provided.

2.5.3 Low-Voltage Cable Splices

Low-voltage cable splices and terminations shall be rated at not less than 600 Volts. Splices in conductors No. 10 AWG and smaller shall be made with an insulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A. Splices in conductors No. 8 AWG and larger shall be made with noninsulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A and UL 486B. Splices shall then be covered with an insulation and jacket material equivalent to the conductor insulation and jacket. Splices below grade or in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.

2.5.4 Medium Voltage Terminations

Terminations shall be in accordance with IEEE Std 48, Class 1 or Class 2; of the molded elastomer, wet-process porcelain, prestretched elastomer, heat-shrinkable elastomer, or taped type. Acceptable elastomers are track-resistant silicone rubber or track-resistant ethylene propylene compounds, such as ethylene propylene rubber or ethylene propylene diene monomer. Separable insulated connectors may be used for apparatus terminations, when such apparatus is provided with suitable bushings. Terminations shall be of the outdoor type, except that where installed inside outdoor equipment

housings which are sealed against normal infiltration of moisture and outside air, indoor, Class 2 terminations are acceptable. Class 3 terminations are not acceptable. Terminations, where required, shall be provided with mounting brackets suitable for the intended installation and with grounding provisions for the cable shielding, metallic sheath, and armor.

2.5.4.1 Medium Voltage Factory Preformed Type

Molded elastomer, wet-process porcelain, prestretched, and heat-shrinkable terminations shall utilize factory preformed components to the maximum extent practicable rather than tape build-up. Terminations shall have basic impulse levels as required for the system voltage level.

2.6 CONDUIT AND DUCTS

Ducts shall be single, round-bore type, with wall thickness and fittings suitable for the application. Duct lines and communication lines shall be concrete-encased, thin-wall type for duct lines between manholes and for other medium-voltage lines. Low-voltage lines run elsewhere may be direct-burial, thick-wall type.

2.6.1 Metallic Conduit

Intermediate metal conduit shall comply with UL 1242. Rigid galvanized steel conduit shall comply with UL 6 and ANSI C80.1. Metallic conduit fittings and outlets shall comply with UL 514A and NEMA FB 1.

2.6.2 Nonmetallic Ducts

2.6.2.1 Concrete Encased Ducts

UL 651 Schedule 40 or NEMA TC 6 Type EB.

2.6.2.2 Direct Burial

UL 651 Schedule 40 or NEMA TC 6 Type DB.

2.6.3 Conduit Sealing Compound

Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F (2 degrees C) shall neither slump at a temperature of 300 degrees F(150 degrees C), nor harden materially when exposed to the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials.

2.7 MANHOLES, HANDHOLES, AND PULLBOXES

Manholes, handholes, and pullboxes shall be as indicated. Strength of manholes, handholes, and pullboxes and their frames and covers shall conform to the requirements of IEEE C2. Precast-concrete manholes shall have the required strength established by ASTM C 478, ASTM C 478M. Frames and covers

shall be made of gray cast iron and a machine-finished seat shall be provided to ensure a matching joint between frame and cover. Cast iron shall comply with ASTM A 48, Class 30B, minimum. Handholes for low voltage cables installed in parking lots, sidewalks, and turfed areas shall be fabricated from an aggregate consisting of sand and with continuous woven glass strands having an overall compressive strength of at least 10,000 psi (69 MPa) and a flexural strength of at least 5000 psi (34.5 MPa). Pullbox and handhole covers in sidewalks, and turfed areas shall be of the same material as the box. Concrete pullboxes shall consist of precast reinforced concrete boxes, extensions, bases, and covers. See related Execution paragraph for ancilliary hardware required.

2.8 UNIT SUBSTATION

The unit substations shall be of the outdoor type having the ratings and arrangements indicated. Medium-voltage ratings of cable terminations shall be 15 kV between phases for 133 percent insulation level. Substation shall be designed for outdoor service with ventilation openings and gasketing provided to ensure a weatherproof assembly under rain, snow, and sleet conditions. External doors shall have provisions for padlocking.

2.8.1 Secondary Unit Substation

Secondary unit substations shall comply with ANSI C37.121 and shall be of the radial type with an outgoing section mounted integrally on the transformer. Substations shall be subassembled and coordinated by one manufacturer and shall be shipped in complete sections ready for connection at the site. Complete sections shall include incoming, transformer, and outgoing sections and, where practicable, shall be shipped as one unit.

2.8.1.1 Incoming Section

Metal-enclosed interrupter switchgear consisting of fused, air-insulated, interrupters in series with automatic, visible blade disconnects shall be provided for protection of incoming circuits. Metal-enclosed interrupter switchgear shall comply with IEEE C37.30 for load-interrupter switches, NEMA SG 2 for power fuses, and shall be of the outdoor no-aisle type that meets or exceeds the requirements of applicable publications listed. Switch construction shall be of the manually-operated, "OPEN-CLOSED," air-insulated, load interrupter type equipped with a stored energy operator for quick-make quick-break to make operating speeds independent of manual switch operations. Where indicated, suitable bus or lug connections shall be provided to mount field-installed, slip-on, medium-voltage cable terminations for cable entering via conduit from below and a flanged throat suitable for direct connection to the associated transformer and a bus throat suitable for connection to the associated metal-enclosed bus. If required for proper connection and alignment, include a transition section with the incoming section. Connection between interrupter switch and transformer shall be insulated copper bus or insulated copper cable mounted on porcelain insulators spaced no more than 2 feet (610 mm) apart. Surge protection shall be provided in accordance with paragraph SURGE ARRESTERS.

a. Ratings. Fuse continuous current ratings shall be as indicated for the transformer for an incoming line unit and for the line tie unit. Unless otherwise indicated, fuses shall be of the current limiting type. Switch ratings at 60 Hz shall be:

Nominal voltage.....15 kV.

Rated maximum voltage.....13.8 kV.

Maximum symmetrical interrupting capacity.....40,000 amperes.

Maximum asymmetrical interrupting capacity.....40,000 amperes.

3-Second short time current carrying capacity....1,000 amperes.

Rated continuous current.....600 amperes.

BIL.....95 kV.

b. Basic Requirements. The electrical devices listed below shall be rated for the application and voltage and current indicated. Unless otherwise noted, manufacturer's standard devices shall be provided and shall include the following:

(1) A switch-operating handle with provisions for locking in either the open or closed position.

(2) A switch mechanical position indicator.

(3) A heater as specified in the following paragraph for the outgoing section.

(4) One-pole or 2-pole thermal-magnetic, molded-case circuit breakers suitable for the operating voltage for heater circuits.

(5) Safety devices as necessary to ensure that the load interrupter switch is in the open position whenever unit doors are in the open position.

(6) A key interlock if indicated.

(7) An interface terminal block wired for required exterior connections.

2.8.1.2 Transformer Section

Transformers shall have two separate windings per phase and shall be of the mineral oil-insulated liquid. Transformers shall be suitable for outdoor use. Liquid-insulated transformers shall comply with IEEE C57.12.00, ANSI C57.12.13, and ANSI C57.12.27, and shall have two 2-1/2 percent full capacity taps above and two 2-1/2 percent full capacity taps below rated voltage. Transformers shall be of the sealed tank type construction with welded-on cover. High-voltage terminals shall be provided for direct connection to the incoming line section. Low-voltage terminals shall be provided for direct connection to the outgoing switchgear section. Low-voltage terminals shall be on the right when facing the front, accessory side of the transformer. Transformer accessories and ratings at 60 Hz shall be as follows:

Three-phase capacity, self-cooled.....2,500 kVA.

Impedance.....5.75 percent, standard.

Temperature rise.....65 degrees C.

High-voltage winding.....13,800 volts.

High-voltage winding connection.....delta.

Low-voltage winding.....480/277 volts.

Low-voltage winding connection.....wye, grounded.

Accessories:

a. drain and filter connection.

b. filling and top filter press connection.

c. pressure-vacuum gauge.

d. dial type thermometer.

e. magnetic liquid level indicator.

f. pressure relief device.

g. ground connection pad.

h. provision for jacking, lifting, and towing.

i. diagram and rating nameplate.

2.8.1.3 Integral Outgoing Section

Integral outgoing section shall be of the dead-front distribution switchboard type. Each circuit breaker and auxiliary compartment shall have a suitable metal or laminated plastic nameplate with white cut letters at least 1/4 inch (6.4 mm) high on contrasting backgrounds identifying the breaker unit.

a. Dead-Front Distribution Switchboard Type: Outgoing section shall be of the switchboard type mounted integrally with the transformer and shall consist of metering devices and main circuit breakers mounted in switchboard enclosures. Switchboards shall comply with NEMA PB 2.

b. Ground Fault Protection: Ground fault protection shall be provided utilizing sensors of the zero-sequence type or by the residual connection of phase and neutral current sensors. Ground fault settings shall be as determined by the coordination study.

c. Control Power Transformers: Transformers shall be designed for continuous operation at rated kVA 24 hours a day, 365 days a year with normal life expectancy as defined in IEEE C57.96. Dry-type, two-winding type, 115 degrees C rise above 40 degrees C maximum ambient designed for mounting in switchboard cubicle or drawer. Transformer shall be sized as required to serve the connected load

and shall have a voltage rating of 480 kV three-phase, delta primary, and 120/208 V wye secondary, 60 Hz.

d. Power-Switchgear Outgoing Section: Refer to Section 16415, "Electrical Work, Interior" for the requirements power-switchboard for the outgoing section.

f. Instrumentation and Metering:

1. Potential Transformers:

a. Type: Molded.
b. Accuracy Classification: 0.3 at burden imposed by meters and instruments, including future.
c. Primary Fuses: Three, current-limiting.
d. Secondary Fuses: Three, current-limiting.

2. Current Transformer:

a. Type: Molded donut.
b. Accuracy: 0.3 at burden imposed by meters and instruments.
c. Shorting type terminal boards for current transformer leads.

3. Power Display Monitor (PDM):

a. Solid state device with LED displays.
b. Voltage input 120 volts ac via potential transformer.
c. Current input via current transformer with 5-ampere secondary.
d. Programmable current and potential transformer ratios.
e. Programmable limits to activate up to four alarms.
f. Selectable Voltage Measurements: Line-to-line or line-to-neutral and wye or delta.
g. Simultaneous Display:
1) Volts, three-phase.
2) Amperes, three-phase.
3) Kilowatts.
4) Kilowatt hours.
5) Power factor.
6) Frequency.
7) KW Demand with programmable period intervals.
8) kVA.
9) kVAR.
10) kVARh.
h. Voltage Rating: 95 to 135 ac.
i. Communications: AB 1771 remote I/O.
j. Manufacturers: Allen-Bradley; Bulletin 1400.

4. Metering Transducers:

a. In accordance with IEEE 460.
b. Inputs: 115 volts nominal, 5 amperes, 60-Hz.
c. Output: 4 to 20 mA dc into variable loads as established by manufacturer.

d. Withstand:
1) ANSI C37.90.1 surge capability tests.
2) Minimum of 1,500-volt rms between input, output, and case.
d. Maximum Ripple: 1 percent dc peak-to-peak output.
e. Step Change Input Responses: Within 400 milliseconds.
f. Operating Temperature Range: Minus 20 to plus 60 degrees C.
g. Circuitry: Solid state, with calibration and zero adjustment.
h. Enclosure: Steel, suitable for back mounting.
i. Screw type barrier terminal blocks plus enclosure grounding terminal.
j. Transducers: Watt.

g. Heaters: Provide 120-volt heaters in the incoming (primary) section and each outgoing switchboard section. Heaters shall be of sufficient capacity to control moisture condensation in the compartments, and shall be sized 250 watts minimum. Heaters shall be controlled by a thermostat and humidistat located inside each section. Thermostats shall be industrial type, high limit, to maintain compartments within the range of 60 to 90 degrees F (15 to 32 degrees C). Humidistats shall have a range of 30 percent to 60 percent relative humidity. Provide transformer rated to carry 125 percent of heater full load rating. Transformers shall have 220 degrees C insulation system with a temperature rise not exceeding 115 degrees C and shall conform to NEMA ST 20. Provide panelboard and circuit breakers in a switchboard section to serve the heaters. Energize electric heaters in switchboard assemblies while the equipment is in storage or in place prior to being placed in service. Provide method for easy connection of heater to external power source.

h. Corrosion Protection: Bases frames, and channels of unit substation shall be corrosion resistant and shall be fabricated of stainless steel or galvanized steel. Base shall include any part of unit substation that is within 3 inches (75 mm) of concrete pad. Paint unit substation, including bases, light gray No. 61 or No. 49. Paint coating system shall comply with NEMA C57.12.28 regardless of base and substation material. The color notation is specified in ASTM D 1535.

1. Stainless Steel: ASTM A 167, Type 304 or 304L.

2. Galvanized Steel: ASTM A 123/A 123M, ASTM A 653/A 653M G90 coating, and ASTM A 153/A 153M, as applicable. Galvanize after fabrication where practicable.

~~i. Terminal Boards: Provide with engraved plastic terminal strips and screw type terminals for external wiring between components and for internal wiring between removable assemblies. Terminal boards associated with current transformers shall be short-circuiting type. Terminate conductors for current transformers with ring-tongue lugs. Terminal board identification shall be identical in similar units. External wiring shall be color coded consistently for similar terminal boards.~~

~~j. Wire Marking: Mark control and metering conductors at each end. Provide factory-installed white plastic tubing heat stamped with black block type letters on factory-installed wiring. On field-installed wiring, provide multiple white preprinted polyvinyl chloride (PVC) sleeves, heat stamped with black block type letters. Each sleeve shall contain a single letter or number, shall be elliptically shaped to fit the wire securely, and shall be keyed, or otherwise arranged, in such a manner to ensure alignment with adjacent sleeves. Provide specific wire markings using the appropriate combination of individual sleeves. Wire markers for factory installed conductors shall indicate wire designations corresponding to the schematic drawings. Wire markers on field installed conductors shall indicate the device or equipment, including specific terminal number to which the remote end of the wire is attached, as well as the terminal number to which the wire is directly attached (near end/far end marking).~~

2.8.1.4 Accessories

High-voltage warning signs shall be permanently attached to each side of transformer stations. Voltage warning signs shall comply with IEEE C2. Copper-faced steel or stainless steel ground connection pads shall be provided in both the high- and low-voltage compartments. Dial-type thermometer, liquid-level gauge, and drain valve with built-in sampling device shall be provided for each transformer station. Insulated-bushing-type parking stands shall be provided adjacent to each separable load-break elbow to provide for cable isolation during sectionalizing operations.

2.9 SURGE ARRESTERS

Surge arresters shall comply with NEMA LA 1, IEEE C62.1, IEEE C62.2, and IEEE C62.11 and shall be provided where indicated. Arresters shall be distribution class, rated at 18 kV. Arresters for use at elevations in excess of 6000 feet (1.8 km) above mean sea level shall be specifically rated for that purpose. Arresters shall be equipped with mounting brackets suitable for the indicated installations. Arresters shall be of the metal-oxide varistor type.

2.10 GROUNDING AND BONDING

2.10.1 Driven Ground Rods

Ground rods shall be copper-clad steel conforming to UL 467 not less than 3/4 inch (19 mm) in diameter by 10 feet (3.1 m) in length. Sectional type rods may be used.

2.10.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

2.11 CONCRETE AND REINFORCEMENT

Concrete work shall have minimum 3000 psi (20 MPa) compressive strength and conform to the requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Concrete reinforcing shall be as specified in Section 03200 CONCRETE REINFORCEMENT.

2.12 PADLOCKS

Padlocks shall comply with Section 08710 DOOR HARDWARE.

2.13 CABLE FIREPROOFING SYSTEMS

Cable fireproofing systems shall be listed in FM P7825a as a fire-protective coating or tape approved for grouped electrical conductors and shall be suitable for application on the type of medium-voltage cables provided. After being fully cured, materials shall be suitable for use where exposed to oil, water, gases, salt water, sewage, and fungus and shall not damage cable jackets or insulation. Asbestos materials are not acceptable.

2.13.1 Fireproof Coating

Cable fireproofing coatings shall be compounded of water-based thermoplastic resins, flame-retardant chemicals, and inorganic noncombustible fibers and shall be suitable for the application methods used. Coatings applied on bundled cables shall have a derating factor of less than 5 percent, and a dielectric strength of 95 volts per mil minimum after curing.

2.13.2 Fireproofing Tape

Fireproofing tape shall be at least 2 inches (50 mm) wide and shall be a flexible, conformable, polymeric, elastomer tape designed specifically for fireproofing cables.

2.13.3 Plastic Tape

Preapplication plastic tape shall be pressure sensitive, 10 mil (0.254 mm) thick, conforming to UL 510.

2.14 LIQUID DIELECTRICS

Liquid dielectrics for transformers, capacitors, reclosers, and other liquid-filled electrical equipment shall be non-polychlorinated biphenyl (PCB) mineral-oil or less-flammable liquid as specified. Nonflammable fluids shall not be used. Tetrachloroethylene (perchloroethylene) and 1, 2, 4 trichlorobenzene fluids shall not be used. Liquid dielectrics in retrofitted equipment shall be certified by the manufacturer as having less than 50 parts per million (ppm) PCB content. In lieu of the manufacturer's certification, the Contractor may submit a test sample of the dielectric in accordance with ASTM D 923 and have tests performed per ASTM D 4059 at a testing facility approved by the Contracting Officer. Equipment with test results indicating PCB level exceeding 50 ppm shall be replaced.

2.15 FACTORY TESTS

Factory tests shall be performed, as follows, in accordance with the applicable publications and with other requirements of these specifications.

The Contracting Officer shall be notified at least 10 days before the equipment is ready for testing. The Contracting Officer reserves the right to witness the tests.

a. Transformers: Manufacturer's standard routine tests in accordance with IEEE C57.12.00.

b. Transformers rated 200 kVA and above: Reduced full-wave, chopped-wave, and full-wave impulse test on each line and neutral terminal, in accordance with IEEE C57.98.

c. High-Voltage Air Switches: Manufacturer's standard tests in accordance with IEEE C37.34 and IEEE C37.41.

d. Factory Preformed Terminations: Wet withstand voltage tests in accordance with IEEE Std 48 for the next higher BIL level.

e. Electrical Power Insulators: Manufacturer's standard tests in accordance with ANSI C29.1.

2.16 FENCING

Fencing shall conform to the requirements of Section 02821 FENCING.

2.17 COORDINATED POWER SYSTEM PROTECTION

Analyses shall be prepared to demonstrate that the equipment selected and system constructed meet the contract requirements for equipment ratings, coordination, and protection for the primary power system affected to the point of the substation feeder breaker. They shall include a fault current analysis, and a coordination study. The studies shall be performed by a registered professional engineer with demonstrated experience in power system coordination in the last three years. The Contractor shall provide a list of references complete with points of contact, addresses and telephone numbers. The selection of the engineer is subject to the approval of the Contracting Officer.

2.17.1 Scope of Analyses

The fault current analysis, and protective device coordination study shall begin at: the source bus and extend down to the primary side of the building's power transformer.

2.17.2 Determination of Facts

The time-current characteristics, features, and nameplate data for each existing protective device shall be determined and documented. The Contractor shall utilize the fault current availability indicated as a basis for fault current studies.

2.17.3 Single Line Diagram

A single line diagram shall be prepared to show the electrical system buses, devices, transformation points, and all sources of fault current (including generator and motor contributions). A fault-impedance diagram or a computer analysis diagram may be provided. Each bus, device or transformation point shall have a unique identifier. If a fault-impedance diagram is provided,

impedance data shall be shown. Locations of switches, breakers, and circuit interrupting devices shall be shown on the diagram together with available fault data, and the device interrupting rating.

2.17.4 Fault Current Analysis

2.17.4.1 Method

The fault current analysis shall be performed in accordance with methods described in IEEE Std 242, and IEEE Std 399.

2.17.4.2 Data

Actual data shall be utilized in fault calculations. Bus characteristics and transformer impedances shall be those proposed. Data shall be documented in the report.

2.17.5 Coordination Study

The study shall demonstrate that the maximum possible degree of selectively has been obtained between devices specified, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. Provide a written narrative that describes: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; situations where system coordination is not achievable due to device limitations (an analysis of any device curves which overlap); coordination between upstream and downstream devices; and any relay settings. Recommendations to improve or enhance system reliability, and detail where such changes would involve additions or modifications to the contract and cost changes (addition or reduction) shall be provided. Composite coordination plots shall be provided on log-log graph paper.

2.17.6 Study Report

a. The report shall include a narrative describing: the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.

b. The study shall include descriptive and technical data for existing devices and new protective devices proposed. The data shall include manufacturers published data, nameplate data, and definition of the fixed or adjustable features of the existing or new protective devices.

c. The report shall document existing power system data including time-current characteristic curves and protective device ratings and settings.

d. The report shall contain fully coordinated composite time-current characteristic curves for each bus in the system, as required to ensure coordinated power system protection between protective devices or equipment. The report shall include recommended ratings and settings of all protective devices in tabulated form.

e. The report shall provide the calculation performed for the analyses, including computer analysis programs utilized. The name of the software package, developer, and version number shall be provided.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed aerially shall conform to the requirements of Section 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL. Steel conduits installed underground shall be installed and protected from corrosion in conformance with the requirements of Section 16415 ELECTRICAL WORK, INTERIOR. Except as covered herein, excavation, trenching, and backfilling shall conform to the requirements of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Concrete work shall have minimum 3000 psi (20 MPa) compressive strength and conform to the requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Cable installation shall be performed by individuals meeting the Cable Installer Qualifications criteria.

3.1.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable.

3.1.2 Verification of Dimensions

The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

3.1.3 Disposal of Liquid Dielectrics

PCB-contaminated dielectrics must be marked as PCB and transported to and incinerated by an approved EPA waste disposal facility. The Contractor shall furnish certification of proper disposal. Contaminated dielectrics shall not be diluted to lower the contamination level. (No such dielectrics are anticipated to be encountered on this project.)

3.2 CABLE INSTALLATION

The Contractor shall obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, etc. The Contractor shall then prepare a checklist of significant requirements and perform pulling calculations and prepare a pulling plan which shall be submitted along with the manufacturers instructions in accordance with SUBMITTALS.

3.2.1 Cable Installation Plan and Procedure

Cable shall be installed strictly in accordance with the cable manufacturer's recommendations. Each circuit shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal,

in each manhole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

3.2.1.1 Cable Inspection

The cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable in accordance with the cable manufacturer's recommendations.

3.2.1.2 Duct Cleaning

Duct shall be cleaned with an assembly that consists of a flexible mandrel (manufacturers standard product in lengths recommended for the specific size and type of duct) that is 1/4 inch (6.4 mm) less than inside diameter of duct, 2 wire brushes, and a rag. The cleaning assembly shall be pulled through conduit a minimum of 2 times or until less than a volume of 8 cubic inches (131 cubic centimeters) of debris is expelled from the duct.

3.2.1.3 Duct Lubrication

The cable lubricant shall be compatible with the cable jacket for cable that is being installed. Application of lubricant shall be in accordance with lubricant manufacturer's recommendations.

3.2.1.4 Cable Installation

The Contractor shall provide a cable feeding truck and a cable pulling winch as required. The Contractor shall provide a pulling grip or pulling eye in accordance with cable manufacturer's recommendations. The pulling grip or pulling eye apparatus shall be attached to polypropylene or manilla rope followed by lubricant front end packs and then by power cables. A dynamometer shall be used to monitor pulling tension. Pulling tension shall not exceed cable manufacturer's recommendations. The Contractor shall not allow cables to cross over while cables are being fed into duct. For cable installation in cold weather, cables shall be kept at 50 degrees F (10 degrees C) temperature for at least 24 hours before installation.

3.2.1.5 Cable Installation Plan

The Contractor shall submit a cable installation plan for all cable pulls in accordance with the detail drawings portion of paragraph SUBMITTALS. Cable installation plan shall include:

a. Site layout drawing with cable pulls identified in numeric order of expected pulling sequence and direction of cable pull.

b. List of cable installation equipment.

c. Lubricant manufacturer's application instructions.

d. Procedure for resealing cable ends to prevent moisture from entering cable.

e. Cable pulling tension calculations of all cable pulls.

f. Cable percentage conduit fill.

g. Cable sidewall thrust pressure.

h. Cable minimum bend radius and minimum diameter of pulling wheels used.

i. Cable jam ratio.

j. Maximum allowable pulling tension on each different type and size of conductor.

k. Maximum allowable pulling tension on pulling device.

3.2.2 Duct Line

Cables shall be installed in duct lines where indicated. Cable splices in low-voltage cables shall be made in manholes and handholes only, except as otherwise noted. Cable joints in medium-voltage cables shall be made in manholes or approved pullboxes only. Neutral and grounding conductors shall be installed in the same duct with their associated phase conductors.

3.2.3 Insect and Rodent Damage

Animal guards shall be installed.

3.2.4 Electric Manholes

Cables shall be routed around the interior walls and securely supported from walls on cables racks. Cable routing shall minimize cable crossover, provide access space for maintenance and installation of additional cables, and maintain cable separation in accordance with IEEE C2.

3.3 CABLE JOINTS

Medium-voltage cable joints shall be made by qualified cable splicers only. Qualifications of cable splicers shall be submitted in accordance with paragraph SUBMITTALS. Shields shall be applied as required to continue the shielding system through each entire cable joint. Shields may be integrally molded parts of preformed joints. Shields shall be grounded at each joint or in accordance with manufacturer's recommended practice. Cable joints shall provide insulation and jacket equivalent to that of the associated cable. Armored cable joints shall be enclosed in compound-filled, cast-iron or alloy, splice boxes equipped with stuffing boxes and armor clamps of a suitable type and size for the cable being installed.

3.4 FIREPROOFING

Each medium-voltage cable and conductor in manholes shall be fire-proofed for their entire length within the manhole. Where cables and conductors have been lubricated to enhance pulling into ducts, the lubricant shall be removed from cables and conductors exposed in the manhole before fireproofing.

3.4.1 Tape Method

Before application of fireproofing tape, plastic tape wrapping shall be applied over exposed metallic items such as the cable ground wire, metallic outer covering, or armor to minimize the possibility of corrosion from the fireproofing materials and moisture. Before applying fireproofing tape, irregularities of cables, such as at cable joints, shall be evened out with insulation putty. A flexible conformable polymeric elastomer fireproof tape shall be wrapped tightly around each cable spirally in 1/2 lapped wrapping or in 2 butt-jointed wrappings with the second wrapping covering the joints of the first.

3.4.2 Sprayable Method

Manholes shall be power ventilated until coatings are dry and dewatered and the coatings are cured. Ventilation requirements shall be in accordance with the manufacturer's instruction, but not less than 10 air changes per hour shall be provided. Cable coatings shall be applied by spray, brush, or glove to a wet film thickness that reduces to the dry film thickness approved for fireproofing by FM P7825a. Application methods and necessary safety precautions shall be in accordance with the manufacturers instructions. After application, cable coatings shall be dry to the touch in 1 to 2 hours and fully cured in 48 hours, except where the manufacturer has stated that because of unusual humidity or temperature, longer periods may be necessary.

3.5 DUCT LINES

3.5.1 Requirements

Numbers and sizes of ducts shall be as indicated. Duct lines shall be laid with a minimum slope of 4 inches per 100 feet (100 mm per 30 m.) Depending on the contour of the finished grade, the high-point may be at a terminal, a manhole, a handhole, or between manholes or handholes. The minimum manufactured bend radius shall be 18 inches (450 mm) for ducts of less than 3 inch (80 mm) diameter, and 36 inches (900 mm) for ducts 3 inches (80 mm) or greater in diameter. Otherwise, long sweep bends having a minimum radius of 25 feet (7.6 m) shall be used for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends, but the maximum curve used shall be 30 degrees and manufactured bends shall be used. Ducts shall be provided with end bells whenever duct lines terminate in manholes or handholes. Where communication conduit and electrical conduits share the same trench the electrical conduits shall be no closer that 6 inches where secondary power less than 600 volts is likely to be used and no closer than 12 inches if voltages greater than 600 volts is expected.

3.5.2 Treatment

Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic

ducts shall be stored on a flat surface and protected from the direct rays of the sun.

3.5.3 Concrete Encasement

Ducts requiring concrete encasements shall comply with NFPA 70, except that electrical duct bank configurations for ducts 6 inches (150 mm) in diameter shall be determined by calculation and as shown on the drawings. The separation between adjacent electric power and communication ducts shall conform to IEEE C2. Duct line encasements shall be monolithic construction. Where a connection is made to a previously poured encasement, the new encasement shall be well bonded or doweled to the existing encasement. The Contractor shall submit proposed bonding method for approval in accordance with the detail drawing portion of paragraph SUBMITTALS. At any point, tops of concrete encasements shall be not less than the cover requirements listed in NFPA 70. Separators or spacing blocks shall be made of steel, concrete, plastic, or a combination of these materials placed not farther apart than 4 feet (1.2 m) on centers. Ducts shall be securely anchored to prevent movement during the placement of concrete and joints shall be staggered at least 6 inches (150 mm) vertically.

3.5.4 Duct Line Markers

Duct line markers shall be provided at the ends of long duct line stubouts or for other ducts whose locations are indeterminate because of duct curvature or terminations at completely below-grade structures. In addition to markers, a 5 mil (0.127 mm) brightly colored plastic tape, not less than 3 inches (75 mm) in width and suitably inscribed at not more than 10 feet (3 m)on centers with a continuous metallic backing and a corrosion-resistant 1 mil (0.0254 mm) metallic foil core to permit easy location of the duct line, shall be placed approximately 12 inches (300 mm) below finished grade levels of such lines.

3.6 MANHOLES, HANDHOLES, AND PULLBOXES

3.6.1 General

Manholes shall be constructed approximately where shown. The exact location of each manhole shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. The location of each manhole shall be approved by the Contracting Officer before construction of the manhole is started. Manholes shall be the type noted on the drawings and shall be constructed in accordance with the applicable details as indicated. Top, walls, and bottom shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. The Contractor may at his option utilize monolithically constructed precast-concrete manholes having the required strength and inside dimensions as required by the drawings or specifications. In paved areas, frames and covers for manhole and handhole entrances in vehicular traffic areas shall be flush with the finished surface of the paving. In unpaved areas, the top of manhole covers shall be approximately 1/2 inch (15 mm) above the finished grade. Where existing grades that are higher than finished grades are encountered, concrete assemblies designed for the purpose shall be installed to elevate temporarily the manhole cover to existing grade level. All duct lines entering manholes must be installed on compact soil or otherwise supported when entering a manhole to prevent shear stress on the duct at the point of entrance to the manhole. Duct lines entering cast-in-

place concrete manholes shall be cast in-place with the manhole. Duct lines entering precast concrete manholes through a precast knockout penetration shall be grouted tight with a portland cement mortar. PVC duct lines entering precast manholes through a PVC endbell shall be solvent welded to the endbell. A cast metal grille-type sump frame and cover shall be installed over the manhole sump. A cable-pulling iron shall be installed in the wall opposite each duct line entrance. Electrical and communication vaults/manholes shall be separated by a minimum of 15 meters and electrical vaults shall be offset of by a minimum of 4 meters from the communication duct bank run.

3.6.2 Electric Manholes

Cables shall be securely supported from walls by hot-dip galvanized cable racks with a plastic coating over the galvanizing and equipped with adjustable hooks and insulators. The number of cable racks indicated shall be installed in each manhole and not less than 2 spare hooks shall be installed on each cable rack. Insulators shall be made of high-glazed porcelain. Insulators will not be required on spare hooks.

3.6.3 Communications Manholes

The number of hot-dip galvanized cable racks shall be installed in each telephone manhole. Each vertical cable rack shall be provided with three 12-inch cable hooks, each of the four vault walls shall be provided with cable rack. Cables, as shown in the Drawings, for the telephone and communication systems shall be installed.

Install six spare 12-inch cable hooks in addition to those otherwise specified. Provide a man-ladder and properly installed ring steps.

3.6.4 Handholes

Handholes shall be located approximately as shown. Handholes shall be of the type noted on the drawings and shall be constructed in accordance with the details shown.

3.6.5 Pullboxes

Pullbox tops shall be flush with sidewalks or curbs or placed 1/2 inch (15 mm) above surrounding grades when remote from curbed roadways or sidewalks. Covers shall be marked "Low-Voltage" and provided with 2 lifting eyes and 2 hold-down bolts. Each box shall have a suitable opening for a ground rod. Conduit, cable, ground rod entrances, and unused openings shall be sealed with mortar.

3.6.6 Ground Rods

A ground rod shall be installed at the manholes, handholes and pullboxes. Ground rods shall be driven into the earth before the manhole floor is poured so that approximately 4 inches (100 mm) of the ground rod will extend above the manhole floor. When precast concrete manholes are used, the top of the ground rod may be below the manhole floor and a No. 1/0 AWG ground conductor brought into the manhole through a watertight sleeve in the manhole wall.

3.7 PAD-MOUNTED EQUIPMENT INSTALLATION

Pad-mounted equipment, shall be installed on concrete pads in accordance with the manufacturer's published, standard installation drawings and procedures, except that they shall be modified to meet the requirements of this document. Units shall be installed so that they do not damage equipment or scratch painted or coated surfaces. After installation, surfaces shall be inspected and scratches touched up with a paint or coating provided by the manufacturer especially for this purpose. Three-phase transformers shall be installed with the phase sequence as directed by the post Public Works. Primary taps shall be set at nominal.

3.7.1 Concrete Pads

3.7.1.1 Construction

Concrete pads for pad-mounted electrical equipment may be either pre-fabricated or poured-in-place. Pads shall be constructed as indicated, except that exact pad dimensions and mounting details are equipment specific and are the responsibility of the Contractor. Tops of concrete pads shall be level and shall project 4 inches (100 mm) above finished paving or grade and sloped to drain. Edges of concrete pads shall have 3/4 inch (20 mm) chamfer. Conduits for primary, secondary, and grounding conductors shall be set in place prior to placement of concrete pads. Where grounding electrode conductors are installed through concrete pads, PVC conduit sleeves shall be installed through the concrete to provide physical protection. To facilitate cable installation and termination, the concrete pad shall be provided with a rectangular hole below the primary and secondary compartments, sized in accordance with the manufacturer's recommended dimensions. Upon completion of equipment installation the rectangular hole shall be filled with masonry grout.

3.7.1.2 Concrete and Reinforcement

Concrete work shall have minimum 3000 psi (20 MPa) compressive strength and conform to the requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Concrete pad reinforcement shall be in accordance with Section 03200 CONCRETE REINFORCEMENT.

3.7.1.3 Sealing

When the installation is complete, the Contractor shall seal all conduit and other entries into the equipment enclosure with an approved sealing compound. Seals shall be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter.

3.7.2 Padlocks

Padlocks shall be provided for pad-mounted equipment and for each fence gate. Padlocks shall be keyed alike as directed by the Contracting Officer.

3.8 CONNECTIONS BETWEEN AERIAL AND UNDERGROUND SYSTEMS

Connections between aerial and underground systems shall be made as shown. Underground cables shall be extended up poles in conduit to cable terminations. Conduits shall be secured to the poles by 2-hole galvanized

steel pipe straps spaced not more than 10 feet (3 m) apart and with 1 strap not more than 12 inches (300 mm) from any bend or termination. Cable guards shall be secured to poles in accordance with the manufacturer's published procedures. Conduits shall be equipped with bushings to protect cables and minimize water entry. Capnut potheads shall be used to terminate medium-voltage multiple-conductor cable. Cables shall be supported by devices separate from the conduit or guard, near their point of exit from the conduit or guard.

3.8.1 Pole Installation

Pole installation shall be in accordance with Section 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL.

3.9 CONNECTIONS TO BUILDINGS

Cables shall be extended into the various buildings as indicated, and shall be connected to the first applicable termination point in each building. Interfacing with building interior conduit systems shall be at conduit stubouts terminating 5 feet (1.5 m) outside of a building and 2 feet (600 mm) below finished grade as specified and provided under Section 16415 ELECTRICAL WORK, INTERIOR. After installation of cables, conduits shall be sealed with caulking compound to prevent entrance of moisture or gases into buildings.

3.10 GROUNDING

A ground ring consisting of the indicated configuration of bare copper conductors and driven ground rods shall be installed around pad-mounted equipment as shown. Equipment frames of metal-enclosed equipment, and other noncurrent-carrying metal parts, such as cable shields, cable sheaths and armor, and metallic conduit shall be grounded. At least 2 connections shall be provided from a transformer to the ground ring. Metallic frames and covers of handholes and pull boxes shall be grounded by use of a braided, copper ground strap with equivalent ampacity of No. 6 AWG.

3.10.1 Grounding Electrodes

Grounding electrodes shall be installed as shown on the drawings and as follows:

a. Driven rod electrodes - Unless otherwise indicated, ground rods shall be driven into the earth until the tops of the rods are approximately 1 foot (300 mm) below finished grade.

b. Ground ring - A ground ring shall be installed as shown consisting of bare copper conductors installed 18 inches (450 mm), plus or minus 3 inches (75 mm), below finished top of soil grade. Ground ring conductors shall be sized as shown.

3.10.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors, in compliance with UL 467, and those below grade shall be made by a fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.10.3 Grounding and Bonding Conductors

Grounding and bonding conductors include conductors used to bond transformer enclosures and equipment frames to the grounding electrode system. Grounding and bonding conductors shall be sized as shown, and located to provide maximum physical protection. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete shall be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

3.10.4 Surge Arrester Grounding

Surge arresters and neutrals shall be bonded directly to the transformer enclosure and then to the grounding electrode system with a bare copper conductor, sized as shown. Lead lengths shall be kept as short as practicable with no kinks or sharp bends.

3.10.5 Manhole, Handhole, or Concrete Pullbox Grounding

Ground rods installed in manholes, handholes, or concrete pullboxes shall be connected to cable racks, cable-pulling irons, the cable shielding, metallic sheath, and armor at each cable joint or splice by means of a No. 4 AWG braided tinned copper wire. Connections to metallic cable sheaths shall be by means of tinned terminals soldered to ground wires and to cable sheaths. Care shall be taken in soldering not to damage metallic cable sheaths or shields. Ground rods shall be protected with a double wrapping of pressure-sensitive plastic tape for a distance of 2 inches (50 mm) above and 6 inches (150 mm) below concrete penetrations. Grounding electrode conductors shall be neatly and firmly attached to manhole or handhole walls and the amount of exposed bare wire shall be held to a minimum.

3.10.6 Riser Pole Grounding

A single continuous vertical grounding electrode conductor shall be installed on each riser pole and connected directly to the grounding electrodes indicated on the drawings or required by these specifications. All equipment, neutrals, surge arresters, and items required to be grounded shall be connected directly to this vertical conductor. The grounding electrode conductor shall be sized as shown. Grounding electrode conductors shall be stapled to wood poles at intervals not exceeding 2 feet (600 mm).

3.11 FIELD TESTING

3.11.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 10 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test

equipment, and test results. Field test reports shall be signed and dated by the Contractor.

3.11.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.11.3 Ground-Resistance Tests

The resistance of each grounding electrode system and the ground ring shall be measured using the fall-of-potential method defined in IEEE Std 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

a. Single rod electrode - 10 ohms.

b. Ground ring - 2 ohms.

3.11.4 Medium-Voltage Cable Test

After installation and before the operating test or connection to an existing system, the medium-voltage cable system shall be given a high potential test. Direct-current voltage shall be applied on each phase conductor of the system by connecting conductors as one terminal and connecting grounds or metallic shieldings or sheaths of the cable as the other terminal for each test. Prior to making the test, the cables shall be isolated by opening applicable protective devices and disconnecting equipment. The test shall be conducted with all splices, connectors, and terminations in place. The method, voltage, length of time, and other characteristics of the test for initial installation shall be in accordance with NEMA WC 7 or NEMA WC 8 for the particular type of cable installed, except that 28 kV and 35 kV insulation test voltages shall be in accordance with either AEIC CS5 or AEIC CS6 as applicable, and shall not exceed the recommendations of IEEE Std 404 for cable joints and IEEE Std 48 for cable terminations unless the cable and accessory manufacturers indicate higher voltages are acceptable for testing. Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the Contractor shall make necessary repairs or replace cables as directed. Repaired or replaced cables shall be retested.

3.11.5 Low-Voltage Cable Test

Low-voltage cable, complete with splices, shall be tested for insulation resistance after the cables are installed, in their final configuration, ready for connection to the equipment, and prior to energization. The test voltage shall be 500 volts dc, applied for one minute between each conductor and ground and between all possible combinations conductors in the same

trench, duct, or cable, with all other conductors in the same trench, duct, or conduit. The minimum value of insulation shall be:

R in megohms = (rated voltage in kV + 1) x 1000/(length of cable in feet

Each cable failing this test shall be repaired or replaced. The repaired cable shall be retested until failures have been eliminated.

3.11.6 Liquid-Filled Transformer Tests

The following field tests shall be performed on all liquid-filled transformers. Pass-fail criteria shall be in accordance with transformer manufacturer's specifications.

a. Insulation resistance test phase-to-ground.

b. Turns ratio test.

c. Correct phase sequence.

d. Correct operation of tap changer.

3.11.7 Pre-Energization Services

Calibration, testing, adjustment, and placing into service of the installation shall be accomplished by a manufacturer's product field service engineer or independent testing company with a minimum of 2 years of current product experience. The following services shall be performed on the equipment listed below. These services shall be performed subsequent to testing but prior to the initial energization. The equipment shall be inspected to ensure that installation is in compliance with the recommendations of the manufacturer and as shown on the detail drawings. Terminations of conductors at major equipment shall be inspected to ensure the adequacy of connections. Bare and insulated conductors between such terminations shall be inspected to detect possible damage during installation. If factory tests were not performed on completed assemblies, tests shall be performed after the installation of completed assemblies. Components shall be inspected for damage caused during installation or shipment to ensure packaging materials have been removed. Components capable of being both manually and electrically operated shall be operated manually prior to the first electrical operation. Components capable of being calibrated, adjusted, and tested shall be calibrated, adjusted, and tested in accordance with the instructions of the equipment manufacturer. Items for which such services shall be provided, but are not limited to, are the following:

a. Secondary unit substation.

3.12 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

3.13 AS-BUILT DRAWINGS

Provide as-built drawings for the installed components.

End of Section

This Section 16410 added by Amendment R0002

SECTION 16410

AUTOMATIC TRANSFER SWITCH

PART 1 GENERAL

1.1 BID FORM INFORMATION

The hardware and work of this Section shall be supplied under Option 0013.

1.2 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.13	(1990; R 1995) Low-Voltage AC Power Circuit Breakers Used in Enclosures
IEEE C37.90.1	(1989; R 1994) IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
IEEE C62.41	(1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits
IEEE Std 602	(1996) Electric Systems in Health Care Facilities

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	(1993) Industrial Controls and Systems
NEMA ICS 2	(1993) Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 4	(1997) Industrial Control and Systems Terminal Blocks
NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures
NEMA ICS 10	(1999) Industrial Control and Systems: AC Transfer Switch Equipment - Part 2: Static AC Transfer Equipment

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
NFPA 110	(1999) Emergency and Standby Power Systems

UNDERWRITERS LABORATORIES (UL)

UL 1008	(1996; Rev thru Feb 1999) Transfer Switch Equipment
UL 1066	(1997) Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Automatic Transfer Switch (ATS); G

Schematic, external connection, one-line schematic and wiring diagram of each ATS assembly. Interface equipment connection diagram showing conduit and wiring between ATS and related equipment. Device, nameplate, and item numbers shown in list of equipment and material shall appear on drawings wherever that item appears. Diagrams shall show interlocking provisions and cautionary notes, if any. Operating instructions shall be shown either on one-line diagram or separately. Unless otherwise approved, one-line and elementary or schematic diagrams shall appear on same drawing.

Equipment; G
Installation; G

Dimensioned plans, sections and elevations showing minimum clearances, weights, and conduit entry provisions for each ATS.

SD-03 Product Data

Material; G
Equipment; G

List of proposed equipment and material, containing a description of each separate item.

SD-06 Test Reports

Testing; G

A description of proposed field test procedures, including proposed date and steps describing each test, its duration and expected results, not less than 4 weeks prior to test date.

Certified factory and field test reports, within 14 days following completion of tests. Reports shall be certified and dated and shall demonstrate that tests were successfully completed prior to shipment of equipment.

SD-07 Certificates

Equipment; G
Material; G

Certificates of compliance showing evidence of UL listing and conformance with applicable NEMA standards. Such certificates are not required if manufacturer's published data, submitted and approved, reflect UL listing or conformance with applicable NEMA standards.

Automatic Transfer Switch (ATS); G

Evidence that ATS withstand current rating (WCR) has been coordinated with upstream protective devices as required by UL 1008. Upon request, manufacturer shall also provide notarized letter certifying compliance with requirements of this specification, including withstand current rating.

SD-10 Operation and Maintenance Data

Automatic Transfer Switch (ATS); G
Instructions; G

Six copies of operating manual outlining step-by-step procedures for system startup, operation, and shutdown. Manual shall include manufacturer's name, model number, service manual, parts list, and brief description of equipment and basic operating features. Manufacturer's spare parts data shall be included with supply source and current cost of recommended spare parts. Six copies of maintenance manual listing routine maintenance, possible breakdowns, repairs, and troubleshooting guide. Manual shall include simplified wiring and control diagrams for system as installed.

1.4 GENERAL REQUIREMENTS

1.4.1 Standard Product

Material and equipment shall be standard products of a manufacturer regularly engaged in manufacturing the products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. The experience use shall include applications in similar circumstances and of same design and rating as specified ATS.

Equipment shall be capable of being serviced by a manufacturer-authorized and trained organization that is, in the Contracting Officer's opinion, reasonably convenient to the site.

1.4.2 Nameplate

Nameplate showing manufacturer's name and equipment ratings shall be made of corrosion-resistant material with not less than 1/8 inch tall characters. Nameplate shall be mounted to front of enclosure and shall comply with nameplate requirements of NEMA ICS 2.

1.5 SERVICE CONDITIONS

Seismic requirements shall be as specified in Sections 13080 SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT, 15070 SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT and 16070 SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT. ATS shall be suitable for prolonged performance under following service conditions:

a. Altitude: 322 feet (98 meters) above mean sea level.

b. Relative Humidity: 35 percent maximum, continuous.

c. Temperature: 18 to 86 degrees F (-8 to 30 degrees C).

PART 2 PRODUCTS

2.1 AUTOMATIC TRANSFER SWITCH (ATS)

ATS shall be electrically operated and mechanically held in both operating positions. ATS shall be suitable for use in standby systems described in NFPA 70. ATS shall be UL listed. ATS shall be manufactured and tested in accordance with applicable requirements of IEEE C37.90.1, IEEE C37.13, IEEE C62.41, IEEE Std 602, NEMA ICS 1, NEMA ICS 2, NEMA ICS 10, UL 1008 and UL 1066. ATS shall conform to NFPA 110. To facilitate maintenance, manufacturer's instruction manual shall provide typical maximum contact voltage drop readings under specified conditions for use during periodic maintenance. Manufacturer shall provide instructions for determination of contact integrity. ATS shall be rated for continuous duty at specified continuous current rating. ATS shall be fully compatible and approved for use with BP/IS specified. BP/IS shall be considered part of ATS system. ATS shall have following characteristics:

a. Voltage: 480 volts ac.

b. Number of Phases: Three.

c. Number of Wires: Four.

d. Frequency: 60 Hz.

e. Poles: Three switched and solid neutral.

f. ATS WCR: Rated to withstand short-circuit current of 42,000 amperes, RMS symmetrical.

g. Nonwelding Contacts: Rated for nonwelding of contacts when used with upstream feeder overcurrent devices shown and with available fault current specified.

h. Main Contacts: Contacts shall have silver alloy composition.

2.1.1 Override Time Delay

Time delay to override monitored source deviation shall be adjustable from 0.5 to 6 seconds and factory set at 1 second. ATS shall monitor phase conductors to detect and respond to sustained voltage drop of 25 percent of nominal between any two preferred source conductors and initiate transfer action to alternate source and start engine driven generator after set time period. Pickup voltage shall be adjustable from 85 to 100 percent of nominal and factory set at 90 percent. Dropout voltage shall be adjustable from 75 to 98 percent of pickup value and factory set at 85 percent of nominal.

2.1.2 Transfer Time Delay

Time delay before transfer to alternate power source shall be adjustable from 0 to 5 minutes and factory set at 0 minutes. ATS shall monitor frequency and voltage of alternate power source and transfer when frequency and voltage are stabilized. Pickup voltage shall be adjustable from 85 to 100 percent of nominal and factory set at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal and factory set at 90 percent.

2.1.3 Return Time Delay

Time delay before return transfer to preferred power source shall be adjustable from 0 to 30 minutes and factory set at 30 minutes. Time delay shall be automatically defeated upon loss or sustained undervoltage of alternate power source, provided that preferred supply has been restored.

2.1.4 Engine Shutdown Time Delay

Time delay shall be adjustable from 0 to 30 minutes and shall be factory set at 10 minutes.

2.1.5 Exerciser

Provide a generator exerciser timer. Run times shall be user programmable. The generator exerciser shall be selectable between load transfer and engine run only, and shall have a fail-safe feature that will retransfer the ATS to preferred during the exercise period.

2.1.6 Auxiliary Contacts

Two normally open and two normally closed auxiliary contacts rated at 15 amperes at 120 volts shall operate when ATS is connected to preferred power source, and two normally open and two normally closed contacts shall operate when ATS is connected to alternate source.

2.1.7 Supplemental Features

ATS shall be furnished with the following:

a. Engine start contact.

b. Alternate source monitor.

c. Test switch to simulate normal power outage.

d. Voltage sensing. Pickup voltage adjustable from 85 to 100 percent of nominal; dropout adjustable from 75 to 98 percent of pickup.

e. Time delay bypass switch to override return time delay to normal.

f. Manual return-to-normal switch.

2.1.8 Operator

Manual operator conforming to UL 1008 shall be provided, and shall incorporate features to prevent operation by unauthorized personnel. ATS shall be designed for safe manual operation under full load conditions. If manual operation is accomplished by opening the door, then a dead-front shall be supplied for operator safety.

2.1.9 Green Indicating Light

A green indicating light shall supervise/provide preferred power source switch position indication and shall have a nameplate engraved PREFERRED.

2.1.10 Red Indicating Light

A red indicating light shall supervise/provide alternate power source switch position indication and shall have a nameplate engraved ALTERNATE.

2.2 ENCLOSURE

ATS and accessories shall be installed in free-standing, floor-mounted, ventilated NEMA ICS 6, Type 1, smooth sheet metal enclosure constructed in accordance with applicable requirements of UL 1066 and/or UL 1008. Intake vent shall be screened and filtered. Exhaust vent shall be screened. Door shall have suitable hinges, locking handle latch, and gasketed jamb. Metal gauge shall be not less than No. 14. Enclosure shall be equipped with at least two approved grounding lugs for grounding enclosure to facility ground system using No. 4 AWG copper conductors. Factory wiring within enclosure and field wiring terminating within enclosure shall comply with NFPA 70. If wiring is not color coded, wire shall be permanently tagged or marked near terminal at each end with wire number shown on approved detail drawing. Terminal block shall conform to NEMA ICS 4. Terminals shall be arranged for entrance of external conductors from top and bottom of enclosure as shown. Main switch terminals, including neutral terminal if used, shall be pressure type suitable for termination of external copper conductors shown.

2.2.1 Construction

Enclosure shall be constructed for ease of removal and replacement of ATS components and control devices from front without disconnection of external

power conductors or removal or disassembly of major components. Enclosure of ATS with BP/IS shall be constructed to protect personnel from energized BP/IS components during ATS maintenance.

2.2.2 Cleaning and Painting

Both the inside and outside surfaces of an enclosure, including means for fastening, shall be protected against corrosion by enameling, galvanizing, plating, powder coating, or other equivalent means. Protection is not required for metal parts that are inherently resistant to corrosion, bearings, sliding surfaces of hinges, or other parts where such protection is impractical. Finish shall be manufacturer's standard material, process, and color and shall be free from runs, sags, peeling, or other defects. An enclosure marked Type 1, 3R, 4 or 12 shall be acceptable if there is no visible rust at the conclusion of a salt spray (fog) test using the test method in ASTM B 117, employing a 5 percent by weight, salt solution for 24 hours. Type 4X enclosures are acceptable following performance of the above test with an exposure time of 200 hours.

2.3 TESTING

2.3.1 Factory Testing

A prototype of specified ATS shall be factory tested in accordance with UL 1008. In addition, factory tests shall be performed on each ATS as follows:

a. Insulation resistance test to ensure integrity and continuity of entire system.

b. Main switch contact resistance test.

c. Visual inspection to verify that each ATS is as specified.

d. Mechanical test to verify that ATS sections are free of mechanical hindrances.

e. Electrical tests to verify complete system electrical operation and to set up time delays and voltage sensing settings.

2.3.2 Factory Test Reports

Manufacturer shall provide three certified copies of factory test reports.

PART 3 EXECUTION

3.1 INSTALLATION

ATS shall be installed as shown and in accordance with approved manufacturer's instructions.

3.2 INSTRUCTIONS

Manufacturer's approved operating instructions shall be permanently secured to cabinet where operator can see them. One-line and elementary or schematic diagram shall be permanently secured to inside of front enclosure door.

3.3 SITE TESTING

Following completion of ATS installation and after making proper adjustments and settings, site tests shall be performed in accordance with manufacturer's written instructions to demonstrate that each ATS functions satisfactorily and as specified. Contractor shall advise Contracting Officer not less than 5 working days prior to scheduled date for site testing, and shall provide certified field test reports within 2 calendar weeks following successful completion of site tests. Test reports shall describe adjustments and settings made and site tests performed. Minimum operational tests shall include the following:

a. Insulation resistance shall be tested, both phase-to-phase and phase-to-ground.

b. Power failure of normal source shall be simulated by opening upstream protective device. This test shall be performed a minimum of five times.

c. Power failure of emergency source with normal source available shall be simulated by opening upstream protective device for emergency source. This test shall be performed a minimum of five times.

d. Low phase-to-ground voltage shall be simulated for each phase of normal source.

e. Operation and settings shall be verified for specified ATS features, such as override time delay, transfer time delay, return time delay, engine shutdown time delay, exerciser, auxiliary contacts, and supplemental features.

f. Manual and automatic ATS and BP/IS functions shall be verified.

End of Section

SECTION 16415

ELECTRICAL WORK, INTERIOR

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C39.1	(1981; R 1992) Requirements for Electrical Analog Indicating Instruments
ANSI C78.1	(1991; C78.1a; R 1996) Fluorescent Lamps - Rapid-Start Types - Dimensional and Electrical Characteristics
ANSI C78.1350	(1990) Electric Lamps - 400-Watt, 100-Volt, S51 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1351	(1989) Electric Lamps - 250-Watt, 100-Volt S50 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1352	(1990) Electric Lamps - 1000-Watt, 250-Volt, S52 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1355	(1989) Electric Lamps - 150-Watt, 55-Volt S55 High-Pressure Sodium Lamps
ANSI C78.1375	(1996) 400-Watt, M59 Single-Ended Metal-Halide Lamps
ANSI C78.1376	(1996) 1000-Watt, M47 Metal-Halide Lamps
ANSI C78.20	(1995) Electric Lamps - Characteristics of Incandescent Lamps A, G, PS, and Similar Shapes with E26 Medium Screw Bases
ANSI C78.21	(1995) Physical and Electrical Characteristics - Incandescent Lamps - PAR and R Shapes
ANSI C78.2A	(1991) 18 & 26- Watt, Compact Fluorescent Quad Tube Lamps **
ANSI C78.2B	(1992) 9 & 13-Watt, Compact Fluorescent Quad Tube Lamps **
ANSI C82.1	(1997) Specifications for Fluorescent Lamp Ballasts Addenda D & E

ANSI C82.4	(1992) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 1	(1995) Hard-Drawn Copper Wire
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D 709	(2000) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.20.1	(1993) Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear
IEEE C57.13	(1993) Instrument Transformers
IEEE C62.41	(1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits
IEEE Std 242	(1986; R 1991) Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
IEEE Std 399	(1997) Recommended Practice for Industrial and Commercial Power Systems Analysis
IEEE Std 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA AB 1	(1993) Molded Case Circuit Breakers and Molded Case Switches
NEMA FU 1	(1986) Low Voltage Cartridge Fuses
NEMA ICS 1	(1993) Industrial Control and Systems
NEMA ICS 2	(1993) Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 3	(1993) Industrial Control and Systems Factory Built Assemblies
NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures

NEMA LE 4	(1987) Recessed Luminaires, Ceiling Compatibility
NEMA MG 1	(1998) Motors and Generators
NEMA MG 10	(1994) Energy Management Guide for Selection and Use of Polyphase Motors
NEMA OS 1	(1996) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA OS 2	(1998) Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA PB 1	(1995) Panelboards
NEMA PB 2	(1995) Deadfront Distribution Switchboards
NEMA ST 20	(1992) Dry-Type Transformers for General Applications
NEMA TC 2	(1998) Electrical Polyvinyl Chloride (PVC) Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA VE 1	(1996) Metal Cable Tray Systems
NEMA WD 1	(1999) General Requirements for Wiring Devices
NEMA WD 6	(1997) Wiring Devices - Dimensional Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2000) Life Safety Code
NFPA 70	(2002) National Electrical Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 18	Industrial, Scientific, and Medical Equipment

UNDERWRITERS LABORATORIES (UL)

UL 1	(2000) Flexible Metal Conduit
UL 1004	(1994; Rev thru Nov 1999) Electric Motors
UL 1029	(1994; Rev thru Dec 1997) High-Intensity-Discharge Lamp Ballasts
UL 1449	(1996; Rev thru Dec 1999) Transient Voltage Surge Suppressors
UL 1569	(1999; Rev thru Jan 2000) Metal-Clad Cables

UL 1570	(1995; Rev thru Nov 1999) Fluorescent Lighting Fixtures
UL 1571	(1995; Rev thru Nov 1999) Incandescent Lighting Fixtures
UL 1572	(1995; Rev thru Nov 1999) High Intensity Discharge Lighting Fixtures
UL 1660	(2000) Liquid-Tight Flexible Nonmetallic Conduit
UL 198B	(1995) Class H Fuses
UL 198C	(1986; Rev thru Feb 1998) High-Interrupting-Capacity Fuses, Current-Limiting Types
UL 198D	(1995) Class K Fuses
UL 198E	(1988; Rev Jul 1988) Class R Fuses
UL 198H	(1988; Rev thru Nov 1993) Class T Fuses
UL 198L	(1995; Rev May 1995) D-C Fuses for Industrial Use
UL 360	(1996; Rev thru Oct 1997) Liquid-Tight Flexible Steel Conduit
UL 4	(1996) Armored Cable
UL 486A	(1997; Rev thru Dec 1998) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486C	(1997; Rev thru Aug 1998) Splicing Wire Connectors
UL 486E	(1994; Rev thru Feb 1997) Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
UL 489	(1996; Rev thru Dec 1998) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 5	(1996) Surface Metal Raceways and Fittings
UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 506	(1994; R Oct 1997) Specialty Transformers
UL 508	(1999) Industrial Control Equipment
UL 510	(1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

UL 512	(1993; Rev thru Mar 1999) Fuseholders
UL 514A	(1996; Rev Dec 1999) Metallic Outlet Boxes
UL 514B	(1997; Rev Oct 1998) Fittings for Cable and Conduit
UL 514C	(1996; Rev thru Dec 1999) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 542	(1999) Lampholders, Starters, and Starter Holders for Fluorescent Lamps
UL 6	(1997) Rigid Metal Conduit
UL 651	(1995; Rev thru Oct 1998) Schedule 40 and 80 Rigid PVC Conduit
UL 651A	(1995; Rev thru Apr 1998) Type EB and A Rigid PVC Conduit and HDPE Conduit
UL 67	(1993; Rev thru Oct 1999) Panelboards
UL 674	(1994; Rev thru Oct 1998) Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations
UL 797	(1993; Rev thru Mar 1997) Electrical Metallic Tubing
UL 817	(1994; Rev thru May 1999) Cord Sets and Power-
UL 83	(1998; Rev thru Sep 1999) Thermoplastic-Insulated Wires and Cables
UL 845	(1995; Rev thru Nov 1999) Motor Control Centers
UL 869A	(1998) Reference Standard for Service Equipment
UL 877	(1993; Rev thru Nov 1999) Circuit Breakers and Circuit-Breaker Enclosures for Use in Hazardous (Classified) Locations
UL 891	(1994; Rev thru Jan 1995) Dead-Front Switchboards
UL 916	(1998) Energy Management Equipment
UL 924	(1995; Rev thru Oct 97) Emergency Lighting and Power Equipment
UL 935	(1995; Rev thru Oct 1998) Fluorescent-Lamp Ballasts

UL 943	(1993; Rev thru May 1998) Ground-Fault Circuit-Interrupters
UL 98	(1994; Rev thru Jun 1998) Enclosed and Dead-Front Switches
UL Elec Const Dir	(1999) Electrical Construction Equipment Directory

1.2 GENERAL

1.2.1 Rules

The installation shall conform to the requirements of NFPA 70 and NFPA 101, unless more stringent requirements are indicated or shown.

1.2.2 Coordination

The drawings indicate the extent and the general location and arrangement of equipment, conduit, and wiring. The Contractor shall become familiar with all details of the work and verify all dimensions in the field so that the outlets and equipment shall be properly located and readily accessible. Lighting fixtures, outlets, and other equipment and materials shall be carefully coordinated with mechanical or structural features prior to installation and positioned according to architectural reflected ceiling plans; otherwise, lighting fixtures shall be symmetrically located according to the room arrangement when uniform illumination is required, or asymmetrically located to suit conditions fixed by design and shown. Raceways, junction and outlet boxes, and lighting fixtures shall not be supported from sheet metal roof decks. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change. The Contractor shall coordinate the electrical requirements of the mechanical work and provide all power related circuits, wiring, hardware and structural support, even if not shown on the drawings.

1.2.3 Special Environments

1.2.3.1 Weatherproof Locations

Wiring, Fixtures, and equipment in designated locations shall conform to NFPA 70 requirements for installation in damp or wet locations.

1.2.3.2 Ducts, Plenums and Other Air-Handling Spaces

Wiring and equipment in ducts, plenums and other air-handling spaces shall be installed using materials and methods in conformance with NFPA 70 unless more stringent requirements are indicated in this specification or on the contract drawings.

1.2.4 Standard Products

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially

duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

1.2.5 Nameplates

1.2.5.1 Identification Nameplates

Major items of electrical equipment and major components shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number as indicated. Designation of motors shall coincide with their designation in the motor control center or panel. Unless otherwise specified, identification nameplates shall be made of laminated plastic in accordance with ASTM D 709 with black outer layers and a white core. Edges shall be chamfered. Plates shall be fastened with black-finished round-head drive screws, except motors, or approved nonadhesive metal fasteners. When the nameplate is to be installed on an irregular-shaped object, the Contractor shall devise an approved support suitable for the application and ensure the proper installation of the supports and nameplates. In all instances, the nameplate shall be installed in a conspicuous location. At the option of the Contractor, the equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic. The front of each panelboard, motor control center, switchgear, and switchboard shall have a nameplate to indicate the phase letter, corresponding color and arrangement of the phase conductors. The following equipment, as a minimum, shall be provided with identification nameplates:

Minimum 1/4 inch High Letters	Minimum 1/8 inch High Letters
Panelboards	Control Power Transformers
Starters	Control Devices
Safety Switches	Instrument Transformers
Motor Control Centers	
Transformers	
Equipment Enclosures	
Switchgear	
Switchboards	
Motors	

Each panel, section, or unit in motor control centers, switchgear or similar assemblies shall be provided with a nameplate in addition to nameplates listed above, which shall be provided for individual compartments in the respective assembly, including nameplates which identify "future," "spare," and "dedicated" or "equipped spaces."

1.2.6 As-Built Drawings

Following the project completion or turnover, within 30 days the Contractor shall furnish 2 sets of as-built drawings to the Contracting Officer.

1.2.7 Recessed Light Fixtures (RLF) Option

The Contractor has the option to substitute inch-pound (I-P) RLF to metric RLF. This option shall be coordinated with Section 09510 ACOUSTICAL CEILINGS.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Interior Electrical Equipment; G.

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams, and other information necessary to define the installation. Detail drawings shall show the rating of items and systems and how the components of an item and system are assembled, function together, and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall show physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded. Detail drawings shall as a minimum include:

a. Substation.

b. Dry Type Transformers.

c. Switchgear.

d. Power conditioners.

e. Motors and rotating machinery.

f. Motor controllers.

g. Single line electrical diagrams including primary, metering, sensing and relaying, control wiring, and control logic.

h. Sway bracing for suspended luminaires.

Structural drawings showing the structural or physical features of major equipment items, components, assemblies, and structures, including foundations or other types of supports for equipment and conductors. These drawings shall include accurately scaled or dimensioned outline and arrangement or layout drawings to show the physical size of equipment and components and the relative arrangement and physical connection of related components. Weights

of equipment, components and assemblies shall be provided when required to verify the adequacy of design and proposed construction of foundations or other types of supports. Dynamic forces shall be stated for switching devices when such forces must be considered in the design of support structures. The appropriate detail drawings shall show the provisions for leveling, anchoring, and connecting all items during installation, and shall include any recommendations made by the manufacturer.

Electrical drawings including single-line and three-line diagrams, and schematics or elementary diagrams of each electrical system; internal wiring and field connection diagrams of each electrical device when published by the manufacturer; wiring diagrams of cabinets, panels, units, or separate mountings; interconnection diagrams that show the wiring between separate components of assemblies; field connection diagrams that show the termination of wiring routed between separate items of equipment; internal wiring diagrams of equipment showing wiring as actually provided for this project. Field wiring connections shall be clearly identified.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures, including changes in related portions of the project and the reasons why, shall be submitted with the detail drawings. Approved departures shall be made at no additional cost to the Government.

SD-03 Product Data

Fault Current and Protective Device Coordination Study; G.

The study shall be submitted along with protective device equipment submittals. No time extensions or similar contract modifications will be granted for work arising out of the requirements for this study. Approval of protective devices proposed shall be based on recommendations of this study, The Government shall not be held responsible for any changes to equipment, device ratings, settings, or additional labor for installation of equipment or devices ordered and/or procured prior to approval of the study.

Installation Procedures

Installation procedures for rotating equipment, transformers, switchgear, battery systems, voltage regulators, and grounding resistors. Procedures shall include diagrams, instructions, and precautions required to install, adjust, calibrate, and test devices and equipment.

As-Built Drawings; G.

The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full-sized set of prints marked to reflect all

deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor.

Onsite Tests; G.

A detailed description of the Contractor's proposed procedures for on-site tests.

Field Test Plan; G.

A detailed description of the Contractor's proposed procedures for onsite test submitted 20 days prior to testing the installed system. No field test will be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Field Test Reports; G.

Six copies of the information described below in 8 1/2 x 11 inch (216 x 280 mm) binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

a. A list of equipment used, with calibration certifications.

b. A copy of measurements taken.

c. The dates of testing.

d. The equipment and values to be verified.

e. The conditions specified for the test.

f. The test results, signed and dated.

g. A description of adjustments made.

h. Final position of controls and device settings.

SD-07 Certificates

Materials and Equipment; G.

The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted. However, materials and equipment installed in hazardous locations must bear the UL label unless the data submitted from other testing agency is specifically approved in writing by the Contracting Officer. Items which are required to be listed and labeled in accordance with Underwriters Laboratories must be affixed with a UL label that states that it is UL listed. No exceptions or waivers will be granted to this requirement. Materials and equipment will be approved based on the manufacturer's published data.

For other than equipment and materials specified to conform to UL publications, a manufacturer's statement indicating complete compliance with the applicable standard of the American Society for Testing and Materials, National Electrical Manufacturers Association, or other commercial standard, is acceptable.

1.4 WORKMANSHIP

Materials and equipment shall be installed in accordance with NFPA 70, recommendations of the manufacturer, and as shown.

PART 2 PRODUCTS (INTERIOR ELECTRICAL EQUIPMENT)

Products shall conform to the respective publications and other requirements specified below. Materials and equipment not listed below shall be as specified elsewhere in this section. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.1 CABLES AND WIRES

Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise. Conductor sizes and ampacities shown are based on copper, unless indicated otherwise. All conductors shall be copper.

2.1.1 Aluminum Conductors

Aluminum conductors shall not be used.

2.1.2 Insulation

Unless indicated otherwise, or required by NFPA 70, power and lighting wires shall be 600-volt, Type THWN, THHN, or THW conforming to UL 83, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits shall be Type TW, THW or TF, conforming to UL 83. For all Type MC Cable and where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.1.3 Bonding Conductors

ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.1.4 Metal-Clad Cable

UL 1569; NFPA 70, Type MC cable.

2.1.5 Armored Cable

UL 4; NFPA 70, Type AC cable.

2.1.6 Tray Cable or Power Limited Tray Cable

UL listed; Type TC or PLTC.

2.1.7 Cord Sets and Power-Supply Cords

UL 817.

2.2 CABLE TRAYS

Cable tray shall conform to NEMA VE 1, shall form a wireway system, and shall be of nominal depth and width as shown on the Telecommunications (T-series) Drawings. Cable trays shall be constructed of continuous rigid welded steel wire mesh with a minimum diameter of 0.192 inches (.48 cm) on all mesh sections. Mesh size shall be a maximum of 2 inches by 4 inches (5.08 cm by 10.16 cm). Trays shall include splice and end plates, dropouts, and miscellaneous hardware. Edges, fittings, and hardware shall be finished free from burrs and sharp edges. Fittings shall have not less than the load-carrying ability of straight tray sections and shall have manufacturer's minimum standard radius. Radius of bends shall be as shown.

2.2.1 Finish

Electroplated Zinc Galvanizing: Electrodeposited zinc coating shall be applied to an average thickness of .7 mils (18 microns).

2.2.2 Support

Provide support per manufacturer's requirements and seismic requirement for the area.

2.3 TRANSIENT VOLTAGE SURGE PROTECTION (TVSP)

Transient voltage surge protection shall be provided as indicated. Protection shall be in the form of surge suppressors which meet the requirements of IEEE C62.41 and be UL listed and labeled as having been tested in accordance with UL 1449. Surge voltage suppressor ratings shall not exceed those specified under UL 1449 for the associated nominal system voltage. Maximum Allowable Continuous Operating Voltage (MCOV) shall be at least 115 percent of the nominal system voltage. Fuses shall not be used as surge suppression.

2.4 CIRCUIT BREAKERS

2.4.1 MOLDED-CASE CIRCUIT BREAKERS

Molded-case circuit breakers shall conform to NEMA AB 1 and UL 489and UL 877for circuit breakers and circuit breaker enclosures located in hazardous (classified) locations. Circuit breakers may be installed in panelboards, switchboards, enclosures, motor control centers, or combination motor controllers.

2.4.1.1 Construction

Circuit breakers shall be suitable for mounting and operating in any position. Lug shall be listed for copper conductors only in accordance with UL 486E. Single-pole circuit breakers shall be full module size with not more than one pole per module. Multi-pole circuit breakers shall be of the common-trip type having a single operating handle such that an overload or short circuit on any one pole will result in all poles opening simultaneously. Sizes of 100 amperes or less may consist of single-pole breakers permanently factory assembled into a multi-pole unit having an internal, mechanical, nontamperable common-trip mechanism and external handle ties. All circuit breakers shall have a quick-make, quick-break overcenter toggle-type mechanism, and the handle mechanism shall be trip-free to prevent holding the contacts closed against a short-circuit or sustained overload. All circuit breaker handles shall assume a position between "ON" and "OFF" when tripped automatically. All ratings shall be clearly visible.

2.4.1.2 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. The interrupting rating of the circuit breakers shall be at least equal to the available short-circuit current at the line terminals of the circuit breaker and correspond to the UL listed integrated short-circuit current rating specified for the panelboards and switchboards. Molded-case circuit breakers shall have nominal voltage ratings, maximum continuous-current ratings, and maximum short-circuit interrupting ratings in accordance with NEMA AB 1. Ratings shall be coordinated with system X/R ratio.

2.4.1.3 Thermal-Magnetic Trip Elements

Thermal magnetic circuit breakers shall be provided as shown. Automatic operation shall be obtained by means of thermal-magnetic tripping devices located in each pole providing inverse time delay and instantaneous circuit protection. The instantaneous magnetic trip shall be adjustable and accessible from the front of all circuit breakers on frame sizes above 150 amperes.

2.4.2 Solid-State Trip Elements

Solid-state circuit breakers shall be provided as shown. All electronics shall be self-contained and require no external relaying, power supply, or accessories. Printed circuit cards shall be treated to resist moisture absorption, fungus growth, and signal leakage. All electronics shall be housed in an enclosure which provides protection against arcs, magnetic interference, dust, and other contaminants. Solid-state sensing shall measure true RMS current with error less than one percent on systems with

distortions through the 13th harmonic. Peak or average actuating devices are not acceptable. Current sensors shall be torodial construction, encased in a plastic housing filled with epoxy to protect against damage and moisture and shall be integrally mounted on the breaker. Where indicated on the drawings, circuit breaker frames shall be rated for 100 percent continuous duty. Circuit breakers shall have tripping features as shown on the drawings and as described below:

a. Long-time current pick-up, adjustable from 50 percent to 100 percent of continuous current rating.

b. Adjustable long-time delay.

c. Short-time current pick-up, adjustable from 1.5 to 9 times long-time current setting.

d. Adjustable short-time delay.

e. Instantaneous current pick-up, adjustable from 1.5 to 9 times long-time current setting.

f. Ground-fault pick-up, adjustable from 20 percent to 60 percent of sensor rating, but not greater than 1200 amperes. Sensing of ground-fault current at the main bonding jumper or ground strap will not be permitted.

g. Adjustable ground-fault delay.

h. Ground-fault I square times t switch.

i. Overload, short-time, and ground-fault trip indicators shall be provided.

2.4.3 HACR Circuit Breakers

Circuit breakers 60 amperes or below, 240 volts, 1-pole or 2-pole, intended to protect multi-motor and combination-load installations involved in heating, air conditioning, and refrigerating equipment shall be marked "Listed HACR Type."

2.4.4 Ground Fault Circuit Interrupters

UL 943. Breakers equipped with ground fault circuit interrupters shall have ground fault class, interrupting capacity, and voltage and current ratings as indicated.

2.5 CONDUIT AND TUBING

2.5.1 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797

2.5.2 Flexible Conduit, Steel and Plastic

General-purpose type, UL 1; liquid tight, UL 360, and UL 1660.

2.5.3 Rigid Metal Conduit

UL 6.

2.5.4 Rigid Plastic Conduit

NEMA TC 2, UL 651 and UL 651A.

2.5.5 Surface Metal Electrical Raceways and Fittings

UL 5.

2.6 CONDUIT AND DEVICE BOXES AND FITTINGS

2.6.1 Boxes, Metallic Outlet

NEMA OS 1 and UL 514A.

2.6.2 Boxes, Nonmetallic, Outlet and Flush-Device Boxes and Covers

NEMA OS 2 and UL 514C.

2.6.3 Fittings for Conduit and Outlet Boxes

UL 514B.

2.6.4 Fittings, PVC, for Use with Rigid PVC Conduit and Tubing

UL 514B.

2.7 CONNECTORS, WIRE PRESSURE

2.7.1 For Use With Copper Conductors

UL 486A.

2.8 ENCLOSURES

NEMA ICS 6 or NEMA 250, unless otherwise specified.

2.8.1 Cabinets and Boxes

Cabinets and boxes with volume greater than 100 cubic inches (0.0164 cubic meters) shall be in accordance with UL 50, hot-dip, zinc-coated, if sheet steel.

2.8.2 Circuit Breaker Enclosures

UL 489.

2.9 LIGHTING FIXTURES, LAMPS, BALLASTS, EMERGENCY EQUIPMENT, CONTROLS AND ACCESSORIES

The following specifications are supported and supplemented by information and details on the drawings. Additional fixtures, if shown, shall conform to this specification. Lamps, lampholders, ballasts, transformers, electronic circuitry and other lighting system components shall be

constructed according to industry standards. Equipment shall be tested and listed by a recognized independent testing laboratory for the expected installation conditions. Equipment shall conform to the standards listed below.

2.9.1 Lamps

Lamps shall be constructed to operate in the specified fixture, and shall function without derating life or output as listed in published data. Lamps shall meet the requirements of the Energy Policy Act of 1992.

a. Incandescent and tungsten halogen lamps shall be designed for 125 volt operation (except for low voltage lamps), shall be rated for minimum life of 2,000 hours, and shall have color temperature between 2,800 and 3,200 degrees Kelvin. Tungsten halogen lamps shall incorporate quartz capsule construction. Lamps shall comply with ANSI C78.20 and sections 238 and 270 of ANSI C78.21.

b. Fluorescent lamps shall be green-tipped and shall have color temperature as shown of 3,500 degrees Kelvin. They shall be designed to operate with the ballasts and circuitry of the fixtures in which they will be used. Fluorescent lamps, including spares, shall be manufactured by one manufacturer to provide for color and performance consistency. Fluorescent lamps shall comply with ANSI C78.1. Fluorescent tube lamp efficiencies shall meet or exceed the following requirements.

T8, 32 watts	(4' lamp)	2800 lumens
T12,34 watts	(4' lamp)	2800 lumens
T8,59 watts	(8' lamp)	5700 lumens
T12,60 watts	(8' lamp)	5600 lumens
T8/U,31-32 watts	(U-tube)	2600 lumens
T12/U,34 watts	(U-tube)	2700 lumens

(1) Linear fluorescent lamps, unless otherwise indicated, shall be 4 feet (1219 mm) long 32 watt T8, 265 mA, with minimum CRI of 75. Lamps of other lengths or types shall be used only where specified or shown. Lamps shall deliver rated life when operated on rapid start ballasts.

(2) Small compact fluorescent lamps shall be twin, double, or triple tube configuration as shown with bi-pin or four-pin snap-in base and shall have minimum CRI of 85. They shall deliver rated life when operated on ballasts as shown. 9 and 13 watt double tube lamps shall comply with ANSI C78.2B. 18 and 26 watt double tube lamps shall comply with ANSI C78.2A. Minimum starting temperature shall be 32 degrees F (0 degrees C) for twin tube lamps and for double and triple twin tube lamps without internal starter; and 15 degrees F (-9 degrees C) for double and triple twin tube lamps with internal starter.

(3) Long compact fluorescent lamps shall be 18, 27, 39, 40, 50, or 55 watt bi-axial type as shown with four-pin snap-in base; shall have minimum CRI of 85; and shall have a minimum starting

temperature of 50 degrees F (10 degrees C). They shall deliver rated life when operated on rapid start ballasts.

c. High intensity discharge lamps, including spares, shall be manufactured by one manufacturer in order to provide color and performance consistency. High intensity discharge lamps shall be designed to operate with the ballasts and circuitry of the fixtures in which they will be used and shall have wattage, shape and base as shown. High intensity discharge lamps, unless otherwise shown, shall have medium or mogul screw base and minimum starting temperature of -20 degrees F (-29 degrees C). Metal halide lamps, unless otherwise shown, shall have minimum CRI of 65; color temperature of 4,300 degrees Kelvin; shall be -BU configuration if used in base-up position; and shall be -H or high output configuration if used in horizontal position. Lamps shall comply with all applicable ANSI C78.1350, ANSI C78.1351, ANSI C78.1352, ANSI C78.1355,ANSI C78.1375, and ANSI C78.1376.

2.9.2 Ballasts and Transformers

Ballasts or transformers shall be designed to operate the designated lamps within their optimum specifications, without derating the lamps. Lamp and ballast combinations shall be certified as acceptable by the lamp manufacturer.

a. Low voltage incandescent transformers shall be Class II UL listed 120/12 volt or 120/24 volt step-down transformers as required for the lamps shown. Transformers shall be high power factor type and shall be rated for continuous operation under the specified load. Transformers shall be encased or encased and potted, and mounted integrally within the lighting fixture unless otherwise shown.

b. Fluorescent ballasts shall comply with ANSI C82.1 and shall be mounted integrally within fluorescent fixture housing unless otherwise shown. Ballasts shall have maximum current crest factor of 1.7; high power factor; Class A sound rating; maximum operating case temperature of 77 degrees F (25 degrees C) above ambient; and shall be rated Class P. Unless otherwise indicated, the minimum number of ballasts shall be used to serve each individual fixture. A single ballast may be used to serve multiple fixtures if they are continuously mounted, identically controlled and factory manufactured for that installation with an integral wireway.

(1) Compact fluorescent ballasts shall comply with IEEE C62.41 Category A transient voltage variation requirements and shall be mounted integrally within compact fluorescent fixture housing unless otherwise shown. Ballasts shall have minimum ballast factor of 0.95; maximum current crest factor of 1.6; high power factor; maximum operating case temperature of 77 degrees F (25 degrees C) above ambient; shall be rated Class P; and shall have a sound rating of Class A. Ballasts shall meet FCC Class A specifications for EMI/RFI emissions. Ballasts shall operate from nominal line voltage of 120 or 277 volts at 60 Hz and maintain constant light output over a line voltage variation of $\pm$ 10%. Ballasts shall have an end-of-lamp-life detection and shut-down circuit. Ballasts shall be UL listed and shall contain no PCBs. Ballasts shall

contain potting to secure PC board, provide lead strain relief, and provide a moisture barrier.

(2) Electronic fluorescent ballasts shall comply with 47 CFR 18 for electromagnetic interference. Ballasts shall withstand line transients per IEEE C62.41, Category A. Ballasts shall have total harmonic distortion between 10 and 20%; minimum frequency of 20,000Hz; filament voltage between 2.5 and 4.5 volts; maximum starting inrush current of 20 amperes; and shall comply with the minimum Ballast Efficacy Factors shown in the table below. Minimum starting temperature shall be 50 degrees F (10 degrees C). Ballasts shall carry a manufacturer's full warranty of three years, including a minimum $10 labor allowance per ballast.

ELECTRONIC FLUORESCENT BALLAST EFFICACY FACTORS

LAMP TYPE	TYPE OF STARTER & LAMP	NOMINAL OPERATIONAL VOLTAGE	NUMBER OF LAMPS	MINIMUM BALLAST EFFICACY FACTOR
32W T8	rapid start linear & U-tubes	120 or 277 V	1	2.54
			2	1.44
			3	0.93
			4	0.73
34W T12	rapid start linear & U-tubes	120 or 277 V	1	2.64
			2	1.41
			3	0.93
59W T8	rapid start linear	120 or 277 V	2	0.80
60W T12	rapid start linear	120 or 277 V	2	0.80

(3) Magnetic fluorescent ballasts shall be energy-saving, automatic resetting type, approved for the application by the Certified Ballast Manufacturers and complying with ANSI C82.1 and UL 935. Minimum ballast starting temperature shall be 40 degrees F (4.4 degrees C) for normal service and 0 degrees F (-18 degrees C) where cold temperature service is required. Magnetic fluorescent ballasts shall have a ballast factor not less than shown in the following table:

MAGNETIC FLUORESCENT BALLAST FACTORS*

Design starting temperature above 40 degrees F (4.4 degrees C) with 60 Hz input frequency

LAMP TYPE	NUMBER OF LAMPS	NOMINAL OPERATIONAL INPUT VOLTAGE	TYPE OF STARTER & LAMP	MIN. BALLAST FACTOR
25W F25T8	1	120v	rapid start	.96
	1	277v		.96
	2	120v		.95
	2	277v		.94
32W F32T8	1	120v	rapid start	.96
	1	277v		.95
	2	120v		.85
	2	277v		.96
96W F96T8	1	120 or 277v	instant start	1.10
	2			.85

* For ballasts not specifically designed for use with dimming controls.

(4) Dimming fluorescent ballasts shall be electronic and shall comply with the applicable electronic ballast specifications shown above. Dimming ballasts shall be compatible with the specified dimming control equipment and shall operate the lamps shown in the range from full rated light output to 1 percent of full rated light output. Dimming ballasts shall provide smooth square law dimming such that perceived dimming action is proportionate to the motion of the dimming control. Single or two-lamp dimming ballasts shall be used. Multi-lamp dimming ballasts shall be designed to operate lamps of the same length and current rating.

(5) Dimming compact fluorescent ballasts shall be electronic and shall comply with the applicable compact fluorescent and dimming ballast specifications shown above. Ballasts shall operate the lamps shown in the range from full rated light output to 5 percent of full rated light output. Ballast power factor shall be <90% throughout dimming range. THD shall be <10% at maximum light output and <20% at minimum light output. Ballast shall ignite the lamps at any light output setting selected.

c. High intensity discharge ballasts shall comply with UL 1029 and, if multiple supply types, with ANSI C82.4. Ballasts shall have minimum ballast factor of 0.9; high power factor; Class A sound rating; and maximum operating case temperature of 77 degrees F (25 degrees C) above ambient.

(1) Electronic high intensity discharge ballasts shall be constant wattage autotransformer type; shall have less than 10% ballast loss; shall have total harmonic distortion between 10 and 20%; and shall have a minimum starting temperature of 0 degrees F (-18 degrees C).

(2) Magnetic high intensity discharge ballasts shall have a minimum starting temperature of -20 degrees F (-29 degrees C).

2.9.3 Fixtures

Fixtures shall be in accordance with the size, shape, appearance, finish, and performance shown. Unless otherwise indicated, lighting fixtures shall be provided with housings, junction boxes, wiring, lampholders, mounting supports, trim, hardware and accessories for a complete and operable installation. Recessed housings shall be minimum 20 gauge cold rolled or galvanized steel as shown. Extruded aluminum fixtures shall have minimum wall thickness of 0.125 inches (3 mm). Plastic lenses shall be 100% virgin acrylic or as shown. Glass lenses shall be tempered. Heat resistant glass shall be borosilicate type. Conoid recessed reflector cones shall be Alzak with clear specular low iridescent finish.

a. Incandescent fixtures shall comply with UL 1571. Incandescent fixture specular reflector cone trims shall be integral to the cone and shall be finished to match. Painted trim finishes shall be white with minimum reflectance of 88%. Low voltage incandescent fixtures shall have integral step-down transformers.

b. Fluorescent fixtures shall comply with UL 1570. Recessed ceiling fixtures shall comply with NEMA LE 4. Fixtures shall be plainly marked for proper lamp and ballast type to identify lamp diameter, wattage, color and start type. Marking shall be readily visible to service personnel, but not visible from normal viewing angles. Fluorescent fixture lens frames on recessed and surface mounted troffers shall be one assembly with mitered corners. Parabolic louvers shall have a low iridescent finish and 45 degree cut-off. Louver intersection joints shall be hairline type and shall conceal mounting tabs or other assembly methods. Louvers shall be free from blemishes, lines or defects which distort the visual surface. Integral ballast and wireway compartments shall be easily accessible without the use of special tools. Housings shall be constructed to include grounding necessary to start the lamps. Open fixtures shall be equipped with a sleeve, wire guard, or other positive means to prevent lamps from falling. Medium bi-pin lampholders shall be twist-in type with positive locking position. Long compact fluorescent fixtures and fixtures utilizing U-bend lamps shall have clamps or secondary lampholders to support the free ends of the lamps.

c. High intensity discharge fixture shall comply with UL 1572. Recessed ceiling fixtures shall comply with NEMA LE 4. Reflectors shall be anodized aluminum. Fixtures for horizontal lamps shall have position oriented lampholders. Lampholders shall be pulse-rated to 5,000 volts. Fixtures indicated as classified or rated for hazardous locations or special service shall be designed and independently tested for the environment in which they are installed. Recessed lens fixtures shall have extruded aluminum lens frames. Ballasts shall be integral to fixtures and shall be accessible without the use of special tools. Remote ballasts shall be encased and potted. Lamps shall be shielded from direct view with a UV absorbing material such as tempered glass, and shall be circuited through a cut-off switch which will shut off the lamp circuit if the lens is not in place.

d. Exit Signs: Exit signs shall be ENERGY STAR compliant, thereby meeting the following requirements. Input power shall be less than 5 watts per face. Letter size and spacing shall adhere to NFPA 101. Luminance contrast shall be greater than 0.8. Average

luminance shall be greater than 15 cd/m^2 measured at normal (0 degree) and 45 degree viewing angles. Minimum luminance shall be greater than 8.6 cd/m^2 measured at normal and 45 degree viewing angles. Maximum to minimum luminance shall be less than 20:1 measured at normal and 45 degree viewing angles. The manufacturer warranty for defective parts shall be at least 5 years.

2.9.4 Lampholders, Starters, and Starter Holders

UL 542

2.9.5 Ultrasonic, and Passive Infrared Occupancy Sensors

UL 916

2.9.6 Lighting Inverter

a. The lighting inverter shall be a single phase uninterruptible power supply (UPS) system with a VA rating of 14,000. The system shall be ETL listed to UL standard 924. Equipment and accessories furnished under the terms of this specification shall be the standard product of a single manufacturer. The connected load shall be powered by the rectifier and inverter and, upon failure of the utility input, the load shall automatically continue to be powered via the system's battery and inverter for a minimum of 1.5 hours. Upon restoration of utility power, the system will automatically walk-in the inverter and recharge the batteries even if the batteries are completely discharged. The UPS Series System shall be capable of powering any combination of fluorescent ballasted lamps, incandescent lamps, electronic and high power factor compact fluorescent ballasts, H.I.D lamps or other approved loads up to the total rating of the system. The system shall automatically protect itself from overloads and short circuits.

b. Under emergency operations, the output voltage shall be within ±1 percent of nominal at full load for the specified discharge period; and the frequency shall be 60 Hz ±0.05 percent. The system shall automatically revert to emergency mode operation should the average utility AC voltage fall below 75 percent of the nominal line voltage. The system shall use no relays or other moving parts in the main inverter or battery charger circuitry. During emergency mode operation, the systems' efficiency shall not be less than 90 percent. The system shall use fans in the cooling of the electronic compartments for forced air ventilation. The AC output to the load shall be isolated from the utility input during inverter emergency operation.

c. Overall Characteristics: 86 percent throughput efficiency. Operating temperature range 32 to 104 degrees F (0 to 40 degrees C). Internal maintenance by-pass and main load disconnect switch. Double conversion with no interruption. Provide backup time of 90 minutes.

d. The ~~mcPhilben Systems~~ rectifier shall be SCR controlled. The rectifier efficiency shall not be less than 97.7 percent. The rectifier shall have a ripple voltage less than 2 percent rms

voltage with inverter fully loaded and battery disconnected. Charge voltage applied to the batteries shall be temperature compensated.

e. Electronics: Sine wave output. Completely solid-state Pulse Width Modulation (PWM) inverter. 16-bit micro-processor control. Input power factor correction to maintain power factor at 0.99. Transient response ≤5 percent, recovery time 10 mS (100 percent load step). 3:1 crest factor capability. Inverter output distortion ≤8 percent THD (at unity power factor, 100 percent non-linear load). Output voltage regulation ±6 percent of nominal at full load. Frequency within ±0.05 percent of nominal. Inverter efficiency ≥90 percent. Load power factor capability is 0.5 leading to 0.5 lagging. Automatic, battery protecting low voltage disconnect (LVD). Advanced battery diagnostics and management system. Temperature compensated battery charger. 24-hour recharge time. High-frequency, very low ripple current charger. Input and output disconnect switch. Fused battery disconnect switch.

f. Under emergency mode conditions, the system shall be powered by maintenance-free, sealed lead calcium batteries. The battery shall operate entirely unattended and require no addition of water for a period of 10 years or longer.

g. System metering and controls shall consist of computer interface, RS232 port for direct two-way communication, relay contacts to drive remote alarm monitor, a multilingual alphanumerical display of voltage/frequency/current, load percentage crest factor, and the system shall be self-testing/self-diagnostic that automatically perform a minimum 30-second test and diagnostic routine at least every 30 days and indicates failures and alarms. Status, test and alarm information shall be stored in memory and retrievable from unit display.

h. Housing: Free-standing NEMA 1 enclosure. Acid-resistant powder coat finish. Multiple conduit entries.

2.10 LOW-VOLTAGE FUSES AND FUSEHOLDERS

2.10.1 Fuses, Low Voltage Cartridge Type

NEMA FU 1.

2.10.2 Fuses, High-Interrupting-Capacity, Current-Limiting Type

Fuses, Class G, J, L and CC shall be in accordance with UL 198C.

2.10.3 Fuses, Class K, High-Interrupting-Capacity Type

UL 198D.

2.10.4 Fuses, Class H

UL 198B.

2.10.5 Fuses, Class R

UL 198E.

2.10.6 Fuses, Class T

UL 198H.

2.10.7 Fuses, D-C for Industrial Use

UL 198L.

2.10.8 Fuseholders

UL 512.

2.11 INSTRUMENTS, ELECTRICAL INDICATING

ANSI C39.1.

2.12 MOTORS, AC, FRACTIONAL AND INTEGRAL

Motors, ac, fractional and integral horsepower, 500 hp (373.0 kW) and smaller shall conform to NEMA MG 1 and UL 1004for motors; NEMA MG 10 for energy management selection of polyphase motors; and UL 674 for use of motors in hazardous (classified) locations. In addition to the standards listed above, motors shall be provided with efficiencies as specified in the table "MINIMUM NOMINAL EFFICIENCIES" below.

2.12.1 Rating

The horsepower rating of motors should be limited to no more than 125 percent of the maximum load being served unless a NEMA standard size does not fall within this range. In this case, the next larger NEMA standard motor size should be used.

2.12.2 Motor Efficiencies

All permanently wired polyphase motors of 1 hp (746 W) or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 1 hp (746 W) or more with open, drip proof or totally enclosed fan cooled enclosures shall be high efficiency type, unless otherwise indicated. Motor efficiencies indicated in the tables apply to general-purpose, single-speed, polyphase induction motors. Applications which require definite purpose, special purpose, special frame, or special mounted polyphase induction motors are excluded from these efficiency requirements. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

MINIMUM NOMINAL MOTOR EFFICIENCIES
OPEN DRIP PROOF MOTORS

kW	1200 RPM	1800 RPM	3600 RPM
0.746	82.5	85.5	80.0

1.12	86.5	86.5	85.5
1.49	87.5	86.5	86.5
2.24	89.5	89.5	86.5
3.73	89.5	89.5	89.5
5.60	91.7	91.0	89.5
7.46	91.7	91.7	90.2
11.2	92.4	93.0	91.0
14.9	92.4	93.0	92.4
18.7	93.0	93.6	93.0
22.4	93.6	93.6	93.0
29.8	94.1	94.1	93.6
37.3	94.1	94.5	93.6
44.8	95.0	95.0	94.1
56.9	95.0	95.0	94.5
74.6	95.0	95.4	94.5
93.3	95.4	95.4	95.0
112.0	95.8	95.8	95.4
149.0	95.4	95.8	95.4
187.0	95.4	96.2	95.8
224.0	95.4	95.0	95.4
261.0	94.5	95.4	95.0
298.0	94.1	95.8	95.0
336.0	94.5	95.4	95.4
373.0	94.5	94.5	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS

kW	1200 RPM	1800 RPM	3600 RPM
0.746	82.5	85.5	78.5
1.12	87.5	86.5	85.5
1.49	88.5	86.5	86.5
2.24	89.5	89.5	88.5
3.73	89.5	89.5	89.5
5.60	91.7	91.7	91.0
7.46	91.7	91.7	91.7
11.2	92.4	92.4	91.7
14.9	92.4	93.0	92.4
18.7	93.0	93.6	93.0
22.4	93.6	93.6	93.0
29.8	94.1	94.1	93.6
37.3	94.1	94.5	94.1
44.8	94.5	95.0	94.1
56.9	95.0	95.4	94.5
74.6	95.4	95.4	95.0
93.3	95.4	95.4	95.4
112.0	95.8	95.8	95.4
149.0	95.8	96.2	95.8
187.0	95.6	96.2	95.9
224.0	95.4	96.1	95.8
261.0	94.5	96.2	94.8
298.0	94.5	95.8	94.5
336.0	94.5	94.5	94.5
373.0	94.5	94.5	94.5

MINIMUM NOMINAL MOTOR EFFICIENCIES
OPEN DRIP PROOF MOTORS

HP	1200 RPM	1800 RPM	3600 RPM
1	82.5	85.5	80.0
1.5	86.5	86.5	85.5
2	87.5	86.5	86.5
3	89.5	89.5	86.5
5	89.5	89.5	89.5
7.5	91.7	91.0	89.5
10	91.7	91.7	90.2
15	92.4	93.0	91.0
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	93.6
60	95.0	95.0	94.1
75	95.0	95.0	94.5
100	95.0	95.4	94.5
125	95.4	95.4	95.0
150	95.8	95.8	95.4
200	95.4	95.8	95.4
250	95.4	96.2	95.8
300	95.4	95.0	95.4
350	94.5	95.4	95.0
400	94.1	95.8	95.0
450	94.5	95.4	95.4
500	94.5	94.5	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS

HP	1200 RPM	1800 RPM	3600 RPM
1	82.5	85.5	78.5
1.5	87.5	86.5	85.5
2	88.5	86.5	86.5
3	89.5	89.5	88.5
5	89.5	89.5	89.5
7.5	91.7	91.7	91.0
10	91.7	91.7	91.7
15	92.4	92.4	91.7
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	94.1
60	94.5	95.0	94.1
75	95.0	95.4	94.5
100	95.4	95.4	95.0
125	95.4	95.4	95.4
150	95.8	95.8	95.4
200	95.8	96.2	95.8
250	95.6	96.2	95.9
300	95.4	96.1	95.8
350	94.5	96.2	94.8
400	94.5	95.8	94.5
450	94.5	94.5	94.5

500	94.5	94.5	94.5

2.13 MOTOR CONTROLS

2.13.1 General

NEMA ICS 1, NEMA ICS 2, NEMA ICS 3 and NEMA ICS 6, and UL 508 and UL 845. Panelboards supplying non-linear loads shall have neutrals sized for 200 percent of rated current.

2.13.2 Motor Starters

Combination starters shall be provided with circuit breakers as indicated.

2.13.3 Thermal-Overload Protection

Each motor of 1/8 hp (93 W) or larger shall be provided with thermal-overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload-protection device shall be provided either integral with the motor or controller, or shall be mounted in a separate enclosure. Unless otherwise specified, the protective device shall be of the manually reset type. Single or double pole tumbler switches specifically designed for alternating-current operation only may be used as manual controllers for single-phase motors having a current rating not in excess of 80 percent of the switch rating.

2.13.4 Low-Voltage Motor Overload Relays

2.13.4.1 General

Thermal and magnetic current overload relays shall conform to NEMA ICS 2 and UL 508. Overload protection shall be provided either integral with the motor or motor controller, and shall be rated in accordance with the requirements of NFPA 70.

2.13.4.2 Construction

Manual reset type thermal relay shall be bimetallic construction. Automatic reset type thermal relays shall be bimetallic construction. Magnetic current relays shall consist of a contact mechanism and a dash pot mounted on a common frame.

2.13.4.3 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. Trip current ratings shall be established by selection of the replaceable overload device and shall not be adjustable. Where the controller is remotely-located or difficult to reach, an automatic reset, non-compensated overload relay shall be provided. Manual reset overload relays shall be provided otherwise, and at all locations where automatic starting is provided. Where the motor is located in a constant ambient temperature, and the thermal device is located in an ambient temperature that regularly varies by more than minus 18 degrees F (10 degrees C), an ambient temperature-compensated overload relay shall be provided.

2.13.5 Automatic Control Devices

2.13.5.1 Direct Control

Automatic control devices (such as thermostats, float or pressure switches) which control the starting and stopping of motors directly shall be designed for that purpose and have an adequate horsepower rating.

2.13.5.2 Pilot-Relay Control

Where the automatic-control device does not have such a rating, a magnetic starter shall be used, with the automatic-control device actuating the pilot-control circuit.

2.13.5.3 Manual/Automatic Selection

a. Where combination manual and automatic control is specified and the automatic-control device operates the motor directly, a double-throw, three-position tumbler or rotary switch (marked MANUAL-OFF-AUTOMATIC) shall be provided for the manual control.

b. Where combination manual and automatic control is specified and the automatic-control device actuates the pilot control circuit of a magnetic starter, the magnetic starter shall be provided with a three-position selector switch marked MANUAL-OFF-AUTOMATIC.

c. Connections to the selector switch shall be such that; only the normal automatic regulatory control devices will be bypassed when the switch is in the Manual position; all safety control devices, such as low-or high-pressure cutouts, high-temperature cutouts, and motor-overload protective devices, shall be connected in the motor-control circuit in both the Manual and the Automatic positions of the selector switch. Control circuit connections to any MANUAL-OFF-AUTOMATIC switch or to more than one automatic regulatory control device shall be made in accordance with wiring diagram approved by the Contracting Officer unless such diagram is included on the drawings. All controls shall be 120 volts or less unless otherwise indicated.

2.14 PANELBOARDS

Dead-front construction, NEMA PB 1 and UL 67.

2.15 MINI-POWER CENTER (MPC)

a. General: Transformer, primary, and secondary main circuit breakers, and secondary panel board section enclosed in NEMA 250, Type 31 enclosure.

b. Transformer:

1. Type: Dry, self-cooled, encapsulated.

2. Insulation: Manufacturer's standard, with UL 1561 temperature rise.

3. Full capacity, 2-1/2 percent voltage taps, two above and two below normal voltage.

4. Primary Voltage: 480, three-phase.

5. Secondary Voltage: 208/120 volts, three-phase, four-wire.

6. Rating: 15 kVA.

c. Panelboard: UL 489, fully-rated.

1. Type: Thermal-magnetic, quick-make, quick-break, indicating, with noninterchangeable molded case circuit breakers.

2. Number and Breaker Ampere Ratings: Refer to Panelboard Schedule.

2.16 RECEPTACLES

2.16.1 Heavy Duty Grade

NEMA WD 1. Devices shall conform to all requirements for heavy duty receptacles.

2.16.2 Ground Fault Interrupters

UL 943, Class A or B.

2.16.3 NEMA Standard Receptacle Configurations

NEMA WD 6.

a. Single and Duplex, 20-Ampere, 125 Volt

20-ampere, non-locking: NEMA type 5-20R, locking: NEMA type L5-20R.

b. 20-Ampere, 250 Volt

Two-pole, 3-wire grounding, non-locking: NEMA type 6-20R, locking: NEMA type L6-20R. Three-pole, 4-wire grounding, non-locking: NEMA type 15-20R, locking: NEMA type L15-20R.

c. 30-Ampere, 125/250 Volt

Three-pole, 3-wire, non-locking: NEMA type 10-30R, locking: NEMA type L10-30R. Three-pole, 4-wire grounding, non-locking: NEMA type 14-30R, locking: NEMA type L14-30R.

d. 30-Ampere, 250 Volt

Two-pole, 3-wire grounding, non-locking: NEMA type 6-30R, locking: NEMA type L6-30R. Three-pole, 4-wire grounding, non-locking: NEMA type 15-30R, locking: NEMA type L15-30R.

e. 50-Ampere, 125/250 Volt

Three-pole, 3-wire: NEMA type 10-50R. Three-pole, 4-wire grounding: NEMA type 14-50R.

f. 50-Ampere, 250 Volt

Two-pole, 3-wire grounding: NEMA type 6-50R. Three-pole, 4-wire grounding: NEMA type 15-50R.

2.17 SERVICE ENTRANCE EQUIPMENT

UL 869A.

2.18 SPLICE, CONDUCTOR

UL 486C.

2.19 POWER-SWITCHGEAR ASSEMBLIES INCLUDING SWITCHBOARDS

Assemblies shall be metal-enclosed, freestanding general-purpose type in accordance with NEMA PB 2, UL 891, and IEEE C37.20.1 and shall be installed to provide front and rear access. Busses shall be copper. Assembly shall be approximately 90 inches (2.3 meters) high; arrangement of circuit breakers and other items specified shall be as indicated. The withstand rating and interrupting capacity of the switchgear, switchboards, and circuit breakers shall be based on the maximum fault current available.

2.19.1 Buswork

a. Material: Phase noninsulated copper throughout entire length of sufficient cross section to limit temperature rise at rated current to 55 degrees C (131 degrees F).

b. Bus Arrangement: A-B-C, left-to-right, top-to-bottom, and front-to-rear, as viewed from front.

c. Brace for short-circuit currents as shown.

d. Main Horizontal Bus: Nontapered, continuous current rating as shown.

e. Neutral Bus: Continuous current rating as shown.

f. Ground Bus:

1. Copper.
2. Rating: 500 amperes.
3. Bolted to each vertical section.
4. Bus Connections and Joints: Bolted with Belleville washers.

g. Extend each bus entire length of switchboard.

2.19.2 Protective Devices

2.19.2.1 Insulated-Case Circuit Breakers

a. Main Protective Devices Secondary Unit Substation: Fixed, individually mounted, UL 489 listed for 100 percent of continuous ampere rating, suitable for use with 75 degrees C wire at full 75 degrees C ampacity when mounted in switchboard.

b. Arrangement: As shown.

c. Frame Sizes: As shown with solid-state trip units.

d. Interrupting Rating: As shown.

e. Selective override circuit having short-time adjustment for selectivity up to rated rms short-time rating.

f. Two-step, stored energy mechanism with maximum of five cycle closings.

g. Operation: Manual with multiple charge/close and anti-pump provisions.

h. Control Power Voltage: Integral.

i. Operational Sequence: CHARGE-CLOSE-RECHARGE-OPEN-CLOSE-OPEN.

j. Color-Coded Visual Indicators: Contact OPEN and CLOSE, plus mechanism CHARGE and DISCHARGED.

2.19.2.2 Molded-Case Circuit Breakers

a. Main and Branch Feeder Protective Devices: ~~Individually~~ Group mounted, suitable for use with 75 degree C wire at full 75 degree C ampacity when mounted in switchboard.

b. Arrangement: Fully rated main and branch feeder as shown.

c. Breakers 225-Ampere Frame and Above: Continuously adjustable magnetic pickups five to ten times trip rating.

d. Breakers 600-Ampere Frame and Above: Solid-state trip unit.

e. Interrupting Rating: As shown.

f. Breakers 2,000- through 3,000-Ampere Frame: UL 489 listed and labeled 100 percent application in accordance with NFPA 70.

g. Mechanical interlock to prevent opening compartment door while breaker is in closed position.

2.19.2.3 Ground Fault Protection

a. Ground sensor encircling phase conductors and neutral conductor, where used.

b. Solid-state sensing relay and monitor/test panel.

c. Zero sequence current detection, adjustable over range shown.

d. Monitor panel with fault detection indicating light, test, and reset buttons.

e. Control Power Source: Suitable to operate circuit protective device when connected to faulted phase conductor.

2.19.2.4 Solid-State-Trip Unit

a. Flux-shift trip and current sensors.

b. Protective Programmers:

1. Self-powered, automatic RMS sensing micro-electronic processor.

2. No external relays or accessories.

3. Printed circuit cards with gold-plated contacts.

4. Programmable Controls:

a) Fixed-point, with repetitive accuracy and precise unit settings.

b) Trip adjustments made by nonremovable, discrete step switching.

5. Field-Installable Rating Plugs:

a) Long-time pickup LED indicator and test receptacle.

b) Matching load and cable requirements.

c) Interlocked with tripping mechanism.

d) Breaker to remain trip-free with plug removed.

e) Keyed rating plugs to prevent incorrect application.

6. Long-time pickup light.

7. Selective Coordination Time/Current Curve Shaping Adjustable Functions:

a) Current setting.

b) Long-time pickup.

c) Long-time delay.

d) Instantaneous pickup with short-time for main and feeders.

e) Short-time pickup for main and feeders.

g) Ground fault pickup.

h) Ground fault delay with I2T function.

i) High instantaneous pickup with short-time delay.

j) Zone selective interlock.

8. Fault Trip Indicators: Mechanical push-to-reset type for overload and short-circuit overload plus ground fault trip.

9. Rejection Pins: For each programmer frame size.

c. Phase Current Sensors:

1. Single-ratio type.

2. Fixed, mounted on breaker frame.

3. Molded epoxy construction.

4. One toroidal type for each phase.

2.20 CONTROL WIRING

a. Control, Instrumentation, and Power/Current Circuits: NFPA 70, Type SIS, single-conductor, Class B, stranded copper, rated 600 volts.

b. Transducer Output/Analog Circuits: Shielded cable rated 600 volts, 90 degrees C (194 degrees F) minimum.

c. Conductor Lugs: Preinsulated, self-locking, spade-type, with reinforced sleeves.

d. Identification: Individually, with permanent wire markers at each end.

e. Enclose in top and vertical steel wiring troughs, and front-to-rear in nonmetallic wiring troughs.

f. Splices: Not permitted in switchboard wiring.

2.21 TERMINAL BLOCKS

a. Enclosed in steel wiring troughs.

b. Rated 600 volts, 30 amperes minimum, one-piece barrier type with strap screws.

c. Shorting type for current transformer leads.

d. Provide terminal blocks for:

1. Conductors connecting to circuits external to switchboard.

2. Internal circuits crossing shipping splits.

3. Equipment parts requiring replacement and maintenance.

e. Spare Terminals: Not less than 20 percent.

f. Group terminal blocks for external circuit wiring leads.

g. Maintain 6-inch (15.24 cm) minimum space between columns of terminal blocks.

h. Identification: Permanent, for each terminal and columns of terminal blocks.

i. Manufacturer: General Electric; Type EB-5.

2.22 TAPES

2.22.1 Plastic Tape

UL 510.

2.22.2 Rubber Tape

UL 510.

2.23 DRY TYPE TRANSFORMERS

Single- and three-phase transformers shall have two windings per phase. Full-capacity standard NEMA taps shall be provided in the primary windings of transformers unless otherwise indicated. Three-phase transformers shall be configured with delta-wye windings, except as indicated. "T" connections may be used for transformers rated 15 kVA or below. Transformers supplying non-linear loads shall be UL listed as suitable for supplying such loads with a total K-factor not to exceed K-9 and have neutrals sized for 200 percent of rated current.

2.23.1 Transformers, Dry-Type

Transformers shall have 220 degrees C insulation system for transformers 15 kVA and greater, and shall have 180 degrees C insulation system for transformers rated 10 kVA and less, with temperature rise not exceeding 150 degrees C under full-rated load in maximum ambient temperature of 40 degrees C. Transformer of 150 degrees C temperature rise shall be capable of carrying continuously 100 percent of nameplate kVA without exceeding insulation rating.

a. 600 Volt or Less Primary:

NEMA ST 20, UL 506, general purpose, dry-type, self-cooled, ventilated. Transformers shall be provided in NEMA 1 enclosure except NEMA 3R where exterior to the building. Transformers shall be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.

2.23.2 Average Sound Level

The average sound level in decibels (dB) of transformers shall not exceed the following dB level at 12 inches (300 mm) for the applicable kVA rating range listed unless otherwise indicated:

kVA Range	dB Sound Level
1-50	50
51-150	55
151-300	58
301-500	60
501-700	62
701-1000	64
1001-1500	65
1501 & above	70

2.24 WIRING DEVICES

NEMA WD 1 for wiring devices, and NEMA WD 6 for dimensional requirements of wiring devices.

2.25 POWER CONDITIONERS

2.25.1 Summary

These specifications describe requirements for power conditioners and associated distribution panels, supplying computer-grade power to sensitive loads. The specified system shall provide isolation, regulation, noise and transient suppression, distribution, control, and monitoring of AC poser. It shall include all equipment to properly interface the AC power source to the intended load.

2.25.2 System Description

2.25.2.1 Electrical Requirements

a. Output capacity of each conditioner shall be 100 kVA and 100 kW.

b. Input voltage shall be 208 volts AC, 60 Hz, three-phase, three-wire-plus-ground.

c. Output voltage shall be 208/120 volts AC, 60 Hz, three-phase, four wire-plus-ground, wye configuration.

2.25.2.2 Environmental Requirements

a. The storage temperature range shall be -55 degrees C to +85 degrees C (-67 degrees F to +185 degrees F).

b. The operating temperature range shall be 0 degrees C to 40 degrees C (+32 degrees F to 104 degrees F).

c. Operation shall be reliable in an environment with 0 percent to 95 percent noncondensing relative humidity.

d. The audible noise level of the specified system shall be less than 63 dBA at 5 feet (1.5 m).

2.25.3 Components

2.25.3.1 Frame Construction and Enclosure

The frame shall be constructed of welded steel to provide a strong substructure and ensure grounding integrity. The enclosure shall be designed with a welded steel base so that the unit can be moved by fork-lift equipment and set flat on the floor without the use of a floorstand. A tool shall be required to remove the panels that access the hazardous voltage area of the unit. Hinged doors shall provide access for operation of the main input circuit breaker and output circuit breaker(s).

The complete specified system shall have maximum dimensions of: width, 66 inches (1676 mm) 100-125 kVA systems, depth, 36 inches (914 mm); height, 76 inches (1930 mm). Exterior panels shall be removable to allow the unit to

fit through a 34-inch (864 mm) doorway. The distributed floor weight shall be a maximum of 300 lbs/sq. ft. (1465 kg/sq.m). Multiple redundant cooling fans (n + 1) shall allow continuous full load operation at the maximum specified temperature without overtemperature.

2.25.3.2 Input Connections

a. Power: Terminals shall be provided for the incoming AC power and ground. The power connections shall be designed to accept wire sizes commensurate with the input circuit breaker:

   1. 300 - 600 A; (2) #2/0 - 400 kcmil

b. Control: The low-voltage input shall contain a terminal block with at least 21 positions for connecting all building interface alarms, controls, and Remote Emergency Power Off (REPO) switches. The low-voltage section shall also contain a 24 VDC, DPDT building interface relay for interfacing with environmental systems, alarm panels, etc. The relay contacts shall be rated for use at up to 10 amps at 240 VAC.

c. Main Input Circuit Breaker: The specified unit shall be equipped with a main input circuit breaker to provide overcurrent protection and a means for disconnecting power to the unit. The main input circuit breaker shall be a three-pole molded case circuit breaker sized for at least 125 percent of the specified full load input current and rated for 600 VAC. The minimum UL-listed interrupting rating for the main input circuit breaker shall be (25,000) RMS symmetrical amperes at 480 volts AC. The main input circuit breaker shall include a 24 VDC shunt trip mechanism to interface with EPO switches and other system controls.

d. Magnetic Synthesizer: Power conditioning shall be accomplished by using a magnetic synthesizer. The magnetic synthesizer shall be a static electromagnetc 3-phase AC power regenerator and shall not contain mechanically moving parts, power semi-conductors or feedback control circuits. The following shall be typical characteristics exhibited by the magnetic synthesizer:

   1. Static Voltage Regulation (for any load condition, no load to full load): For nominal input voltage, the output voltage shall be within nominal to +/-3 percent. For input voltage variation of +40 percent to -40 percent of nominal, the output voltage shall be within +5 percent to -5 percent.

   2. Unbalanced Load: At nominal input voltage, and with 100 percent load imbalance, output voltage shall be within +5 percent and -2 percent.

   3. Overload: At nominal input voltage, while increasing the load from full to 200 percent of full load, the output voltage shall be no less that -6 percent of nominal. The unit shall be capable of sustaining 200 percent load until activation of the overcurrent protection, typically 3 to 20 minutes.

   4. Input Transients: No power disturbances shall be evident on the output when high-energy ringing transients are impressed on the input lines. The specified system shall protect against surges as defined by ANSI/IEEE Standards C62.41 and C62.45.

5. Electrical Noise Suppression: Common mode noise suppression shall be 120 dB minimum. Normal mode noise suppression shall be 120 dB minimum.

6. Unbalanced Input Voltage (Single-Phasing): Upon loss of one phase of input voltage, output phase voltages shall remain within +5.8 percent to -4 percent of nominal from no load to 60 percent load.

7. Short-Circuit Capability: The sustained short-circuit current shall be limited to 300 percent of full load. This current output shall be sustained without damage, until the overcurrent protection is activated.

8. Harmonic Distortion (No load to full load): The output voltage total harmonic distortion shall be less than 4 percent. Input voltage distortion shall not be added to the output voltage distortion.

9. Efficiency: At nominal input voltage, the efficiency of the system shall be 93 percent at full load, 91.5 percent at three quarter load, and 89 percent at half load.

10. Power Factor: The input power factor of the magnetic synthesizer shall be nearly unity under all load conditions from half to full load. The full load input power factor shall be 0.96 lagging, or better. The input power factor shall be independent of the load power factor.

11. Input Current: The magnetic synthesizer shall draw linear input current from no load to full load. Input current distortion shall be less than 8 percent THD, independent of output current distortion.

12. Output Impedance: A 3-phase bank of capacitors shall be directly connected access the output of the magnetic synthesizer for low output impedance. The output capacitance shall attenuate load generated noise and transients, as well as supply the non-linear current requirements of modern computer equipment without causing excessive output voltage distortion.

The magnetic synthesizer shall be provided with additional thermal overload protection for the transformers. An alarm shall sound if any transformer temperature reaches 160 degrees C. The system shall automatically shut down if any transformer temperature reaches 180 degrees C.

e. Manual Restart: A manual restart circuit shall allow for an orderly supervised startup after power failure. The control circuit shall automatically energize the shunt trip mechanism of the main input breaker upon sensing output voltage failure. A field-selectable auto-restart mode shall be provided to deactivate the manual restart if desired.

f. Emergency Power Off (EPO): The local EPO shall include a fully guarded and illuminated "EMERGENCY POWER OFF" pushbutton. Pressing the EPO switch shall immediately shut down the system by activating the shunt

trip of the main input circuit breaker. As part of the EPO circuit, an interface shall also be provided for connecting normally open or normally closed remote EPO switches to the EPO circuit. For flexibility in meeting shutdown control schemes, the local EPO (unit shutdown) circuit shall be isolated from the remote EPO (room shutdown) circuit. The remote EPO circuit shall be designed to allow direct connection of multiple units with single and/or multiple shutdown control contacts.

g. Computer-Grade Ground: A computer-grade, single-point ground shall be provided in accordance with computer manufacturer's recommendations, IEEE Std. 1100, and the requirements of the NEC. The synthesizer output neutral shall be solidly grounded in accordance with NEC article 250-26.

2.25.3.3 Self-Contained System

The self-contained system shall also include:

a. Output Distribution Panelboards: The specified system shall contain four vertically mounted output panelboards for distribution to the intended loads. Each output distribution panelboard shall be individually protected by a main panelboard circuit breaker. Each panelboard shall be individually enclosed with a separate cover which provides access to that panelboard without exposing other portions of the unit. The panelboard shall have a rating of 225 amperes, with an overall short-circuit current rating of 10,000 RMS symmetrical amperes. The panelboards shall provide a total of 120 single-pole branch circuit breaker positions. Each panel board shall include separate isolated neutral and safety-ground bus bars for the neutral and safety-ground connections from each branch load. Each neutral bus bar and wiring shall be rated for at least 1.73 times the full load rating of the panelboard to accommodate high neutral currents associated with single-phase nonliner loads.

b. Branch Circuit Breakers: Each load shall be protected by an individual branch circuit breaker. Each panel shall be fully equipped with 20-amp single-pole breakers in each position, with exception to a 125-amp, 3-pole breaker in SPCP-4 to feed panel SSP. Each branch circuit breaker shall provide overcurrent protection and "ON-OFF" switching to the specified load. Single-pole, two pole and three pole bolt-in type branch circuit breakers up through 100 amperes shall be utilized. Each circuit breaker shall clearly identify the "ON", the "OFF", and the "TRIPPED" positions. All branch circuit breakers shall have a minimum interrupting capacity of 10,000 RMS symmetrical amperes at 120/240 VAC. Each branch circuit breaker shall be sized in accordance with the NEC and shall be UL/CSA listed. Branch circuit breakers shall have an associated directory label, located adjacent to the breaker, identifying the branch circuit number and the equipment being served.

2.25.3.4 Power Monitoring System

The specified system shall be equipped with a microprocessor-based Power Monitor Panel. The monitor panel shall gather and process information from electrical and environmental sensors, relays, and switches both internal and external to the unit. The monitored parameters and alarms shall be displayed on the unit monitor panel, and shall also be available for communication to a Liebert centralized site monitoring system using a two-wire, twisted-pair, low-voltage signal circuit having an RS-422 format for

reliable communication up to 1000 meters. Additionally, the monitor panel shall be equipped with an RS-232 service port for adjusting parameters and performing diagnostics.

a. Monitored Parameters:

1. The monitoring system shall monitor and display all of the following parameters:

a) Input Voltages, Line-to-Line for all three phases.
b) Output Voltages, Line-to-Line for all three phases.
c) Output Voltages, Line-to Neutral for all three phases.
d) Output Current for all three phases.
e) Output Neutral Current.
f) System Ground Current.
g) Output Frequency.
h) Output kVA.
i) Output kW.
j) Output Power Factor.
k) Percent Load.

2. All three phases of the three-phase parameters shall be displayed simultaneously. All voltage and current parameters shall be monitored using true RMS measurements for accurate representation of non-sinusoidal waveforms typical of computers and other sensitive loads.

b. Alarm Annunciation:

1. The monitoring system shall detect and annunciate by audible alarm and displayed alarm message the following conditions:

a) Output Overvoltage
b) Output Undervoltage
c) Output Overload
d) Neutral Overcurrent
e) Ground Overcurrent
f) Transformer Overtemperature
g) Frequency Deviation
h) Phase Sequence Error
i) Phase Loss

2. All alarm thresholds for monitored parameters shall be adjustable by the way of the service port to match site requirements. The factory setpoints for the alarms shall be as follows:

a). Output Overvoltage: Output voltage exceeds +6 percent of nominal.
b). Output Undervoltage: Output voltage falls below -13 percent of nominal.
c). Output Overload: Output current exceed 95 percent of full load amps.
d). Neutral Overcurrent: Neutral current exceeds 95 percent of full load amps.
e). Ground Overcurrent: Ground current exceeds 5 amps.
f). Frequency Deviation: Output frequency exceeds +/-0.5 Hz of nominal.

To facilitate troubleshooting, all alarms shall be stored in battery-backed (non-volatile) memory until reset to protect against erasure by a power outage. Alarms shall be able to be manually reset, either at the unit or through the centralized site monitoring system, after the alarm condition has been corrected.

c. Custom Alarm Annunciation: The monitoring system shall be capable of providing alarm annunciation for up to five contact closures (4 N.O. and 1 N.C.). A custom alarm message of up to 20 characters shall be provided for each contact. Alarm messages shall be programmable by way of the service port to match site requirements.

d. Summary Alarm Contact: A form C (1 N.O. and 1 N.C.) Summary Alarm Contact shall be provided for remote alarm status. The contacts shall change state upon occurrence of any alarm and shall reset upon alarm silence.

e. Display:

1. All monitored parameters and alarm messages shall be displayed on a 4 x 20 character, high-visibility liquid crystal display (LCD) located on the unit front door within a decorative bezel. Included in the bezel shall be an Identifying Unit Number, Emergency Power Off (EPO) switch, and an Alarm Present/Silence switch.

2. The Alarm Present/Silence switch shall be illuminated upon occurrence of any alarm and remain illuminated until all alarms are reset. The switch shall also be used to silence the audible alarm and reset inactive alarms.

f. Autoscan: For ease of operation, the monitoring system shall include an autoscan mode which provides continuous sequential display of all monitored parameters and active alarm messages. A Hold/Sequence switch shall be provided to interrupt the autoscan mode and allow manual selection of the displayed parameters.

2.25.3.5 Accessories

a. Bypass Switch:

1. The unit shall be equipped with a bypass circuit for manually removing the magnetic synthesizer from the power path. The bypass circuit shall include a reserve input power connection, a reserve input breaker, and a bypass switch. The unit shall contain power terminals for connection of the incoming AC power. The reserve input power connections shall be designed to accept a wire size commensurate with the reserve input breaker rating.

2. The reserve input breaker shall be a 3-pole molded-case circuit breaker, providing overcurrent protection and a means for disconnecting power to the bypass circuit. The circuit breaker shall be rated for 600 VAC and sized for 125 percent of the bypass circuit full load input circuit in accordance with the NEC. The minimum UL-listed interrupting rating for the reserve input circuit breaker shall be (25,000) RMS symmetrical amperes at 480 VAC. The reserve input circuit breaker shall include a 24VDC shunt trip

mechanisms to interface with EPO switches and other system controls.

3. The bypass switch shall be UL recognized 4-pole, double-throw, break-before-make switch rated for industrial use, with a continuous current rating of at least 125 percent of the full load output amps. The bypass switch shall switch the output phases and neutral simultaneously for complete isolation of the magnetic synthesizer. The switch shall allow the output to be powered from either the magnetic synthesizer or from the reserve input.

2.25.4 Floor Pedestals

Floor pedestals shall be furnished to level the unit and to provide bottom cabling access without relying upon a raised floor for support. The nominal height of the floor pedestals shall be 6 inches with adjustments for +/-3 inches.

2.26 MANUAL TRANSFER SWITCH

a. Transfer switch consisting of inherently double-throw power switch.

b. Rated 100 percent, in amperes, for total system transfer of motor, electric heating, discharge lamp loads, and tungsten-filament lamp loads. Switches rated above 400 amperes suitable for 30 percent tungsten-filament lamp loads

c. Main and arcing contacts visible for inspection with cabinet door and barrier covers removed.

d. Suitable for 480/277 volts, three-phase, four-wire, grounded-wye electrical service having an available short circuit at line terminals of 65,000 amperes rms symmetrical.

e. Switch Rating: 600 amperes rating in nonventilated enclosure.

f. Current carrying capacity of arcing contacts shall not be used to determine the transfer switch rating.

g. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.

h. Operating Conditions:

1. Ambient Temperature: Maximum 50 degrees C.

2. Equipment to be fully rated without any derating for operating conditions listed above.

i. Locking mechanism to maintain constant contact pressure.

j. Silver alloy contacts protected by arcing contacts.

k. Nonventilated NEMA 250, Type I with enclosure grounding terminal.

l. Dead front, front accessible floor mounted cabinet with 14-gauge welded steel construction.

m. Continuously hinged single door, with handle and lock cylinder.

n. Finish: Baked enamel applied over rust-inhibiting, phosphate base coating.

1. Exterior and Interior Color: Provide gray finish.

2. Unpainted Metal Parts: Plated for corrosion resistance.

2.27 FAULT CURRENT AND PROTECTIVE DEVICE COORDINATION STUDY

Analyses shall be prepared to demonstrate that the equipment and system constructed meet the specified requirements for equipment ratings, coordination, and protection. They shall include a load flow analysis, a fault current analysis, and protective device coordination study. The studies shall be performed by a registered professional engineer with demonstrated experience in power system coordination in the last three years. The Contractor shall provide a list of references complete with points of contact, addresses and telephone numbers. The selection of the engineer is subject to the approval of the Contracting Officer.

2.27.1 Scope of Analyses

The fault current analysis, and protective device coordination study shall begin at: the source bus and extend down to system buses where fault availability is 10,000 amperes (symmetrical) for building/facility 600 volt level distribution buses.

2.27.2 Determination of Facts

The time-current characteristics, features, and nameplate data for each existing protective device shall be determined and documented. The Contractor shall utilize the fault current availability indicated as a basis for fault current studies.

2.27.3 Single Line Diagram

A single line diagram shall be prepared to show the electrical system buses, devices, transformation points, and all sources of fault current (including generator and motor contributions). A fault-impedance diagram or a computer analysis diagram may be provided. Each bus, device or transformation point shall have a unique identifier. If a fault-impedance diagram is provide, impedance data shall be shown. Locations of switches, breakers, and circuit interrupting devices shall be shown on the diagram together with available fault data, and the device interrupting rating.

2.27.4 Fault Current Analysis

2.27.4.1 Method

The fault current analysis shall be performed in accordance with methods described in IEEE Std 242, and IEEE Std 399.

2.27.4.2 Data

Actual data shall be utilized in fault calculations. Bus characteristics and transformer impedances shall be those proposed. Data shall be documented in the report.

2.27.4.3 Fault Current Availability

Balanced three-phase fault, bolted line-to-line fault, and line-to-ground fault current values shall be provided at each voltage transformation point and at each power distribution bus. The maximum and minimum values of fault available at each location shall be shown in tabular form on the diagram or in the report.

2.27.5 Coordination Study

The study shall demonstrate that the maximum possible degree of selectivity has been obtained between devices specified, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. Provide a written narrative that describes: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; situation where system coordination is not achievable due to device limitations (an analysis of any device curves which order overlap); coordination between upstream and downstream devices; and relay settings. Recommendations to improve or enhance system reliability, and detail where such changes would involve additions or modifications to the contract and cost changes (addition or reduction) shall be provided. Composite coordination plots shall be provided on log-log graph paper.

2.27.6 Study Report

a. The report shall include a narrative: the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.

b. The study shall include descriptive and technical data for existing devices and new protective devices proposed. The data shall include manufacturers published data, nameplate data, and definition of the fixed or adjustable features of the existing or new protective devices.

c. The report shall document utility company data including system voltages, fault MVA, system X/R ratio, time-current characteristic curves, current transformer ratios, and relay device curves and protective device ratings and settings.

d. The report shall contain fully coordinated composite time-current characteristic curves for each bus in the system, as required to ensure coordinated power system protection between protective devices or equipment. The report shall include recommended ratings and settings of all protective devices in tabulated form.

e. The report shall provide the calculations performed for the analyses, including computer analysis programs utilized. The name of the software package, developer, and version number shall be provided.

PART 3 EXECUTION

3.1 GROUNDING

Grounding shall be in conformance with NFPA 70, the contract drawings, and Section 16665, GROUNDING.

3.2 WIRING METHODS

Wiring shall conform to NFPA 70, the contract drawings, and the following specifications. Unless otherwise indicated, wiring shall consist of insulated conductors installed in rigid zinc-coated steel conduit, rigid plastic conduit, and electrical metallic tubing. Where cables and wires are installed in cable trays, they shall be of the type permitted by NFPA 70 for use in such applications. Wire fill in conduits shall be based on NFPA 70 for the type of conduit and wire insulations specified.

3.2.1 Conduit and Tubing Systems

Conduit and tubing systems shall be installed as indicated. Conduit sizes shown are based on use of copper conductors with insulation types as described in paragraph WIRING METHODS. Minimum size of raceways shall be 1/2 inch (15 mm). Only metal conduits will be permitted when conduits are required for shielding or other special purposes indicated, or when required by conformance to NFPA 70. Nonmetallic conduit and tubing may be used in damp, wet or corrosive locations when permitted by NFPA 70 and the conduit or tubing system is provided with appropriate boxes, covers, clamps, screws or other appropriate type of fittings. Electrical metallic tubing (EMT) may be installed only within buildings. EMT may not be installed in concrete and grout in dry locations. EMT shall not be installed in damp or wet locations, or the air space of exterior masonry cavity walls. Bushings, manufactured fittings or boxes providing equivalent means of protection shall be installed on the ends of all conduits and shall be of the insulating type, where required by NFPA 70. Only UL listed adapters shall be used to connect EMT to rigid metal conduit, cast boxes, and conduit bodies. Penetrations of above grade floor slabs, time-rated partitions and fire walls shall be firestopped in accordance with Section 07840 FIRESTOPPING. Raceways shall not be installed under the firepits of boilers and furnaces and shall be kept 6 inches (150 mm) away from parallel runs of flues, steam pipes and hot-water pipes. Raceways shall be concealed within finished walls, ceilings, and floors unless otherwise shown. Raceways crossing structural expansion joints or seismic joints shall be provided with suitable expansion fittings or other suitable means to compensate for the building expansion and contraction and to provide for continuity of grounding. Wiring installed in underfloor duct system shall be suitable for installation in wet locations.

3.2.1.1 Pull Wires

A pull wire shall be inserted in each empty raceway in which wiring is to be installed if the raceway is more than 50 feet (15 meters) in length and contains more than the equivalent of two 90-degree bends, or where the raceway is more than 150 feet (45 meters) in length. The pull wire shall be of No. 14 AWG zinc-coated steel, or of plastic having not less than 200 pounds per square inch (1.4 MPa) tensile strength. Not less than 10 inches (254 mm) of slack shall be left at each end of the pull wire.

3.2.1.2 Conduit Stub-Ups

Where conduits are to be stubbed up through concrete floors, a short elbow shall be installed below grade to transition from the horizontal run of conduit to a vertical run. A conduit coupling fitting, threaded on the inside shall be installed, to allow terminating the conduit flush with the finished floor. Wiring shall be extended in rigid threaded conduit to equipment, except that where required, flexible conduit may be used 6 inches (150 mm) above the floor. Empty or spare conduit stub-ups shall be plugged flush with the finished floor with a threaded, recessed plug.

3.2.1.3 Below Slab-on-Grade or in the Ground

Electrical wiring below slab-on-grade shall be protected by a conduit system. Conduit passing vertically through slabs-on-grade shall be rigid steel or rigid plastic conduit. Rigid steel or rigid plastic conduits installed below slab-on-grade or in the earth shall be field wrapped with 0.010 inch (0.254 mm) thick pipe-wrapping plastic tape applied with a 50 percent overlay, or shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating system.

3.2.1.4 Installing in Slabs Including Slabs on Grade

Conduit installed in slabs-on-grade shall be rigid steel or rigid plastic conduit. Conduits shall be installed as close to the middle of concrete slabs as practicable without disturbing the reinforcement. Outside diameter shall not exceed 1/3 of the slab thickness and conduits shall be spaced not closer than 3 diameters on centers except at cabinet locations where the slab thickness shall be increased as approved by the Contracting Officer. Where conduit is run parallel to reinforcing steel, the conduit shall be spaced a minimum of one conduit diameter away but not less than one inch (25.4 mm) from the reinforcing steel.

3.2.1.5 Changes in Direction of Runs

Changes in direction of runs shall be made with symmetrical bends or cast-metal fittings. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways in damp and wet locations shall be avoided where possible. Lodgment of plaster, dirt, or trash in raceways, boxes, fittings and equipment shall be prevented during the course of construction. Clogged raceways shall be cleared of obstructions or shall be replaced.

3.2.1.6 Supports

Metallic conduits and tubing, and the support system to which they are attached, shall be securely and rigidly fastened in place to prevent vertical and horizontal movement at intervals of not more than 10 feet (3 meters) and within 3 feet (900 mm) of boxes, cabinets, and fittings, with approved pipe straps, wall brackets, conduit clamps, conduit hangers, threaded C-clamps, beam clamps, or ceiling trapeze. Loads and supports shall be coordinated with supporting structure to prevent damage or deformation to the structure. Loads shall not be applied to joist bridging. Attachment shall be by wood screws or screw-type nails to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat-treated or spring-steel-tension clamps on steel work. Nail-type nylon anchors or threaded studs driven in

by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine screws. Raceways or pipe straps shall not be welded to steel structures. Cutting the main reinforcing bars in reinforced concrete beams or joists shall be avoided when drilling holes for support anchors. Holes drilled for support anchors, but not used, shall be filled. In partitions of light steel construction, sheet-metal screws may be used. Raceways shall not be supported using wire or nylon ties. Raceways shall be independently supported from the structure. Upper raceways shall not be used as a means of support for lower raceways. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Cables and raceways shall not be supported by ceiling grids. Except where permitted by NFPA 70, wiring shall not be supported by ceiling support systems. Conduits shall be fastened to sheet-metal boxes and cabinets with two locknuts where required by NFPA 70, where insulating bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, a single locknut and bushing may be used. Threadless fittings for electrical metallic tubing shall be of a type approved for the conditions encountered. Additional support for horizontal runs is not required when EMT rests on steel stud cutouts.

3.2.1.7 Exposed Raceways

Exposed raceways shall be installed parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings. Raceways under raised floors and above accessible ceilings shall be considered as exposed installations in accordance with NFPA 70 definitions.

3.2.1.8 Exposed Risers

Exposed risers in wire shafts of multistory buildings shall be supported by U-clamp hangers at each floor level, and at intervals not to exceed 10 feet (3 meters).

3.2.1.9 Exposed Lengths of Conduit, Over 600 Volts

Exposed lengths of conduit containing power conductors operating at more than 600 volts shall have two red bands 2 inches (50 mm) wide spaced 8 inches (200 mm) apart painted near each coupling; the intervening space between the red bands shall be painted white, and on the white space the voltage shall be stenciled in black the line-to-line voltage of the system.

3.2.1.10 Communications Raceways

Communications raceways indicated shall be installed in accordance with the previous requirements for conduit and tubing and with the additional requirement that no length of run shall exceed 50 feet (15 meters) for 1/2 inch (15 mm) and 3/4 inch (20 mm) sizes, and 100 feet (30 meters) for 1 inch (25 mm) or larger sizes, and shall not contain more than two 90-degree bends or the equivalent. Additional pull or junction boxes shall be installed to comply with these limitations whether or not indicated. Inside radii of bends in conduits of 1 inch (25 mm) size or larger shall not be less than ten times the nominal diameter.

3.2.2 Busway Systems

Busway systems shall be of the voltage, capacity, and phase characteristics indicated. Vertical runs of busways within 6 feet (1.8 meters) of the floor

shall have solid enclosures. Busways shall be supported at intervals not exceeding 5 feet (1.5 meters), and shall be braced properly to prevent lateral movement. Busways penetrating walls or floors shall be provided with flanges to completely close wall or floor openings.

3.2.3 Cable Trays

Cable trays shall be supported in accordance with the recommendations of the manufacturer but at no more than 6 foot (1.8 meter) intervals. Contact surfaces of aluminum connections shall be coated with an antioxidant compound prior to assembly. Adjacent cable tray sections shall be bonded together by connector plates of an identical type as the cable tray sections. The Contractor shall submit the manufacturer's certification that the cable tray system meets all requirements of Article 318 of NFPA 70. The cable tray shall be installed and grounded in accordance with the provisions of Article 318 of NFPA 70. Data submitted by the Contractor shall demonstrate that the completed cable tray systems will comply with the specified requirements. Cable trays shall be provided with fire pillows within the tray at smoke and fire partitions. The installation shall be sealed to preserve the smoke and fire rating of the partitions. Penetrations shall be firestopped in accordance with Section 07840 FIRESTOPPING.

3.2.4 Cables and Conductors

Installation shall conform to the requirements of NFPA 70. Covered, bare or insulated conductors of circuits rated over 600 volts shall not occupy the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 600 volts or less.

3.2.4.1 Sizing

Unless otherwise noted, all sizes are based on copper conductors and the insulation types indicated. Sizes shall be not less than indicated. Branch-circuit conductors shall be not smaller than No. 12 AWG. Conductors for branch circuits of 120 volts more than 100 feet (30 meters) long and of 277 volts more than 230 feet (70 meters) long, from panel to load center, 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, remote-control and signal circuits shall be not less than No. 22 AWG.

3.2.4.2 Conductor Identification and Tagging

Power, control, and signal circuit conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number, and panel designation. Phase conductors of low voltage power circuits shall be identified by color coding. Phase identification by a particular color shall be maintained continuously for the length of a circuit, including junctions.

a. Color coding shall be provided for service, feeder, branch, and ground conductors. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one

system are installed in the same raceway or box, other neutral shall be white with colored (not green) stripe. The color coding for 3-phase and single-phase low voltage systems shall be as follows:

120/208-volt, 3-phase: Black(A), red(B), and blue(C).
277/480-volt, 3-phase: Brown(A), orange(B), and yellow(C).
120/240-volt, 1-phase: Black and red.

b. Conductor phase and voltage identification shall be made by color-coded insulation for all conductors smaller than No. 6 AWG. For conductors No. 6 AWG and larger, identification shall be made by color-coded insulation, or conductors with black insulation may be furnished and identified by the use of half-lapped bands of colored electrical tape wrapped around the insulation for a minimum of 3 inches (75 mm) of length near the end, or other method as submitted by the Contractor and approved by the Contracting Officer.

c. Control and signal circuit conductor identification shall be made by color-coded insulated conductors, plastic-coated self-sticking printed markers, permanently attached stamped metal foil markers, or equivalent means as approved. Control circuit terminals of equipment shall be properly identified. Terminal and conductor identification shall match that shown on approved detail drawings. Hand lettering or marking is not acceptable.

3.3 BOXES AND SUPPORTS

Boxes shall be provided in the wiring or raceway systems where required by NFPA 70 for pulling of wires, making connections, and mounting of devices or fixtures. Pull boxes shall be furnished with screw-fastened covers. Indicated elevations are approximate, except where minimum mounting heights for hazardous areas are required by NFPA 70. Unless otherwise indicated, boxes for wall switches shall be mounted 48 inches (1.2 meters) above finished floors. Switch and outlet boxes located on opposite sides of fire rated walls shall be separated by a minimum horizontal distance of 24 inches (600 mm). The total combined area of all box openings in fire rated walls shall not exceed 100 square inches (0.0645 square meters) per 100 square feet (9.3 square meters). Maximum box areas for individual boxes in fire rated walls vary with the manufacturer and shall not exceed the maximum specified for that box in UL Elec Const Dir. Only boxes listed in UL Elec Const Dir shall be used in fire rated walls.

3.3.1 Box Applications

Each box shall have not less than the volume required by NFPA 70 for number of conductors enclosed in box. Boxes for metallic raceways shall be listed for the intended use when located in normally wet locations, when flush or surface mounted on outside of exterior surfaces, or when located in hazardous areas. Boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces shall be gasketed. Boxes for mounting lighting fixtures shall be not less than 4 inches (102 mm) square, or octagonal, except smaller boxes may be installed as required by fixture configuration, as approved. Cast-metal boxes with 3/32 inch (2.4 mm) wall thickness are acceptable. Large size boxes shall be NEMA 12 or as shown. Boxes in other locations shall be sheet steel except that aluminum boxes may

be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic conduit and tubing or nonmetallic sheathed cable system, when permitted by NFPA 70. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers.

3.3.2 Brackets and Fasteners

Boxes and supports shall be fastened to wood with wood screws or screw-type nails of equal holding strength, with bolts and metal expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screw or welded studs on steel work. Threaded studs driven in by powder charge and provided with lockwashers and nuts, or nail-type nylon anchors may be used in lieu of expansion shields, or machine screws. Penetration of more than 1-1/2 inches (38.1 mm) into reinforced-concrete beams or more than 3/4 inch (19.1 mm) into reinforced-concrete joists shall avoid cutting any main reinforcing steel. The use of brackets which depend on gypsum wallboard or plasterboard for primary support will not be permitted. In partitions of light steel construction, bar hangers with 1 inch (25 mm) long studs, mounted between metal wall studs or metal box mounting brackets shall be used to secure boxes to the building structure. When metal box mounting brackets are used, additional box support shall be provided on the side of the box opposite the brackets. This additional box support shall consist of a minimum 12 inch (300 mm) long section of wall stud, bracketed to the opposite side of the box and secured by two screws through the wallboard on each side of the stud. Metal screws may be used in lieu of the metal box mounting brackets.

3.3.3 Mounting in Walls, Ceilings, or Recessed Locations

In walls or ceilings of concrete, tile, or other non-combustible material, boxes shall be installed so that the edge of the box is not recessed more than 1/4 inch (6 mm) from the finished surface. Boxes mounted in combustible walls or ceiling material shall be mounted flush with the finished surface. The use of gypsum or plasterboard as a means of supporting boxes will not be permitted. Boxes installed for concealed wiring shall be provided with suitable extension rings or plaster covers, as required. The bottom of boxes installed in masonry-block walls for concealed wiring shall be mounted flush with the top of a block to minimize cutting of the blocks, and boxes shall be located horizontally to avoid cutting webs of block. Separate boxes shall be provided for flush or recessed fixtures when required by the fixture terminal operating temperature, and fixtures shall be readily removable for access to the boxes unless ceiling access panels are provided.

3.3.4 Installation in Overhead Spaces

In open overhead spaces, cast-metal boxes threaded to raceways need not be separately supported except where used for fixture support; cast-metal boxes having threadless connectors and sheet metal boxes shall be supported directly from the building structure or by bar hangers. Hangers shall not be fastened to or supported from joist bridging. Where bar hangers are used, the bar shall be attached to raceways on opposite sides of the box and the raceway shall be supported with an approved type fastener not more than 24 inches (600 mm) from the box.

3.4 DEVICE PLATES

One-piece type device plates shall be provided for all outlets and fittings. Plates on unfinished walls and on fittings shall be of zinc-coated sheet steel, cast-metal, or impact resistant plastic having rounded or beveled edges. Plates on finished walls shall be of steel with baked enamel finish or impact-resistant plastic and shall be ivory, satin finish corrosion resistant steel or satin finish chromium plated brass. Screws shall be of metal with countersunk heads, in a color to match the finish of the plate. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch (1.6 mm). The use of sectional-type device plates will not be permitted. Plates installed in wet locations shall be gasketed and provided with a hinged, gasketed cover, unless otherwise specified.

3.5 RECEPTACLES

3.5.1 Single and Duplex, 15 or 20-ampere, 125 volt

Single and duplex general purpose receptacles shall be rated 20 amperes, 125 volts, two-pole, three-wire, grounding type with polarized parallel slots. Bodies shall be of ivory to match color of switch handles in the same room or to harmonize with the color of the respective wall, and supported by mounting strap having plaster ears. Contact arrangement shall be such that contact is made on two sides of an inserted blade. Receptacle shall be side- or back-wired with two screws per terminal. The third grounding pole shall be connected to the metal mounting yoke. Switched receptacles shall be the same as other receptacles specified except that the ungrounded pole of each suitable receptacle shall be provided with a separate terminal. Only the top receptacle of a duplex receptacle shall be wired for switching application. Receptacles with ground fault circuit interrupters shall have the current rating as indicated, and shall be UL Class A type unless otherwise shown. Ground fault circuit protection shall be provided as required by NFPA 70 and as indicated on the drawings.

3.5.2 Clock Outlet

Clock outlet, for use in other than a wired clock system, shall consist of an outlet box, a plaster cover where required, and a single receptacle with clock-outlet plate. The receptacle shall be recessed sufficiently within the box to allow the complete insertion of a standard cap, flush with the plate. A suitable clip or support for hanging the clock shall be secured to the top of the plate. Material and finish of the plate shall be as specified in paragraph DEVICE PLATES.

3.5.3 Weatherproof Applications

Weatherproof receptacles shall be suitable for the environment, damp or wet as applicable, and the housings shall be labeled to identify the allowable use. Receptacles shall be marked in accordance with UL 514A for the type of use indicated; "Damp locations", "Wet Locations", "Wet Location Only When Cover Closed". Assemblies shall be installed in accordance with the manufacturer's recommendations.

3.5.3.1 Damp Locations

Receptacles in damp locations shall be mounted in an outlet box with a gasketed, weatherproof, cast-metal cover plate (device plate, box cover) and a gasketed cap (hood, receptacle cover) over each receptacle opening. The cap shall be either a screw-on type permanently attached to the cover plate by a short length of bead chain or shall be a flap type attached to the cover with a spring loaded hinge.

3.5.3.2 Wet Locations

Receptacles in wet locations shall be installed in an assembly rated for such use whether the plug is inserted or withdrawn, unless otherwise indicated. In a duplex installation, the receptacle cover shall be configured to shield the connections whether one or both receptacles are in use. Assemblies which utilize a self-sealing boot or gasket to maintain wet location rating shall be furnished with a compatible plug at each receptacle location and a sign notifying the user that only plugs intended for use with the sealing boot shall be connected during wet conditions.

3.5.4 Receptacles, 15-Ampere, 250-Volt

Receptacles, 15-ampere, 250-volt, shall be single two-pole, three-wire, grounding type with bodies of as indicated phenolic compound supported by mounting yoke having plaster ears. The third grounding pole shall be connected to the metal yoke. Each receptacle shall be provided with a mating cord-grip plug.

3.5.5 Receptacles, 20-Ampere, 250-Volt

Receptacles, single, 20-ampere, 250-volt, shall be as indicated molded plastic, two-pole, three-wire or three-pole, four-wire, grounding type complete with appropriate mating cord-grip plug.

3.5.6 Receptacles, 30-Ampere, 250-Volt

Receptacles, single, 30-ampere, 250-volt, shall be molded-plastic, three-pole, three-wire type, complete with appropriate mating cord-grip plug.

3.5.7 Receptacles, 50-Ampere, 250-Volt

Receptacles, single, 50-ampere, 250-volt, shall be flush molded plastic, three-pole, three-wire type, complete with appropriate mating cord-grip plug.

3.5.8 Special-Purpose or Heavy-Duty Receptacles

Special-purpose or heavy-duty receptacles shall be of the type and of ratings and number of poles indicated or required for the anticipated purpose. Contact surfaces may be either round or rectangular. One appropriate straight or angle-type plug shall be furnished with each receptacle. Locking type receptacles, rated 30 amperes or less, shall be locked by rotating the plug. Locking type receptacles, rated more than 50 amperes, shall utilize a locking ring.

3.6 WALL SWITCHES

Wall switches shall be of the totally enclosed tumbler type. The wall switch handle and switch plate color shall be ivory. Wiring terminals shall

be of the screw type or of the solderless pressure type having suitable conductor-release arrangement. Not more than one switch shall be installed in a single-gang position. Switches shall be rated 20-ampere 277-volt for use on alternating current only. Pilot lights indicated shall consist of yoke-mounted candelabra-base sockets rated at 75 watts, 125 volts, and fitted with glass or plastic jewels. A clear 6-watt lamp shall be furnished and installed in each pilot switch. Jewels for use with switches controlling motors shall be green, and jewels for other purposes shall be red. Dimming switches shall be solid-state flush mounted, sized for the loads.

3.7 SERVICE EQUIPMENT

Service-disconnecting means shall be of the type indicated in paragraph POWER SWITCHGEAR ASSEMBLIES INCLUDING SWITCHBOARDS with an external handle for manual operation. When service disconnecting means is a part of an assembly, the assembly shall be listed as suitable for service entrance equipment. Enclosures shall be sheet metal with hinged cover for surface mounting unless otherwise indicated.

3.8 PANELBOARDS

Circuit breakers and switches used as a motor disconnecting means shall be capable of being locked in the open position. Door locks shall be keyed alike. Nameplates shall be as approved. Directories shall be typed to indicate loads served by each circuit and mounted in a holder behind a clear protective covering. Busses shall be copper.

3.8.1 Panelboards

Panelboards shall be circuit breaker or fusible switch equipped as indicated on the drawings. Multipole fusible switches shall be of the hinged-door type; single pole fusible switches shall be of the tumbler switch and fuse type. Switches serving as a motor disconnect means shall be of the tumbler switch and fuse type. Switches serving as motor disconnect means shall be horsepower rated in conformance with UL 98.

3.9 FUSES

Equipment provided under this contract shall be provided with a complete set of properly rated fuses when the equipment manufacturer utilize fuses in the manufacture of the equipment, or if current-limiting fuses are required to be installed to limit the ampere-interrupting capacity of circuit breakers or equipment to less than the maximum available fault current at the location of the equipment to be installed. Fuses shall have a voltage rating of not less than the phase-to-phase circuit voltage, and shall have the time-current characteristics required for effective power system coordination. Time-delay and non-time-delay options shall be as shown.

3.9.1 Cartridge Fuses; Noncurrent-Limiting Type

Cartridge fuses of the noncurrent-limiting type shall be Class H, nonrenewable, dual element, time lag type and shall have interrupting capacity of 10,000 amperes. At 500 percent current, cartridge fuses shall not blow in less than 10 seconds.

3.9.2 Cartridge Fuses; Current-Limiting Type

Cartridge fuses, current-limiting type, Class G, J, K, L, RK1, and CC shall have tested interrupting capacity not less than 100,000 amperes. Fuse holders shall be the type that will reject all Class H fuses.

3.9.3 Continuous Current Ratings (600 Amperes and Smaller)

Service entrance and feeder circuit fuses (600 amperes and smaller) shall be Class RK1, current-limiting, nontime-delay with 200,000 amperes interrupting capacity.

3.9.4 Motor and Transformer Circuit Fuses

Motor, motor controller, transformer, and inductive circuit fuses shall be Class RK1 or RK5, current-limiting, time-delay with 200,000 amperes interrupting capacity.

3.10 MOTORS

Each motor shall conform to the hp and voltage ratings indicated, and shall have a service factor and other characteristics that are essential to the proper application and performance of the motors under conditions shown or specified. Three-phase motors for use on 3-phase 208-volt systems shall have a nameplate rating of 200 volts. Unless otherwise specified, all motors shall have open frames, and continuous-duty classification based on a 40 degree C ambient temperature reference. Polyphase motors shall be squirrel-cage type, having normal-starting-torque and low-starting-current characteristics, unless other characteristics are specified in other sections of these specifications or shown on contract drawings. The Contractor shall be responsible for selecting the actual horsepower ratings and other motor requirements necessary for the applications indicated. When electrically driven equipment furnished under other sections of these specifications materially differs from the design, the Contractor shall make the necessary adjustments to the wiring, disconnect devices and branch-circuit protection to accommodate the equipment actually installed.

3.11 MOTOR CONTROL

Each motor or group of motors requiring a single control and not controlled from a motor-control center or individual combination motor starter shall be provided under other sections of these specifications with a suitable controller and devices that will perform the functions as specified for the respective motors. Each motor of 1/8 hp (93 W) or larger shall be provided with thermal-overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload-protection device shall be provided either integral with the motor or controller, or shall be mounted in a separate enclosure. Unless otherwise specified, the protective device shall be of the manually reset type. Single or double pole tumbler switches specifically designed for alternating-current operation only may be used as manual controllers for single-phase motors having a current rating not in excess of 80 percent of the switch rating. Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motors directly, provided the devices used are designed for that purpose and have an adequate horsepower rating. When the automatic-control device does not have such a rating, a magnetic starter shall be used, with the automatic-control device actuating the pilot-control circuit. When

combination manual and automatic control is specified and the automatic-control device operates the motor directly, a double-throw, three-position tumbler or rotary switch shall be provided for the manual control; when the automatic-control device actuates the pilot control circuit of a magnetic starter, the latter shall be provided with a three-position selector switch marked MANUAL-OFF-AUTOMATIC. Connections to the selector switch shall be such that only the normal automatic regulatory control devices will be bypassed when the switch is in the Manual position; all safety control devices, such as low- or high-pressure cutouts, high-temperature cutouts, and motor-overload protective devices, shall be connected in the motor-control circuit in both the Manual and the Automatic positions of the selector switch. Control circuit connections to any MANUAL-OFF-AUTOMATIC switch or to more than one automatic regulatory control device shall be made in accordance with wiring diagram approved by the Contracting Officer unless such diagram is included on the drawings. All controls shall be 120 volts or less unless otherwise indicated.

3.11.1 Contacts

Unless otherwise indicated, contacts in miscellaneous control devices such as float switches, pressure switches, and auxiliary relays shall have current and voltage ratings in accordance with NEMA ICS 2 for rating designation B300.

3.11.2 Safety Controls

Safety controls for boilers shall be connected to a 2-wire, 120 volt grounded circuit supplied from the associated boiler-equipment circuit. Where the boiler circuit is more than 120 volts to ground, safety controls shall be energized through a two-winding transformer having its 120 volt secondary winding grounded. Overcurrent protection shall be provided in the ungrounded secondary conductor and shall be sized for the load encountered.

3.12 MOTOR-DISCONNECT MEANS

Each motor shall be provided with a disconnecting means when required by NFPA 70 even though not indicated. For single-phase motors, a single or double pole toggle switch, rated only for alternating current, will be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor rating. Switches shall disconnect all ungrounded conductors.

3.13 TRANSFORMER INSTALLATION

Three-phase transformers shall be connected only in a delta-wye or wye-delta configuration as indicated. "T" connections may be used for transformers rated at 15 kVA or below. Dry-type transformers shown located within 5 feet (1.5 meters) of the exterior wall shall be provided in a weatherproof enclosure. Transformers to be located within the building may be provided in the manufacturer's standard, ventilated indoor enclosure designed for use in 40 degrees C ambient temperature, unless otherwise indicated.

3.14 LIGHTING FIXTURES, LAMPS AND BALLASTS

This paragraph shall cover the installation of lamps, lighting fixtures and ballasts in interior or building mounted applications.

3.14.1 Lamps

Lamps of the type, wattage, and voltage rating indicated shall be delivered to the project in the original cartons and installed just prior to project completion. Lamps installed and used for working light during construction shall be replaced prior to turnover to the Government if more than 15% of their rated life has been used. Lamps shall be tested for proper operation prior to turn-over and shall be replaced if necessary with new lamps from the original manufacturer. 10% spare lamps of each type, from the original manufacturer, shall be provided.

3.14.2 Lighting Fixtures

Fixtures shall be as shown and shall conform to the following specifications and shall be as detailed on the drawings. Illustrations shown on the drawings are indicative of the general type desired and are not intended to restrict selection to fixtures of any particular manufacturer. Fixtures of similar designs and equivalent energy efficiency, light distribution and brightness characteristics, and of equal finish and quality will be acceptable if approved.

3.14.2.1 Accessories

Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.

3.14.2.2 Ceiling Fixtures

Ceiling fixtures shall be coordinated with and suitable for installation in, on or from the ceiling as shown. Installation and support of fixtures shall be in accordance with NFPA 70 and manufacturer's recommendations. Where seismic requirements are specified herein, fixtures shall be supported as shown or specified. Recessed fixtures shall have adjustable fittings to permit alignment with ceiling panels. Recessed fixtures installed in fire-resistive ceiling construction shall have the same fire rating as the ceiling or shall be provided with fireproofing boxes having materials of the same fire rating as the ceiling, in conformance with UL Elec Const Dir. Surface-mounted fixtures shall be suitable for fastening to the ceiling panel structural supports.

3.14.2.3 Fixtures for Installation in Grid Type Ceilings

Fixtures for installation in grid type ceilings which are smaller than a full tile shall be centered in the tile. 1 by 4 foot (305 by 1219 mm) fixtures shall be mounted along the grid rail as shown. Work above the ceiling shall be coordinated among the trades to provide the lighting layout shown. Fixtures mounted to the grid shall have trim exactly compatible with the grid. Contractor shall coordinate trims with ceiling trades prior to ordering fixtures. Metric fixtures shall be designed to fit the metric grid specified. Fixtures in continuous rows shall be coordinated between trades prior to ordering. Fixtures shall be mounted using independent supports capable of supporting the entire weight of the fixture. No fixture shall rest solely on the ceiling grid. Recessed fixtures installed in seismic areas should be installed utilizing specially designed seismic clips. Junction boxes shall be supported at four points.

3.14.2.4 Suspended Fixtures

Suspended fixtures shall be provided with swivel hangers or hand-straights so that they hang plumb. Pendants, rods, or chains 4 feet (1.2 meters) or longer excluding fixture shall be braced to prevent swaying using three cables at 120 degrees of separation. Suspended fixtures in continuous rows shall have internal wireway systems for end to end wiring and shall be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces. Aligning splines shall be used on extruded aluminum fixtures to assure hairline joints. Steel fixtures shall be supported to prevent "oil-canning" effects. Fixture finishes shall be free of scratches, nicks, dents, and warps, and shall match the color and gloss specified. Pendants shall be finished to match fixtures. Aircraft cable shall be stainless steel. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown. Maximum distance between suspension points shall be 10 feet (3.1 meters) or as recommended by the manufacturer, whichever is less.

Suspended fixtures installed in seismic areas shall have 45% swivel hangers and shall be located with no obstructions within the 45% range in all directions. The stem, canopy and fixture shall be capable of 45% swing.

3.14.3 Ballasts

Remote type ballasts or transformers, where indicated, shall be mounted in a well ventilated, easily accessible location, within the maximum operating distance from the lamp as designated by the manufacturer.

3.15 BATTERY CHARGERS

Battery chargers shall be installed in conformance with NFPA 70.

3.16 EQUIPMENT CONNECTIONS

Wiring not furnished and installed under other sections of the specifications for the connection of electrical equipment as indicated on the drawings shall be furnished and installed under this section of the specifications. Connections shall comply with the applicable requirements of paragraph WIRING METHODS. Flexible conduits 6 feet (2 m) or less in length shall be provided to all electrical equipment subject to periodic removal, vibration, or movement and for all motors. All motors shall be provided with separate grounding conductors. Liquid-tight conduits shall be used in damp or wet locations.

3.16.1 Motors and Motor Control

Motors, motor controls, and motor control centers shall be installed in accordance with NFPA 70, the manufacturer's recommendations, and as indicated. Wiring shall be extended to motors, motor controls, and motor control centers and terminated.

3.16.2 Installation of Government-Furnished Equipment

Wiring shall be extended to the equipment and terminated.

3.16.3 Food Service Equipment Provided Under Other Sections

Wiring shall be extended to the equipment and terminated.

3.17 CIRCUIT PROTECTIVE DEVICES

The Contractor shall calibrate, adjust, set and test each new adjustable circuit protective device to ensure that they will function properly prior to the initial energization of the new power system under actual operating conditions.

3.18 POWER CONDITIONERS

Factory start-up, preventive maintenance, and full service for the specified system shall be available and included upon request. The manufacturer shall directly employ a nationwide service organization of factory-trained field service personnel dedicated to the start-up, maintenance, and repair of the manufacturer's power equipment. The manufacturer shall maintain a national dispatch center 24 hours per day, 365 days per year, to minimize service response time and to maximize availability of qualified service personnel.

3.19 PAINTING AND FINISHING

Field-applied paint on exposed surfaces shall be provided under Section 09900 PAINTS AND COATINGS.

3.20 REPAIR OF EXISTING WORK

The work shall be carefully laid out in advance, and where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceiling, or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, this work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Government.

3.21 FIELD TESTING

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 20 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests and develop a comprehensive field test plan. The Contractor shall perform all tests and inspection recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. All field test reports will be signed and dated by the Contractor.

3.21.1 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.21.2 Ground-Resistance Tests

The resistance of each grounding electrode system shall be measured using the fall-of-potential method defined in IEEE Std 81. Soil resistivity in the area of the grid shall be measured concurrently with the grid measurements. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

a. Single rod electrode - 25 ohms.

b. Grid electrode system - 5 ohms.

3.21.3 Ground-Grid Connection Inspection

All below-grade ground-grid connections will be visually inspected by the Contracting Officer before backfilling. The Contractor shall notify the Contracting Officer 24 hours before the site is ready for inspection.

3.21.4 Cable Tests

The Contractor shall be responsible for identifying all equipment and devices that could be damaged by application of the test voltage and ensuring that they have been properly disconnected prior to performing insulation resistance testing. An insulation resistance test shall be performed on all low and medium voltage cables after the cables are installed in their final configuration and prior to energization. The test voltage shall be 500 volts DC applied for one minute between each conductor and ground and between all possible combinations of conductors. The minimum value of resistance shall be:

R in megohms = (rated voltage in kV + 1) x 1000/(length of cable in feet)

Each cable failing this test shall be repaired or replaced. The repaired cable system shall then be retested until failures have been eliminated.

3.21.4.1 Medium Voltage Cable Tests

a. Continuity test.

b. Insulation resistance test.

c. DC high-potential test.

3.21.4.2 Low Voltage Cable Tests

a. Continuity test.

b. Insulation resistance test.

3.21.5 Metal Enclosed Busway Tests

a. Insulation Resistance phase-to-phase, all combinations.

b. Insulation resistance phase-to-ground, each phase.

c. AC or DC high-potential test.

d. Phase rotation test.

3.21.6 Motor Tests

a. Phase rotation test to ensure proper directions.

b. Operation and sequence of reduced voltage starters.

c. High potential test on each winding to ground.

d. Insulation resistance of each winding to ground.

e. Vibration test.

f. Dielectric absorption test on motor.

3.21.7 Liquid-Filled Transformer Tests

The following field tests shall be performed on all liquid-filled transformers 1000 kVA and above

a. Insulation resistance test phase-to-ground, each phase.

b. Turns ratio test.

c. Correct phase sequence.

d. Correct operation of tap changer.

3.21.8 Dry-Type Transformer Tests

The following field tests shall be performed on all dry-type transformers 500 kVA and above.

a. Insulation resistance test phase-to-ground, each phase.

b. Turns ratio test.

3.21.9 Circuit Breaker Tests

The following field tests shall be performed on circuit breakers.

3.21.9.1 Circuit Breaker Tests, Medium Voltage

a. Insulation resistance test phase-to-phase, all combinations.

b. Insulation resistance tests phase-to-ground, each phase.

c. Closed breaker contact resistance test.

d. Power factor test.

e. High-potential test.

f. Manual and electrical operation of the breaker.

3.21.9.2 Circuit Breakers, Low Voltage

a. Insulation resistance test phase-to-phase, all combinations.

b. Insulation resistance test phase-to-ground, each phase.

c. Closed breaker contact resistance test.

d. Manual and electrical operation of the breaker.

3.21.9.3 Circuit Breakers, Molded Case

a. Insulation resistance test phase-to-phase, all combinations.

b. Insulation resistance test phase-to-ground, each phase.

c. Closed breaker contact resistance test.

d. Manual operation of the breaker.

3.21.10 Protective Relays

Protective relays shall be visually and mechanically inspected, adjusted, tested, and calibrated in accordance with the manufacturer's published instructions. These tests shall include pick-up, timing, contact action, restraint, and other aspects necessary to insure proper calibration and operation. Relay settings shall be implemented in accordance with the coordination study. Relay contacts shall be manually or electrically operated to verify that the proper breakers and alarms initiate. Relaying current transformers shall be field tested in accordance with IEEE C57.13.

3.22 OPERATING TESTS

After the installation is completed, and at such time as the Contracting Officer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the specified requirements. An operating test report shall be submitted in accordance with paragraph FIELD TEST REPORTS.

3.23 FIELD SERVICE

3.23.1 Onsite Training

The Contractor shall conduct a training course for the operating staff as designated by the Contracting Officer. The training period shall consist of a total of 8 hours of normal working time and shall start after the system is functionally completed but prior to final acceptance tests. The course instruction shall cover pertinent points involved in operating, starting, stopping, servicing the equipment, as well as all major elements of the operation and maintenance manuals. Additionally, the course instructions shall demonstrate all routine maintenance operations. A VHS format video tape of the entire training shall be submitted.

3.23.2 Installation Engineer

After delivery of the equipment, the Contractor shall furnish one or more field engineers, regularly employed by the equipment manufacturer to supervise the installation of equipment, assist in the performance of the onsite tests, oversee initial operations, and instruct personnel as to the operational and maintenance features of the equipment.

3.24 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

3.25 FIXTURE DETAILS

Fixture details applicable to this project are attached at the end of this Section.

End of Section

QUALITY ASSURANCE SURVEILLANCE PLAN

FOR

FACILITY MAINTENANCE
FOR
BATTLE SIMMULATION CENTER
Fort Lewis, WA

This plan is provided for information purposes only. The Quality Assurance Surveillance Plan is not part of the Request for Proposal nor will it be made part of any resulting contract. The Government has the right to change or modify inspection methods at its discretion.

May 2003

QUALITY ASSURANCE SURVEILLANCE PLAN

FOR FACILITY MAINTENANCE

FOR BATTLE SIMMULATION CENTER AT FORT LEWIS, WA

1. INTRODUCTION:

1.1 This Quality Assurance Surveillance Plan (QASP) has been developed to evaluate Contractor performance while implementing the requirements stated in Section 01830 of this contract. It is designed to provide an effective surveillance method of monitoring contractor performance for each listed objective on the Performance Requirements Summary (PRS) in the Facility Maintenance portion of this contract.

1.2 The QASP provides a systematic method to evaluate the services the Contractor is required to furnish. It is based on the premise the Government desires to maintain a quality standard in operating, maintaining, and repairing facilities and that a service contract to provide the service is the best means of achieving that objective.

1.3 The Contractor, and not the Government, is responsible for management and quality control actions to meet the terms of the contract. The role of the Government is quality assurance to ensure contract and proposal standards are achieved.

1.4 In this contract the quality control program is the driver for product quality. The Contractor is required to develop a comprehensive program of inspections and monitoring actions. The first major step to ensuring a "self-correcting" contract is to ensure that the quality control program approved at the beginning of the contract provides the measures needed to lead the Contractor to success.

1.5 Once the quality control program is approved, careful application of the process and standards presented in the remainder of this document will ensure a successful quality assurance program.

2. PERFORMANCE REQUIREMENTS SUMMARY:

2.1 The Contractor's service delivery requirements are summarized into performance objectives that relate directly to standards of performance required to meet mission essential needs. The performance threshold briefly describes the minimum acceptable overall levels of service required for each required service. These thresholds are critical to mission success.

PERFORMANCE REQUIREMENTS SUMMARY

Performance Objective	SOW Para.	Performance Threshold
Operation and Preventive Maintenance. Operate facility systems, manage the operation of facility maintenance program, provide preventive maintenance and unscheduled/corrective maintenance, and maintain storage bins and cabinets with emergency stock of replacement equipment, supplies and spare parts.	1.5	95 % of the time
Continuous operational/functional evaluation of critical systems. Maintain critical systems and components to reach each system's life expectancy.	1.6	95 % of the time
Unscheduled Maintenance and General Services. Perform unscheduled maintenance on all building systems and equipment.	1.7	95 % of the time
Service Orders. Issue service orders for all scheduled and unscheduled maintenance.	1.7.3	95 % of the time
Emergency or Urgent Requirements. Perform emergency and urgent requirements within the time frames in Section 01830.	1.7.4	95 % of the time

3. SURVEILLANCE:

3.1 The primary method of surveillance for the Operation and Preventive Maintenance Objective will be monthly review of the Contractor's operation and maintenance logs and review of customer complaint forms by the Government's Quality Assurance Representative (QAR).

3.2 The primary method of surveillance for the other Performance Objectives will be the Government performing unscheduled inspections of reports and records maintained by the Contractor and reviewing customer complaint forms by the QAR. Unscheduled inspection is any observation made during the course of a normal day that may result in the observation of a defect or unsatisfactory performance.

3.3 If customer complaints and unscheduled inspections indicate ineffective Contractor quality control, the Government QAR will utilize planned inspections as a tightened method of QA surveillance. If the Contractor's performance is unsatisfactory for two (2) consecutive monthly performance periods, the Government will implement a tightened planned sampling surveillance method.

3.4 The Government may request and review records/reports without prior notification.

4. PROCEDURES:

4.1 The QAR will conduct monthly or unscheduled reviews of the Contractor's logs, reports, and records to ensure they adequately reflect the Contractor's operations and maintenance procedures, are sequentially numbered, include dates, identify service orders, customer information (e.g., point of contact, unit or organization, telephone number, and location). Customer complaints forms will also be reviewed. The QAR will record results of inspections, noting the date and time of inspection. If an inspection indicates defective performance, the QAR will notify the Contract Facilities Manager of the defect for correction. Contractor shall be given two (2) hours after notification to correct the defect(s) or provide a plan for correction acceptable to the QAR. The QAE will follow-up to insure corrective action was accomplished.

TRANSCRIPT OF PROCEEDINGS

PRE-PROPOSAL CONFERENCE FOR REQUEST FOR PROPOSALS

NO. DACA67-03-R-0210

BATTLE SIMULATION CENTER

FORT LEWIS, WASHINGTON

8 MAY 2003

Reported by: Fay J. Holme, CSR-RPR

License No. HOLMEFJ374P6

MS. MITTON: Good morning. Thank you all for coming. My name is Mary Mitton. I'm the contract specialist working on this project.

This is the pre-proposal conference and site visit for Request for Proposal No. DACA67-03-R-0210, Battle Simulation Center, Fort Lewis, Washington.

Today's proceedings will be -- the minutes will be taken by our court reporter, and they will be provided via amendment along with the sign-in sheet.

If anyone has not signed up, please put your name and information on the sign-in sheet before we go out to the site visit.

Today's proceedings will be handled as follows: We will go through the -- the project manager will speak about the project. I will go through some contracting issues and some proposal preparation issues. Then we will take you out to the site.

While you're out at the site, we ask that you don't ask any questions, that you write them down and then you come back here, and you can ask your questions. Then anything we say today does not change the request for proposal package. That can only be changed via amendment.

So we may answer a few questions, but if they're in any way different from what's in the RFP, the RFP stands unless we do an amendment.

At this time, I'd like to take the opportunity to

have the Government representatives introduce themselves, and just --

MR. NESPOR: My name is Greg Nespor. I'm the project architect with WJA.

MAJOR WARD: I'm Steve Ward. I'm the project manager. I work out of the Seattle District Corps of Engineer office.

MR. HOHLWEG: I'm Bob Hohlweg with the Corps of Engineers. I will be the quality assurance representative.

MS. MITTON: And at this time, Major Ward, would you like to go ahead and speak about an overview of the project?

MAJOR WARD: Okay. I will do that, and I'll speak very general about the project. It's basically from our original design documents.

What we have, we have a Battle Simulation Center, and just to orient you to where we are right now -- most of you are probably fairly familiar with Fort Lewis.

Right down here is the DuPont gate, so it's the next gate south of where we were. You come in in there, and basically, if you looked over here, I think this is the State Farm offices, if you've seen that.

The new Battle Simulation Center is located right here. This is our little detention facility right next to it. And there's currently -- right next door,

we have a multipurpose training facility which was built about five years ago, and so that facility you'll see stood up right next to our current facility.

This is an approximate 67,000-square-foot facility, so it's about the size of a football field, is kind of how we describe it. So it's a very large building. It's considered high-tech. It has -- it's purpose, primary purpose will be to conduct simulations, war gaming, as you might have heard. It's going to have computer simulation, and so it will have work stations where individuals can go in, and they'll run individual scenarios, and it incorporates all of the people that are in the building.

It also has the capability to extend outside the building to people all over the country. They will be connected through communications that way, and it also has the ability to connect to people in the field who are actually satelliting back in. So it can do all that, and it can also hook into virtual type simulations that are done at other facilities and link that back in. Three can be incorporated into this one facility.

It has an auditorium. I think it's approximately a 250-person auditorium connected to it, and that's for after-action reviews. When people first come in, it can be used for that, so that has that in there.

It also has classrooms that are also dual purpose that can be used for simulation space, so it has classroom, slash, simulation space.

It has large open bays for the simulation space, and probably the biggest -- one of the biggest features of this building is going to be the communication package. We have both secret -- or secure and nonsecure. We have a secure departmentalized intelligence facility inside that building, so that's going to be able to handle secret and top-secret information, so that's part of this building.

We have a guard shack outside of the building, so there will be security requirements that go along with this building, and it's going to be surrounded by fence. And then we also have the capability to park vehicles on the outside of the building, and they connect into this facility so we can transfer data through the building and they can hook up like that.

It has office space for -- how many people? 80?

NESPOR: Approximately.

MAJOR WARD: Approximately 80 people, so it has space for its normal staff, which is about 80 people that will have office space, and they'll be the permanent staff that will be associated with this building, and that's about all I'm going to talk about right now.

MS. MITTON: At this time, let me go through some of the matter items in the RFP package that are important to contracting and important to you.

This project is open to both large and small businesses. For technical matters, there is an e-mail address for you to use.

We're not accepting phone calls or faxes, and the reason is, when you e-mail in to techbid@nws02.usace.army.mil, they are able to keep a record. Oh, it's all in this. It's all in the front. The very first page of the solicitation gives you -- for technical matters, you have an e-mail address.

The reason we don't accept phone calls and faxes is because we are trying to keep a record of everything, and by getting the e-mails in and then keeping track of the responses, the technical folks have a good package to put together for the people on the field after award. And if there are any questions regarding contracting matters, you can contact me, and my phone number and e-mail address are there.

All right. In the "Caution to Offerors" section, there is something you need to be aware of. There was a recent court case, a GAO decision regarding bonding. So you want to be sure that your bid bonds on the power of attorney contain an original signature, and we talk about that in Paragraph 7 on the "Caution to Offerors."

Telegraphic modifications are not acceptable or facsimile proposals are not acceptable.

In order for us to make an award, we have to have the selected firm registered in the central contractor registration. So those are the things on the "Caution to Offerors" page that you need to look at.

On the 1442 standard form, you will be submitting that with your proposal. That is the solicitation, offer, and award page.

Please note that the contractor is going to be beginning performance within ten calendar days after receipt of notice to proceed, and that is discussed for the construction portion in Section 800.

Since this project has a construction phase and a service phase, which is the five years of maintenance, we have a Section 800 which has all the special contract requirements that deal with the construction phase, and then there is a Section 00801 which deals with the matters for the second phase of this project, which is the operations and maintenance phase.

You will have to provide performance and payment bonds and proof of insurance. The same requirement for the power of attorney applies to the performance and payment bonds as to the bid bond.

Currently, okay, the proposals are due at 3 p.m. on May 22nd, 2003, and the proposals are good for 90 calendar days from the date the offers are due.

On the back of the Standard Form 1442, it's very important that you acknowledge all amendments by the number and the date, and not the date you necessarily downloaded them or received them, but the date of issue on the amendment itself.

Corporate certificate. You will fill that out according to whether you are a corporation, a partnership, or a joint venture.

The schedule, which is Section 10, starts on Page 10-5 and goes to Page 10-8. You will notice that we have six base items, and the first year of operations and maintenance is included in that, in the base items. As a minimum, we will award all of the base items when we award the contract. The optional items are discussed in Section 800 and elsewhere, and I will go through that in a few minutes.

A subcontracting plan is required by all large businesses. Now, you see there are quite a few optional items, so the small business utilization specialist has grouped them. So just please don't be too frustrated. Go ahead and look at the groupings for the optional items in the small business subcontracting plan letter, and if you have any questions, please call Susan Price. She's the deputy for small business, and her phone number is 764-6807.

Section 100 is "Instructions to Offerors." Okay. As I said, the contract, in order to be eligible for

award, you must be in the central contractor registration.

In Section 100, there are directions on how to do that. You will also need a DUNS number. There are directions on how to get that. We ask that the offers be submitted in the English language. The basis of award is that as a minimum, we will award the base items.

If there are clerical mistakes, this section tells you how we will treat them. Please pay attention particularly to "Instructions to Offerors, Competitive Acquisition." That is Provision 52.215-1.

In that provision, it tells you what is considered late. And so you want to be sure that you allow extra time to go through our security system. It's just like an airport. You have to put your bags through a conveyor belt. You have to walk through an archway. So be sure you allow enough time so your proposal will not be late when you go to turn it in.

We will be awarding a firm, fixed-price contract as a result of the solicitation, and when we evaluate price, we will evaluate the total price, including all the options.

The Buy American Act under the Trade -- and construction materials under the Trade Agreements Act apply to this solicitation. You can find the information on that in Provision 52.225-12.

Your bid guarantee should be 20 percent of your bid price or $3 million, whichever is less.

Magnitude of construction for the construction portion is between $10 and $25 million.

Now I'm going on to Section 110. That's 00110. That is "Proposal Submission and Evaluation." It's the Government's intent to award on initial offers. We reserve the right to hold discussions, but we would like to award on initial offers.

A contract will be awarded to the firm submitting the proposal that conforms to the RFP, is considered to provide the most advantageous offer in terms of evaluation factors, including price, and is determined to be in the best interest of the Government.

The evaluation factors are listed in this section. The submittal requirements are listed. Let's see. Everything you need to know is in there.

If you have any questions, please call me regarding those submittal requirements.

For joint ventures, there is specific information. Please follow that if you are going to be a joint venture.

Now, I had a telephone call yesterday regarding how we're going to handle the HUBZone preference. So I quick went to see the deputy for small business and got some information on that.

What will happen is, this is a negotiated

procurement. It is not a sealed bid. That particular clause, which is in Section 00700 and is 52.219-4, that clause is called "Notice of Price Evaluation Preference for HUBZone Small Business Concerns."

This clause and the preference only apply when the low bid is a large business and we have a HUBZone -- and we have a HUBZone submitting a bid. All right. However, this is a negotiated procurement, and it may or may not apply.

So this is how it will work, to answer the question of the person who called yesterday: In "Negotiated Procurements," Paragraph 2 of that clause states, "Other evaluation factors described in the solicitation shall be applied before application of the 10 percent price factor. Therefore, in negotiated procurements, the technical and price evaluations are conducted for determining a firm that provides the overall best value to the Government. These evaluations will be conducted in accordance with the procedure stated in Section 110."

And for this solicitation, you would look on Page 110-11, in particular Paragraphs 7.2, which is price evaluation, Paragraph 8, selection and award, and Paragraph 8.3.1, best value analysis.

If the best value firm is a small business, the HUBZone preference is not considered, and that's because a small business cannot be displaced by the

HUBZone program.

If the best value firm is a large business and there is a HUBZone firm in the competition, a separate analysis will be conducted to add the 10 percent to the large business firm's price and to consider all aspects of the best value evaluation in determining which firm will receive the award.

So far, this scenario has not come up in negotiated procurements. However, we have talked to people in the Air Force and other -- and SBA and found out this is the way it's being handled, but so far, it hasn't really come up.

All right. Let's see. I want to be sure I give you the dollar ranges for both phases of this. The construction I told you a few minutes ago. The construction portion of this solicitation, the magnitude of construction is between $10 million and $25 million.

The dollar range for the operation and maintenance portion of the solicitation is between $750,000 and $1.5 million.

Section 600. That is the representations and certifications. That is pretty self-explanatory. Please go ahead and fill that out and send that in with your proposal.

The one thing I want to point out is when you're determining if you are a small business or a large

business.

The small business size standard is the annual average gross revenue taken for the last three fiscal years does not exceed $28.5 million.

Section 700 is the contract clauses, and I have divided those up. They're the clauses that apply to both the construction and the service phases, those that apply only to the construction phase and those that apply only to the service phase.

For the construction phase, please be aware that we use the Davis Bacon wage rates and you will be submitting certified payrolls.

For the maintenance portion of the -- of the contract, I want to point out on Page 48 of 157, there are two clauses. The first one, 52.217-8, "Option to Extend Services," that allows a six-month extension if, at the end of our contract, we haven't awarded the new one and we need to extend the services.

Now, Clause 52.217-9, "Option to Extend the Term of the Contract," that one deals with the option years.

Now, ideally we will be able to award all the option years with the basic contract, but if that doesn't happen, this clause is the one that will govern. So I just wanted to point that out to you.

All right. Now, Section 800 is "Special Clauses." That is for the construction portion of

this project only. For the service project part of this project, Section 00801 will apply.

For the construction portion, I just want to point out a few things. SC-1, "Commencement, Prosecution, and Completion of Work," this project should be completed no later than 570 calendar days after the contractor receives notice to proceed.

The option items that apply only to the construction phase, which are 7 through 15, those will be awarded in accordance with Paragraph SC-1.1, "Option for Increased Quantity."

Liquidated damages. That is Paragraph SC-2. They will be $1,742 for each day of delay. And note that in addition to your performance and payment bonds, after award, you have to submit proof of insurance, and the minimum amounts of insurance are provided in SC-5.

On to 801, which is the part I'm going to take a little bit of extra time with.

The Service Contract Act applies here. So we're going to switch from Davis Bacon wage rates to service contract wage rate.

I have put the current service contract wage rate in here, but you know it's going to be several years until we actually go ahead and start using the service contract wage rates.

At least six months before that first maintenance

period, I'm going to contact the Department of Labor and get the latest wage rates. We're going to send them to you, and you're going to have to figure out and submit to us the basis for any increases that are necessary either in the direct labor rates or in the health and benefits.

Your insurance will still have to be in effect while you're doing the service portion of this work and -- okay.

Substitute personnel. You're going to have to get approval from the contracting officer for the key personnel, which is the contractor facility manager and the alternate contractor facility manager.

All of the specifications for the facility maintenance program are in Section 01830, so go ahead and be sure you read those carefully, and e-mail us or call us if you have any concerns.

We are going to get an amendment out by next Friday at the latest, and so any questions you might have that we could resolve, please e-mail them to techbid, or some of these questions, you can actually call me and I will forward them on to whoever needs to get them.

Are there any questions about the contracting portion of the solicitation at this time? Yes, sir.

MR. ALLEN: There's going to be one amendment that includes this information and then an

additional amendment next Friday, or is it all going to be combined in one?

MS. MITTON: It will all be combined in one.

THE COURT REPORTER: Can you state your name?

MS. MITTON: Oh, yes. I'm sorry. As each person asks a question, they need to state their name and the firm they are with.

MR. ALLEN: I'm Stu Allen, and I'm with Absher Construction.

MS. MITTON: A-b-s-h-e-r. Any other questions?

(No response.)

MS. MITTON: We can go on the site visit if you want to say something now.

MAJOR WARD: Okay. Our plan, I just wanted to also point out when I brought you back up to this map. We're right here, so those of you that want to do, and then Bob will lead us over to the site and take us over there, and our plan there is to go over, maybe walk the ground so you can see it, see if that inspires any questions, and then we'll come back here and have another chance to answer questions.

The intent while we're at the site visit is to not take care of questions over there, because it's very difficult for us to capture everything. We don't want side bar conversations happening over there. So

we will come right back here, and we'll answer your questions at that time.

For those of you, in Amendment 1, we did have some stuff -- a pretty significant change in Amendment 1, and that was the duct bank that takes this project from the current facility over here at the Battle Simulation Center back to Building 2003, which is approximately right here, and that's our DOIM, and that's their headquarters. And what we did is, we did a survey, and we could not find adequate duct bank between the two, and so we had to add a duct bank to this project.

So the routing space, we're going to -- I'm not sure of the exact path, but it basically takes you --

MR. NESPOR: It basically, from this Building 13 -- or 2003, runs directly down this street, crosses this intersection here, and then feeds over to the project. And the information that was issued in the first amendment is partial. We wanted to get as much out as we could so that you would be aware of that change, but there is additional information on that duct bank routing that will be issued with the second amendment.

MAJOR WARD: Yeah, and that will come out a week from Friday.

MS. MITTON: Yes, sir.

MR. McDONALD: Rick McDonald, Pease

Construction. Is there an intention to extend the bid date with that amendment? That's getting pretty close to the bid opening.

MS. MITTON: We'll take that into consideration.

MAJOR WARD: Correct, but at this time, we don't plan -- and that's why we try to get out -- something out in the first amendment, so that you would be aware of it and understand that that's coming down.

It was a very late discovery, and so that's why we handled it the way we did.

(Site visit.)

MS. MITTON: Let's recommence the pre-proposal conference. I will have someone put the attendee list on the web site tomorrow, so you can look for it there.

Are there any questions, anyone?

MAJOR WARD: Any site-specific questions particularly?

MR. ALLEN: Stu Allen, Absher Construction. There was some loose gravel and fill materials in the area to be demolished.

What is going to be the status of those when we take possession of the site?

MAJOR WARD: It will be coordinated with Public Works, but all of the materials will be moved

to a site to be determined by Public Works, but it won't be the contractor's responsibility to move the materials.

MR. ALLEN: Okay.

MAJOR WARD: But the building is separate. The building is in there, but the materials.

MR. NESPOR: And there are also some trailers and things that are currently on the site that are not shown on the plan. The contractor doesn't have any responsibility for those trailers as well.

MAJOR WARD: Yeah. What you'll see is, from the MSTF all the way over to where the RVs are parked will be a clean area, except for the one building that's part of the demolition.

MR. NESPOR: And the fencing.

MAJOR WARD: And the fencing, correct.

MR. MAHER: And you've got some --

MS. MITTON: Oh, just give your name, sir.

MR. MAHER: Tom Maher, JKT Development. You've also got some abutments in there that are used for scooping up the gravel that are going to have to be demo'd.

MR. NESPOR: When you say "abutments," you're talking about ecology block type of things or --

MAJOR WARD: Or the concrete walls?

MR. MAHER: The concrete walls.

MAJOR WARD: Correct. Those are part of the demo.

MR. NESPOR: Right, and that is called out on the demolition plan. It gives you the thickness and height of that wall, and the buttresses are shown in the plan as well. So that's pretty well described.

MS. MITTON: Yes, sir.

MR. HOTSINPILLER: Scott Hotsinpiller, Sequoyah Electric. The specs you're using, 16710 and, I believe, 16711 for telecoms, are the DOIM specifications part of this project?

MAJOR WARD: Can you send that forward as a --

MR. HOTSINPILLER: RFI?

MAJOR WARD: RFI, yeah.

MR. HOTSINPILLER: Sure.

MAJOR WARD: We'll get you -- we'll get an answer out. I just can't remember if we incorporated them into it or how we handled that.

MR. HOTSINPILLER: It looks like there's changes from 16710 and 16711, but there's --

MAJOR WARD: We'll get you that.

MS. MITTON: Any other questions? Yes, sir.

MR. McDONALD: Rick McDonald, Pease Construction. In the facilities management plan, Section 01830 on Page 11, Paragraph 3, it's the

facility management system. It's a computerized system, and it talks about the contractor's intended FMS software. Then in that same paragraph, it talks about Government-furnished RISER software. I'm just wondering if -- is there a difference there or can you explain what is being asked?

MS. MITTON: Page 11.

MAJOR WARD: Yeah. That's a good point. We'll have to coordinate that with Public Works to make sure that we have the correct one, and I think that might actually not be the correct one, so we will get an answer out on that one.

MR. McDONALD: On one hand, it says that we provide software, and then on the other hand, it says --

MAJOR WARD: Yeah. I think there's -- not only that, but I think even the RISER, that's supposed to be maximum, so we'll have to make sure we get a clarification on that.

MS. MITTON: Do you have another question?

MR. McDONALD: Well, the others I'll submit as tech questions.

MS. MITTON: Any other questions today? Any comments the Government representatives want to make?

MAJOR WARD: Just thanks for coming, and get the questions in. We'll get them answered as quickly as we can, the tech info. Glad you could make it.

MS. MITTON: That concludes the pre-proposal conference. Thank you for coming.

(Conference concluded.)

Sign-In Sheet for Pre-Proposal Conference & Site Visit for RFP No. DACA67-03-R-0210
BATTLE SIMULATION CENTER, FT. LEWIS, WA - 10:00 a.m., 8 May 03

	NAME & TITLE	COMPANY NAME	PHONE NO.	FAX NO./ EMAIL
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4	Steve Ward Project Manager	USACE Seattle	206-7643533	
5	MARK ZYLSTRA PROJECT MANAGER	WPC	253 8519309	253 851 6475 MARKC WPCONSTRUCTION.COM
6	STU ALLEN SENIOR ESTIMATOR	ABSHER CONST.	253-845-9544	253-841-0925 STUARTA@AbsherNW.COM
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	NAME & TITLE	COMPANY NAME	PHONE NO.	FAX NO./ EMAIL
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15 16	LONNY MASON	" "	" " "	lmason@Absherww.com
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22	Rick McDonald P.M. & Estimator	Pease Const.	253-584-4404	253-581-7855 rick@peaseinc.com
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	NAME & TITLE	COMPANY NAME	PHONE NO.	FAX NO./ EMAIL
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