US Army Corps of Engineers®

RFP No. DACA67-03-R-0223

Seattle District

Renovate Dormitory 737

Malmstrom AFB, MT

Construction Solicitation and Specifications

August 2003

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Open to both Large and Small Business

MALMSTROM AFB, MONTANA

Pre Proposal Conference and Site Visit:

- A one-time pre proposal conference and site visit for offerors is scheduled for August 19, 2003. Offerors desiring to attend should arrive no later than 0900 A.M., local time, at the main gate of Malmstrom AFB, Montana.
- If you plan to attend the site visit you **must** contact Carolyn Brown at (406) 771-0092 or email carolyn.r.brown@usace.army.mil **on or before August 14, 2003**. You must provide your driver's license number and state of issuance for yourself and any attendees. Also you will need to provide the insurance number and company name for any vehicle driven onto Malmstrom AFB. To enter the installation, you must present a valid drivers license and state your destination on base (Corps of Engineers construction site visit). The site visit will be in Building 771 at 7218 Goddard on Malmstrom AFB.

- DIRECTION TO MALMSTROM AFB: From the airport take I-15 north, to the 10th Ave south exit, following the signs directing traffic to Malmstrom AFB. Turn left on northwest bypass, at light turn right on 2nd Ave South. When entering Malmstrom AFB, park on the west side of the Gate Security building, not in the visitor parking lot. Sign in at the Visitor Center. After getting pass enter the installation on Goddard. Just past the first light, building 770 is the first building on the right. Park close to the Corps of Engineers flag. Enter and check in with Carolyn Brown then proceed to Suite 19.

- 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 bid after opening or for a claim after award of the contract.

FOR INQUIRIES, CONTACT THE FOLLOWING INDIVIDUALS Monday through Friday between the hours of 8:00 A.M. and 3:30 P.M.

TECHNICAL MATTERS: Contact via the following Internet address:
techbid@nws02.usace.army.mil

REQUEST FOR PROPOSAL DOCUMENTS: Register for solicitations at the Internet site:
http://www.nws.usace.army.mil/ct/

PLANHOLDER'S LISTS: Lists may also be obtained from the same site.

ADMINISTRATIVE MATTERS: Susan K. Sherrell

Phone: (206) 764-3203

FAX: (206) 764-6817

Internet: Susan.K.Sherrell@nws02.usace.army.mil

All individuals are at the following mailing and street addresses:
(Mail) Seattle District Corps of Engineers, P.O. Box 3755, Seattle, WA 98124-3755
(Street) 4735 E. Marginal Way S., Seattle, WA 98134-2329

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CAUTION TO OFFERORS

SECTION TITLE

SF1442 - Pages 00010-1 thru 00010-5 (00010-3 is reserved for use at a later time)
& Subcontracting Plan if applicable, Pages 00010-7 thru 0010-13

00100 Instructions, Conditions and Notice to Offerors

00110 Proposal Submission and Evaluation

00600 Representations and Certifications and other Statements of Offerors, and Pre-Award Information

00700 Contract Clauses

00800 Special Clauses, which include the following:

a) Special Clauses Pages 00800-1 thru 00800-11

b) Davis-Bacon General Wage Decision No. MT030026

01000 Technical Specifications

01001 thru 16856

RETURN THE FOLLOWING WITH YOUR OFFER:

SF1442 - Pages 00010-1 thru 00010-5 (00010-3 is reserved for use at a later time)

Section 00600 - Representations and Certifications and Pre-Award Information

20% Bid Bond

*Additionally, if a large business is the apparent low, it will be required to submit a "Small Business and Small Disadvantaged Business Subcontracting Plan," no later than 5 working days after offer closing.

** 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.

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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? If in doubt as to the number of amendments issued, please contact the Plans Room representative listed on the Information Page.

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. **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**.

8. **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.

9. **CENTRAL CONTRACTOR REGISTRATION:** Per DFARS Clause 252.204-7004, REQUIRED CENTRAL CONTRACTOR REGISTRATION, in Section 00700, registration is required prior to award of any contract from a Solicitation issued after May 31, 1998. No Contract Award will be made to an unregistered contractor. Internet access allows contractors to register by completing an electronic on-line registration application from CCR homepage at http://www.ccr.gov/. For further assistance in completing your on-line registration, contact the nearest Procurement Technical Assistance Center (PTAC) near you. A list of the nearest PTAC is located at: http://www.rcacwv.com/ptac.htm.

10. **HUBZONE CERTIFICATION**: Per FAR Clause 52.219-4, NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999) in Section 00700. 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:90000/prodhubzone/hubzone/approval.st.

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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-0223	☐ SEALED BID *(IFB)* ☒ NEGOTIATED *(RFP)*	8August 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-	

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 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 Renovate Dormitory 737 at Malmstrom AFB, MT in accordance with th 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 2:00 p.m. *(hour)* local time September 9, 2003 *(date).* If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelo 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 referenc

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

OFFER *(Must be fully completed by offeror)*

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*	15. TELEPHONE NUMBER *(Include area code)*
	Fax No.:
	16. REMITTANCE ADDRESS *(Include only if different than Item 14)*
Tax ID No: DUNS No: eMail:	
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 accepted by the Government in writing within _____ calendar days after the date offers are due. *(Insert any number equal or greater than th minimum requirement stated in 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)*

AMOUNTS ▶ See Page 00010-5 thru 00010-6

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 26	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 SEE INVOICE PAGE	27. PAYMENT WILL BE MADE BY US Army Corps of Engineers Finance Center CEFC-AO-P 5722 Integrity Drive Millington, TN 38054-500

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.)* You offer on this solicitation is hereby accepted as to the items listed. Th award consummates the contract, which consists of (a) the Governmen solicitation and your offer, and (b) this contract award. No furthe 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)* SUSAN K. SHERRELL CONTRACTING OFFICER	
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY	31C. AWARD DATE

Send the following office 1 Original Invoice and 1 copy

Fairchild Resident Office
PO Box 1929
Airway Heights, WA 99001-1929

And

Send the following office 1 copy of the Invoice

Malmstrom Project Office
PO Box 6570
Great Falls, MT 59406-6570

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IF THE CONTRACTOR IS A CORPORATION OR PARTNERSHIP, THE **APPLICABLE PORTION** OF THE FORM LISTED BELOW MUST BE COMPLETED. IN THE ALTERNATIVE, OTHER EVIDENCE MUST BE SUBMITTED TO SUBSTANTIATE THE AUTHORITY OF THE PERSON SIGNING THE CONTRACT. IF A CORPORATION, **THE SAME OFFICER SHALL NOT EXECUTE BOTH THE CONTRACT AND THE CERTIFICATE**.

CORPORATE CERTIFICATE

I, _____, certify that I am the _____
Secretary of the Corporation named as Contractor herein; that _____, who signed this contract on behalf of the Contractor was then _____of said corporation; that said contract was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

_____ (CORPORATE
(Secretary) SEAL)

AUTHORITY TO BIND PARTNERSHIP

This is to certify that the names, signatures and Social Security Numbers of all partners are listed below and that the person signing the contract has authority actually to bind the partnership pursuant to its partnership agreements. Each of the partners individually has full authority to enter into and execute contractual instruments on behalf of said partnership with the United States of America, except as follows: (state "none" or describe limitations, if any)

_____

This authority shall remain in full force and effect until such time as the revocation of authority by any cause whatsoever has been furnished in writing to, and acknowledged by, the Contracting Officer.

(Names, Signatures and Social Security Numbers of all Partners)

NAME	SIGNATURE	SOCIAL SECURITY NO.
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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SCHEDULE

Item No.	Description of Item	NTE Quantity	Unit	Unit Price	Amount
	BASE ITEMS				
0001	All Work for Renovate Dormitory 737, Except Items Separately Priced	1	JOB	L.S.	$_____
0002	Minor Construction	1	JOB	L.S.	$_____
0003	All Work for As-Built Drawings as specified in Section 01702 from preparation to final approval	1	JOB	L.S.	$30,000
0004	All Work for O&M Manuals as specified in Section 01701 from preparation to final approval Final	1	JOB	L.S.	$30,000
0005	All Work for Form 1354 Checklist and Equipment in Place List as specified in Sections 01704 and 01705 from preparation to final approval	1	JOB	L.S.	$10,000
	TOTAL BASE ITEMS				$_____
	OPTIONAL ITEMS				
0006	Gazebo	1	JOB	L.S.	$_____
0007	UNIT PRICE 1 (Remove/Replace Damaged Floor Leveling Compound At Existing Unit Bathrooms)	NTE 500	SF	$_____	$_____
0008	UNIT PRICE 2 (Asbestos Mudded Pipe Fitting Abatement)	NTE 10	EA	$_____	$_____
0009	UNIT PRICE 3 (Asbestos Pipe Insulation Abatement)	NTE 6	LF	$_____	$_____
0010	UNIT PRICE 4 (Asbestos Floor Tile And Mastic Abatement)	NTE 100	SF	$_____	$_____
	TOTAL OPTIONAL ITEMS 0006 THROUGH 0010			NTE	$_____
	TOTAL ALL ITEMS 0001 THROUGH 0010			NTE	$_____

SCHEDULE

Item No.	Description of Item	NTE Quantity	Unit	Unit Price	Amount

NOTES:

1. The dollar amounts established in Items No. 0003, 0004 and 0005 shall not be revised by offerers.

2. Quantities for Item Numbers 0007-0010 are not to exceed and payment will only be made on actual quantities ordered and used, verified by the Government Inspector and certified by the Contracting Officer.

3. Minor Construction (Item 0002) is subject to a statutory cost limitation of $650,000.

4. “NTE” indicates a not to exceed quantity or amount.

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Contracting Division REV Nov 19, 2002

SUBJECT: DACA67-03-R-0223, Renovate Dormitory 737, Malmstrom AFB, Montana

NOTICE TO LARGE BUSINESS FIRMS: (RFP)

Your attention is directed to the contract clauses entitled "Utilization of Small Business Concerns (Oct 2000) (52.219-8) and "Small Business Subcontracting Plan" (Jan 2002) (52.219-9II), which are included in this solicitation. If you are a large business, and your offer is $500,000 ($1,000,000 for construction**)** or more you are required to submit a subcontracting plan **with** your proposal. Award will not be made under this solicitation without a subcontracting plan approved by the Contracting Officer.

For your information, we consider the following goals reasonable and achievable during the performance of the contract resulting from this solicitation. However, final goals will be negotiated prior to contract award. The Subcontracting Plan will then become a material part of your contract.

a. 75% of planned subcontracting dollars can be placed with all small business concerns.

b. 10% of planned subcontracting dollars can be placed with those small business concerns owned and controlled by socially and economically disadvantaged individuals or Historically Black Colleges and Universities or Minority Institutions. NOTE: b. is a subset of a.

c. 5% of planned subcontracting dollars for small women-owned businesses. NOTE: c. is a subset of a. Also, the women-owned business may meet the definition of a small disadvantaged business. If so, c. will also be a subset of a. (Count firm in all applicable areas.)

d. 3% of planned subcontracting dollars may be placed with HUBZone small business concerns. NOTE: d. is a subset of a. Note: A HUBZone firm may also SDB, women-owned and/or veteran-owned. Count firm in all applicable areas).

e. 3% of planned subcontracting dollars for veteran-owned small business. NOTE: e. is a subset of a. Go to http:///www.va.gov/osdbu/vetctr.htm or http://www.sba.gov/VETS/ for questions concerning the Veterans Business Development program.

. f. 3% of planned subcontracting dollars may be placed with service-disabled veteran-owned small business. NOTE: f. is a subset of a. and e.

Goals included in any proposed plan submitted by you should be at least equal to the ones we are recommending. If lesser goals are proposed, you will have to explain how those goals and your plan represent your best efforts to comply with the policy outlined in the contract clauses. There are a number of equally important aspects of the plan. You should familiarize yourself with the requirements set forth in the contract clauses relating to the subcontracting plan *before* submitting a proposal.

Your plan will be reviewed and scored in accordance with AFARS Appendix D to ensure it clearly represents your firm's ability to carry out the terms and conditions set forth in the contract clauses. A Subcontracting Plan with a score of less than 70 may not be accepted. It is recommended that you use the enclosed example **as a guide** to assist you in developing your own subcontracting plan/program. The example is intended to assist you in developing your own subcontracting plan/program. Delete the instructions shown in parenthesis or your plan for subcontracting to small business will not be approved. If discussions during the evaluation of your subcontracting program raises doubts as to your intentions or ability to comply with FAR clause 52.219-9 it could result in your ineligibility for award.

Your plan must address how you will maximize subcontracting opportunities with the small business communities to be found within the project location. Demonstrated outreach efforts through conference attendance, use of ProNet, Corporate support of your Small Business Program Liaison Officer and Small Business Program must be addressed in your subcontracting plan.

Your Small Business Program Managers' attendance at DOD Regional Council Meetings for Small Business Education and Advocacy will be a contract requirement. **DOD Policy Guidance:** In accordance with the Small Business Act, it is the policy of the federal government to aid, assist, and counsel small business to ensure that a fair share of contracts are awarded to small business. Consistent with this, it is the policy of DOD to sponsor regional councils as one significant way to aid, assist, and counsel large business through education and advocacy *of its members who are charged with the responsibility of fulfilling this federal policy*. Therefore, be advised that the individual listed in paragraph 7 of the example will be required to attend these regional council meetings and that attendance must be addressed in your subcontracting plan. Your plan must be submitted with your price proposal.

Should you have any questions or need assistance in DEVELOPING YOUR SUBCONTRACTING PLAN please call the undersigned at (206) 764-6807. If you need TECHNICAL ASSISTANCE call Kevin Mulvihill at (206) 766-6805.

Sincerely,

Enclosure

Susan C. Price
Deputy for Small Business

NOTE: This is an example plan. You may use this example as a guide in developing your own small business program. Delete all the instructions (parenthesis), including this message, or your plan will be returned.

SMALL BUSINESS SUBCONTRACTING PLAN

DATE:

CONTRACTOR:
ADDRESS:
PHONE NO:

PROJECT TITLE:
SOLICITATION NO:

1. In accordance with the contract clauses at 52.219-8 and 52.219-9, (name of contractor) submits the following Subcontracting Plan for Small, Small Disadvantaged, and Women-owned Business Concerns.

2. Corresponding dollar values for percentages cited in para. 3 for the base period only:

a. Total contract amount is $_____.
b. Total dollars planned to be subcontracted (to all types of businesses): $_____.
c. Total dollars planned to be subcontracted to small business concerns (including 2d, 2e, 2f, 2g, and 2h below): $_____.
d. Total dollars planned to be subcontracted to small disadvantaged business concerns: $_____.
e. Total dollars planned to be subcontracted to small woman-owned business concerns: $_____.
f. Total dollars planned to be subcontracted to HUBZone small business: $_____.

g. Total dollars planned to be subcontracted to veteran-owned small business concerns $_____.
h. Total dollars planned to be subcontracted to service-disabled veteran-owned small business concerns. $_____.

3. The following percentage goals (expressed in terms of a percentage of total planned subcontracting dollars) are applicable to the contract awarded under the solicitation cited above.

a. Small Business Concerns (2c divided by 2b): _____% of total planned subcontracting dollars under this contract will go to subcontractors who are small business concerns including 3c through 3e.

b. Small Disadvantaged Business Concerns (2d divided by 2b): _____% of total planned subcontracting dollars under this contract will go to subcontractors who are small disadvantaged individuals. **(NOTE: SDB firms must be certified by SBA** and meet the definition under clause 52.219-8(c)(3)).

c. Small Woman-Owned Business Concerns (2e divided by 2b):_____% of total planned subcontracting dollars under this contract will go to subcontractors who are small woman-owned businesses

d. Small HUBZone Business Concerns (2f divided by 2b): _____% of total planned subcontracting dollars under this contract will go to subcontractors who are HUBZone small business contractors. (SEE the definition in contract clause 52.219-8(c) or use the internet: http://www.sba.gov/hubzone/ for further information.)

e. Veteran-owned small business concerns (2g divided by 2b):_____% of total planned subcontracting dollars under this contract will go to subcontractors who are veteran-owned small business.

f. Service-disabled veteran-owned small business concerns (2h divided by 2b): _____% of total planned subcontracting dollars under this contract will go to subcontractors who are service-disabled veteran-owned small business.

4. The principal items or areas we will subcontract under this contract are:

a. Of the items or areas stated in 4; the following are planned to be subcontracted to Small Businesses (LIST THE NAME AND RESPONSIBILITY OF FIRM):

b. Of the items or areas stated in 4.a; the following are planned to be subcontracted to Small Disadvantaged Businesses (LIST THE NAME AND RESPONSIBILITY OF FIRM):

c. Of the items or areas stated in 4.a; the following are planned to be subcontracted to Small Women-Owned Businesses (LIST THE NAME AND RESPONSIBILITY OF FIRM):

d. Of the items or areas stated in 4.a; the following are planned to be subcontracted to HUBZone small business concerns (LIST THE NAME AND RESPONSIBILITY OF FIRM):

e. Of the items or areas stated in 4.a; the following are planned to be subcontracted to Veteran-owned Small Business concerns (LIST THE NAME AND RESPONSIBILITY OF FIRM):

f. Of the items or areas stated in 4.a; the following are planned to be subcontracted to Service-disabled veteran-owned small business concerns (LIST THE NAME AND RESPONSIBILITY OF FIRM):

****NOTE: SEE LAST PAGE IF THIS SOLICITATION HAS OPTION YEARS OR PERIODS** (DELETE THIS STATEMENT FROM YOUR PLAN)******

5. Provide a description of the method your firm used to develop the subcontracting goals in paragraph 3:

6. Indirect costs were ( ) were not ( ) used in establishing subcontracting goals. **If indirect costs are included in your goals, furnish a description of the method used to determine the proportionate share of indirect costs to be incurred with (i) small business concerns (ii) small disadvantaged business concerns (iii) women-owned small business concerns (iv) HUBZone small business concerns (v) Veteran-owned small business concerns and (vi) Service-disabled veteran-owned concerns **

7. The following individual will administer (name of contractor) Subcontracting Program:
(**NOTE TO OFFERORS: The individual named here will be expected to perform and manage your plan and contract clause 52.219-9). Site Construction project managers may not be acceptable as your small business advocate that manages your Corporate Small Business Program).**

Name:_____ Job Title:_____
Address and Telephone Number: _____

This individual's specific duties with regard to the conduct of our firm's Subcontracting Plan will include, but will not be limited to, the following:

a. Developing and maintaining bidders lists of small business, HUBZone small business, small disadvantaged business and women-owned small business concerns using sources such as the Small Business Administration's ProNet (http://pro-net.sba.gov/) Washington State Office of Minority and Women-owned Business Enterprises (http://www.wsdot.wa.gov/omwbe/) Minority Business Development Agency, US Department of Commerce, Local Minority Business Development Centers, Economic Development Centers, and National Center for American Indian Enterprise Development.

b. Assuring the inclusion of small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns in all solicitations for products or services which they are capable of providing; and ensuring that all solicitations are structured to permit the maximum possible participation by small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns.

c. Establishing and maintaining records of all solicitations and subcontract awards to ensure that the members of the firm who review bidders proposals documents their reasons for selecting or not selecting a bid submitted by a small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns.

d. Preparing and submitting the Subcontracting Report for Individual Contracts (SF 294) and the Summary Subcontract Report (SF 295) in accordance with instructions provided, and coordinating and preparing for all compliance reviews by Federal agencies.

e. Attendance at DOD sponsored training programs in order to develop guidance and training to firm personnel on the policy of the federal government to aid, assist, and counsel small business under this and other government contracts.

f. Conducting or arranging for all other activities necessary to further the intent and attainment of the goals in the Plan to include motivational training of the firm's purchasing personnel, attendance at workshops, seminars and trade fairs conducted by or on behalf of small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns.

8. The following steps will be taken to ensure that small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns receive notice of and have an equitable opportunity to compete for intended awards of subcontracts and/or purchase orders for the products and/or services describe in paragraph 4 above:

a. Sources will be requested through SBA's ProNet system, business development organizations, minority and small business trade associations and at small, minority, veteran small business and women-owned small business procurement conferences; sources will be contacted; and bidding materials will be provided to all responding parties expressing an interest.

b. Internally, motivational training will be conducted to guide and encourage purchasing personnel; source lists and guides to small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns will be maintained and utilized by purchasing personnel while soliciting subcontracts and purchase orders; activities will be monitored to ensure sufficient time is allowed for interested bidders to prepare their proposals and to evaluate continuing compliance with the Subcontracting Plan.

9. [Name of contractor] agrees that the clause entitled "Utilization of Small Business Concerns" (Oct 2000) will be included in all subcontracts that offer further subcontracting opportunities. All subcontractors, except small business concerns, who receive subcontracts in excess of $500,000 ($1,000,000 in the case of construction) will be required to adopt a subcontracting plan that complies with the requirements of this clause. Such plans will be reviewed to assure that all minimum requirements of an acceptable subcontracting plan have been satisfied.

10. (Name of contractor) agrees to submit such periodic reports and cooperate in any studies or surveys as may be required by the Contracting agency or Small Business Administration in order to determine the extent of compliance by the offeror with the subcontracting plan and with the clause entitled "Utilization of Small Business Concerns" contained in the contract.

11. (Name of Contractor) agrees to maintain at least the following types of records to document compliance with the Subcontracting Plan:

a. The names of all organizations, agencies, and associations contacted for small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns,

veteran-owned small business concerns and service-disabled veteran-owned small business concerns along with records of attendance at conferences, seminars and trade fairs where additional sources were developed.

b. Source lists, guides, and other data identifying small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns.

c. Records on all subcontract solicitations resulting in an award of more than $100,000 on a contract-by-contract basis, indicating (1) whether small business concerns were solicited, and if not, why not; (2) whether veteran-owned small business concerns were solicited, and if not, why not; (3) whether service-disable veteran-owned small business concerns were solicited, and if not, why not; (4) whether HUBZone small business were solicited, and if not, why not; (5) whether small disadvantaged business concerns were solicited, and if not, why not; and (6) whether small women-owned business concerns were solicited, and if not, why not; and (7) reasons for the failure of solicited 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 to receive a subcontract award.

d. Records of all subcontract award data to include subcontractor's name and address, to be kept on a contract-by-contract basis.

e. Minutes of internal motivational and training meetings held for the guidance and encouragement of purchasing personnel, and records of all monitoring activities performed for compliance evaluation.

f. Copies of SF 294 and SF 295 showing date and place of filing and copies of all other reports or results of reviews conducted by the contracting agency or other interested agencies of the Federal government to monitor our compliance with this Subcontracting Plan.

12. (Name of Contractor) will submit a SF 295, Summary Subcontract Report, on Corps of Engineers projects only. The SF 295 shall be completed and distributed in accordance with the Corps of Engineers Supplemental Instructions. (Name of Contractor) will not report Corps of Engineers projects through any other Agency unless authorized by the Contracting Officer.

13. In closing, (Name of contractor) states that it will be the policy of (Name of contractor) to afford every practicable opportunity for small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns to participate in contracts awarded to (Name of contractor) by the Federal Government, to ensure that equitable opportunity is provided small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns to compete for award of subcontracts and purchase orders, and to diligently pursue the achievement of our goals of participation by small business concerns, small disadvantaged business concerns, women-owned small business concerns, HUBZone small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns in the dollars available for subcontract/purchase order awards under this contract.

BY: _____

_____ DATE: _____

Signature and Title of CEO
Company Name

NOTE: If this solicitation has options (or option periods) , the plan must contain separate goals for ***each*** option or option period (year). EXAMPLE:

	Dollars	Percentage
1. Optional Yr_____total:	$_____	_____
2. Total to be subcontracted to all types of businesses:	$_____	_____
a. Subcontracted to Small Business (including b, c, d, e, and f below):	$_____	_____
b. Subcontracted to Small Disadvantaged Businesses:	$_____	_____
c. Subcontracted to Women-Owned Small Businesses:	$_____	_____
d. Subcontracted to HUBzone concerns	$_____	_____
e. Subcontracted to Veteran-owned Small Business:	$_____	_____
f. Subcontracted to Service-disabled Small Business	$_____	_____

.

1. Optional Yr_____total:	$_____	_____
2. Total to be subcontracted to all types of businesses:	$_____	_____
a. Subcontracted to Small Business (including b, c, d, e, and f below):	$_____	_____
b. Subcontracted to Small Disadvantaged Businesses:	$_____	_____
c. Subcontracted to Women-Owned Small Businesses:	$_____	_____
d. Subcontracted to HUBzone concerns	$_____	_____
e. Subcontracted to Veteran-owned Small Business:	$_____	_____
f. Subcontracted to Service-disabled Small Business	$_____	_____

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52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (JUN 99)

(a) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "DUNS" followed by the DUNS number that identifies the offeror's name and address exactly as stated in the offer.

(b) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. A DUNS number will be provided immediately by telephone at no charge to the offeror. For information on obtaining a DUNS number, the offeror, if located within the United States, should call Dun and Bradstreet at 1-800-333-0505. The offeror should be prepared to provide the following information:

(1) Company name.

(2) Company address.

(3) Company telephone number.

(4) Line of business.

(5) Chief executive officer/key manager.

(6) Date the company was started.

(7) Number of people employed by the company.

(8) Company affiliation.

(c) Offerors located outside the United States may obtain the location and phone number of the local Dun and Bradstreet Information Services office from the Internet Home Page at http://www.customerservice@dnb.com. If an offeror is unable to locate a local service center, it may send an e-mail to Dun and Bradstreet at globalinfo@mail.dnb.com.

(End of provision)

52.211-2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE DOD INDEX OF SPECIFICATIONS AND STANDARDS (DODISS) AND DESCRIPTIONS LISTED IN THE ACQUISITION MANAGEMENT SYSTEMS AND DATA REQUIREMENTS CONTROL LIST, DOD 5010.12-L (DEC 1999)

Copies of specifications, standards, and data item descriptions cited in this solicitation may be obtained--

(a) From the ASSIST database via the Internet at http://assist.daps.mil; or

(b) By submitting a request to the--Department of Defense Single Stock Point (DoDSSP), Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Telephone (215) 697-2667/2179, Facsimile (215) 697-1462.

(End of provision)

Basis of Award (52.214-4022)

Notwithstanding any other provision of this invitation, the Government will award all base bid items as a minimum.

52.214-5000 APPARENT CLERICAL MISTAKES (MAR 1995)--EFARS
(a) For the purpose of initial evaluations of bids, the following will be utilized in the resolving arithmetic discrepancies found on the face of bidding schedule as submitted by the bidder:
(1) Obviously misplaced decimal points will be corrected;
(2) Discrepancy between unit price and extended price, the unit price will govern;
(3) Apparent errors in extension of unit prices will be corrected;
(4) Apparent errors in addition of lump-sum and extended prices will be corrected.
(b) For the purpose of bid evaluation, the government will proceed on the assumption that the bidder intends his bid to be evaluated on basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.
(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid is low.
(End of statement)

52.215-1 INSTRUCTIONS TO OFFERORS--COMPETITIVE ACQUISITION (MAY 2001)

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

“Discussions” are negotiations that occur after establishment of the competitive range that may, at the Contracting Officer's discretion, result in the offeror being allowed to revise its proposal.

“In writing or written” means any worded or numbered expression which can be read, reproduced, and later communicated, and includes electronically transmitted and stored information.

“Proposal modification” is a change made to a proposal before the solicitation's closing date and time, or made in response to an amendment, or made to correct a mistake at any time before award.

“Proposal revision” is a change to a proposal made after the solicitation closing date, at the request of or as allowed by a Contracting Officer as the result of negotiations.

“Time”, if stated as a number of days, is calculated using calendar days, unless otherwise specified, and will include Saturdays, Sundays, and legal holidays. However, if the last day falls on a Saturday, Sunday, or legal holiday, then the period shall include the next working day.

(b) Amendments to solicitations. If this solicitation is amended, all terms and conditions that are not amended remain unchanged. Offerors shall acknowledge receipt of any amendment to this solicitation by the date and time specified in the amendment(s).

(c) Submission, modification, revision, and withdrawal of proposals. (1) Unless other methods (e.g., electronic

commerce or facsimile) are permitted in the solicitation, proposals and modifications to proposals shall be submitted in paper media in sealed envelopes or packages (i) addressed to the office specified in the solicitation, and (ii) showing the time and date specified for receipt, the solicitation number, and the name and address of the offeror. Offerors using commercial carriers should ensure that the proposal is marked on the outermost wrapper with the information in paragraphs (c)(1)(i) and (c)(1)(ii) of this provision.

(2) The first page of the proposal must show--

(i) The solicitation number;

(ii) The name, address, and telephone and facsimile numbers of the offeror (and electronic address if available);

(iii) A statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered at the price set opposite each item;

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

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

(3) Submission, modification, or revision, of proposals.

(i) Offerors are responsible for submitting proposals, and any modifications, or revisions, so as to reach the Government office designated in the solicitation by the time specified in the solicitation. If no time is specified in the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that proposal or revision is due.

(ii)(A) Any proposal, modification, or revision received at the Government office designated in the solicitation after the exact time specified for receipt of offers is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and--

(1) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(2) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(3) It is the only proposal received.

(B) However, a late modification of an otherwise successful proposal that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(iii) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(iv) If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the office designated for receipt of proposals by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation, the time specified for receipt of proposals will be

deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(v) Proposals may be withdrawn by written notice received at any time before award. Oral proposals in response to oral solicitations may be withdrawn orally. If the solicitation authorizes facsimile proposals, proposals may be withdrawn via facsimile received at any time before award, subject to the conditions specified in the provision at 52.215-5, Facsimile Proposals. Proposals may be withdrawn in person by an offeror or an authorized representative, if the identity of the person requesting withdrawal is established and the person signs a receipt for the proposal before award.

(4) Unless otherwise specified in the solicitation, the offeror may propose to provide any item or combination of items.

(5) Offerors shall submit proposals in response to this solicitation in English, unless otherwise permitted by the solicitation, and in U.S. dollars, unless the provision at FAR 52.225-17, Evaluation of Foreign Currency Offers, is included in the solicitation.

(6) Offerors may submit modifications to their proposals at any time before the solicitation closing date and time, and may submit modifications in response to an amendment, or to correct a mistake at any time before award.

(7) Offerors may submit revised proposals only if requested or allowed by the Contracting Officer.

(8) Proposals may be withdrawn at any time before award. Withdrawals are effective upon receipt of notice by the Contracting Officer.

(d) Offer expiration date. Proposals in response to this solicitation will be valid for the number of days specified on the solicitation cover sheet (unless a different period is proposed by the offeror).

(e) Restriction on disclosure and use of data. Offerors that include in their proposals data that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall--

(1) Mark the title page with the following legend: This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed--in whole or in part--for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of--or in connection with-- the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in sheets [insert numbers or other identification of sheets]; and

(2) Mark each sheet of data it wishes to restrict with the following legend: Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal.

(f) Contract award. (1) The Government intends to award a contract or contracts resulting from this solicitation to the responsible offeror(s) whose proposal(s) represents the best value after evaluation in accordance with the factors and subfactors in the solicitation.

(2) The Government may reject any or all proposals if such action is in the Government's interest.

(3) The Government may waive informalities and minor irregularities in proposals received.

(4) The Government intends to evaluate proposals and award a contract without discussions with offerors (except clarifications as described in FAR 15.306(a)). Therefore, the offeror's initial proposal should contain the offeror's best terms from a cost or price and technical standpoint. The Government reserves the right to conduct discussions if the

Contracting Officer later determines them to be necessary. If the Contracting Officer determines that the number of proposals that would otherwise be in the competitive range exceeds the number at which an efficient competition can be conducted, the Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals.

(5) The Government reserves the right to make an award on any item for a quantity less than the quantity offered, at the unit cost or prices offered, unless the offeror specifies otherwise in the proposal.

(6) The Government reserves the right to make multiple awards if, after considering the additional administrative costs, it is in the Government's best interest to do so.

(7) Exchanges with offerors after receipt of a proposal do not constitute a rejection or counteroffer by the Government.

(8) The Government may determine that a proposal is unacceptable if the prices proposed are materially unbalanced between line items or subline items. Unbalanced pricing exists when, despite an acceptable total evaluated price, the price of one or more contract line items is significantly overstated or understated as indicated by the application of cost or price analysis techniques. A proposal may be rejected if the Contracting Officer determines that the lack of balance poses an unacceptable risk to the Government.

(9) If a cost realism analysis is performed, cost realism may be considered by the source selection authority in evaluating performance or schedule risk.

(10) A written award or acceptance of proposal mailed or otherwise furnished to the successful offeror within the time specified in the proposal shall result in a binding contract without further action by either party.

(11) The Government may disclose the following information in postaward debriefings to other offerors:

(i) The overall evaluated cost or price and technical rating of the successful offeror;

(ii) The overall ranking of all offerors, when any ranking was developed by the agency during source selection;

(iii) A summary of the rationale for award; and

(iv) For acquisitions of commercial items, the make and model of the item to be delivered by the successful offeror.

(End of provision)

52.216-1 TYPE OF CONTRACT (APR 1984)

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

(End of clause)

52.217-5 EVALUATION OF OPTIONS (JUL 1990)

(a) Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).

(b) The Government may reject an offer as nonresponsive if it is materially unbalanced as to prices for the basic requirement and the option quantities. An offer is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(End of provision)

52.219-2 EQUAL LOW BIDS. (OCT 1995)

(a) This provision applies to small business concerns only.

(b) The bidder's status as a labor surplus area (LSA) concern may affect entitlement to award in case of tie bids. If the bidder wishes to be considered for this priority, the bidder must identify, in the following space, the LSA in which the costs to be incurred on account of manufacturing or production (by the bidder or the first-tier subcontractors) amount to more than 50 percent of the contract price.

_____

_____

(c) Failure to identify the labor surplus area as specified in paragraph (b) of this provision will preclude the bidder from receiving priority consideration. If the bidder is awarded a contract as a result of receiving priority consideration under this provision and would not have otherwise received award, the bidder shall perform the contract or cause the contract to be performed in accordance with the obligations of an LSA concern.

52.225-10 NOTICE OF BUY AMERICAN ACT REQUIREMENT--CONSTRUCTION MATERIALS (MAY 2002)

(a) Definitions. Construction material, domestic construction material, and foreign construction material, as used in this provision, are defined in the clause of this solicitation entitled “Buy American Act --Construction Materials” (Federal Acquisition Regulation (FAR) clause 52.225-9).

(b) Requests for determinations of inapplicability. An offeror requesting a determination regarding the inapplicability of the Buy American Act should submit the request to the Contracting Officer in time to allow a determination before submission of offers. The offeror shall include the information and applicable supporting data required by paragraphs (c) and (d) of the clause at FAR 52.225-9 in the request. If an offeror has not requested a determination regarding the inapplicability of the Buy American Act before submitting its offer, or has not received a response to a previous request, the offeror shall include the information and supporting data in the offer.

(c) Evaluation of offers. (1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act, based on claimed unreasonable cost of domestic construction material, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(3)(i) of the clause at FAR 52.225-9.

(2) If evaluation results in a tie between an offeror that requested the substitution of foreign construction material based on unreasonable cost and an offeror that did not request an exception, the Contracting Officer will award to the offeror that did not request an exception based on unreasonable cost.

(d) Alternate offers.

(1) When an offer includes foreign construction material not listed by the Government in this solicitation in paragraph (b)(2) of the clause at FAR 52.225-9, the offeror also may submit an alternate offer based on use of equivalent domestic construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of the clause at FAR 52.225-9 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of the clause at FAR 52.225-9 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic construction material, and the offeror shall be required to furnish such domestic construction material. An offer based on use of the foreign construction material for which an exception was requested--

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of provision)

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.-

(c) The amount of the bid guarantee shall be **20** percent of the bid price or **$ 3,000,000.00**, whichever is less.-

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.-

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of clause)

INFORMATION REGARDING PERFORMANCE AND PAYMENT BONDS (FAR 28.102) (52.228-4001) FEB 2001

Within 10 days after the prescribed forms are presented to the bidder to whom award is made, unless a shorter time is prescribed in the contract, two bonds, namely a performance bond (Standard Form 25) and a payment bond (Standard Form 25A), shall be executed and furnished to the Government, each with good and sufficient surety or sureties

acceptable to the Government. The penal sums of such bonds shall be as follows:

(1) Performance Bond. The penal sum of the performance bond shall equal one hundred percent (100%) of the contract price.
(2) Payment Bond. The penal sum of the payment bond shall equal one hundred percent (100%) of the contract price.

Any bonds furnished must be furnished by the Contractor to the Government prior to commencement of contract performance.

INDIVIDUAL SURETIES (52.228-4003) DEC 1999

As prescribed in FAR 28.203, individual sureties are acceptable for all types of bonds except position schedule bonds.

One individual surety is adequate support for a bond, provided the unencumbered value of the assets pledged by that individual surety equal or exceed the amount of the bond. An offeror may submit up to three individual sureties for each bond, in which case the pledged assets, when combined, must equal or exceed the penal amount of the bond. Each individual surety must accept both joint and several liability to the extent of the penal amount of the bond.

An individual surety may be accepted only if a security interest in acceptable assets is provided to the Government by the individual surety. THE SECURITY INTEREST SHALL BE FURNISHED WITH THE BOND.

Acceptable assets include:

(a) Cash, or certificates of deposit, or other cash equivalents with a federally insured financial institution;

(b) United States Government securities at market value.

(c) Stocks and bonds actively traded on a national U.S. security exchange with certificates issued in the name of the individual surety. (See FAR 28.203-2(b)(3) for list of acceptable exchanges).

(d) Real property owned in fee simple by the surety without any form of concurrent ownership, escept as provided in FAR 28.203-2(c) (3)(iii), and located within the 50 United States, its territories, or possessions. These assets will be accepted at 100% of the most current tax assessment value (exclusive of encumbrances) or 75% of the properties' unencumbered market value provided a current appraisal is furnished. (See clause entitled "Pledges of Assets").

(e) Irrevocable letters of credit (ILC) issued by a federally insured financial institution in the name of the contracting agency and which identify the agency and solicitation or contract number for which the ILC is provided.

Unacceptable assets include but are not limited to:

(a) Notes or accounts receivable;

(b) Foreign securities;

(c) Real property as follows:

(1) Real property located outside the United States, its territories, or possessions.

(2) Real property which is a principal residence of the surety.

(3) Real property owned concurrently regardless of the form of co-tenancy (including joint tenancy, tenancy by the entirety, and tenancy in common) except where all co-tenants agree to act jointly.

(4) Life estates, leasehold estates, or future interests in real property.

(d) Personal property other than that listed as acceptable assets above (e.g., jewelry, furs, antiques);

(e) Stocks and bonds of the individual surety in a controlled, affiliated, or closely held concern of the offeror/contractor;

(f) corporate assets (e.g., plant and equipment);

(g) Speculative assets (e.g., mineral rights);

(h) Letters of credit, except as provided above.

In order for the Contracting Officer to determine the acceptability of individuals proposed as sureties, all bidders/offerors who submit bonds which are executed by individual sureties shall furnish with the bonds:

(a) SF28, Affidavit of Individual Surety,

(b) Security interest provided to the Government for all pledged assets (See clause entitled "Pledge of Assets") and

(c) A current list of all other bonds (including Bid Bonds) on which each individual surety is a surety and bonds for which the individual is requesting to be a surety, together with a statement as to the percent of completion of these bonded jobs. The list will include Contract or Solicitation Numbers, the name, address and telephone number of the contracting office, the type of bond (bid, performance or payment), and the amount of each original obligation. (Note: Performance and Payment bonds must be listed separately.)

Failure to furnish this information may result in non-approval of the surety and a determination of nonresponsibility.

52.232-13 NOTICE OF PROGRESS PAYMENTS (APR 1984)

The need for customary progress payments conforming to the regulations in Subpart 32.5 of the Federal Acquisition Regulation (FAR) will not be considered as a handicap or adverse factor in the award of the contract. The Progress Payments clause included in this solicitation will be included in any resulting contract, modified or altered if necessary in accordance with subsection 52.232-16 and its Alternate I of the FAR. Even though the clause is included in the contract, the clause shall be inoperative during any time the contractor's accounting system and controls are determined by the Government to be inadequate for segregation and accumulation of contract costs.

(End of clause)

52.232-38 SUBMISSION OF ELECTRONIC FUNDS TRANSFER INFORMATION WITH OFFER (MAY 1999)

The offeror shall provide, with its offer, the following information that is required to make payment by electronic funds transfer (EFT) under any contract that results from this solicitation. This submission satisfies the requirement to provide EFT information under paragraphs (b)(1) and (j) of the clause at 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration.

(1) The solicitation number (or other procurement identification number).

(2) The offeror's name and remittance address, as stated in the offer.

(3) The signature (manual or electronic, as appropriate), title, and telephone number of the offeror's official authorized to provide this information.

(4) The name, address, and 9-digit Routing Transit Number of the offeror's financial agent.

(5) The offeror's account number and the type of account (checking, savings, or lockbox).

(6) If applicable, the Fedwire Transfer System telegraphic abbreviation of the offeror's financial agent.

(7) If applicable, the offeror shall also provide the name, address, telegraphic abbreviation, and 9-digit Routing Transit Number of the correspondent financial institution receiving the wire transfer payment if the offeror's financial agent is not directly on-line to the Fedwire and, therefore, not the receiver of the wire transfer payment.

(End of provision)

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from Kent R. Paul at Seattle District Corps of Engineers, Attn: CENWS-CT, Post Office Box 3755, Seattle, Washington 98124-3755.

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

(End of provision)

52.236-28 PREPARATION OF PROPOSALS--CONSTRUCTION (OCT 1997)

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

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

(1) Lump sum price;

(2) Alternate prices;

(3) Units of construction; or

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

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

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

(End of provision)

MAGNITUDE OF CONSTRUCTION (FAR 36.204) (52. 236-4902) DEC 1999

(a) Amount of Construction for this solicitation is in the range of $1,000,000 to $5,000.000.

252.204-7001 COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE REPORTING (AUG 1999)

(a) The offeror is requested to enter its CAGE code on its offer in the block with its name and address. The CAGE code entered must be for that name and address. Enter “CAGE” before the number.

(b) If the offeror does not have a CAGE code, it may ask the Contracting Officer to request one from the Defense Logistics Information Service (DLIS). The Contracting Officer will--

(1) Ask the Contractor to complete section B of a DD Form 2051, Request for Assignment of a Commercial and Government Entity (CAGE) Code;

(2) Complete section A and forward the form to DLIS; and

(3) Notify the Contractor of its assigned CAGE code.

(c) Do not delay submission of the offer pending receipt of a CAGE code.

(End of provision)

252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION (NOV 2001)

(a) Definitions.

As used in this clause--

(1) Central Contractor Registration (CCR) database means the primary DoD repository for contractor information required for the conduct of business with DoD.

(2) Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet Information Services to identify unique business entities.

(3) Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by Dun and Bradstreet plus a 4-digit suffix that may be assigned by a parent (controlling) business concern. This 4-digit suffix may be assigned at the discretion of the parent business concern for such purposes as identifying subunits or affiliates of the parent business concern.

(4) Registered in the CCR database means that all mandatory information, including the DUNS number or the DUNS+4 number, if applicable, and the corresponding Commercial and Government Entity (CAGE) code, is in the CCR database; the DUNS number and the CAGE code have been validated; and all edits have been successfully completed.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee must be registered in the CCR database prior to award, during performance, and through final payment of any contract resulting from this solicitation, except for awards to foreign vendors for work to be performed outside the United States.

(2) The offeror shall provide its DUNS or, if applicable, its DUNS+4 number with its offer, which will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(3) Lack of registration in the CCR database will make an offeror ineligible for award.

(4) DoD has established a goal of registering an applicant in the CCR database within 48 hours after receipt of a complete and accurate application via the Internet. However, registration of an applicant submitting an application through a method other than the Internet may take up to 30 days. Therefore, offerors that are not registered should consider applying for registration immediately upon receipt of this solicitation.

(c) The Contractor is responsible for the accuracy and completeness of the data within the CCR, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to confirm on an annual basis that its information in the CCR database is accurate and complete.

(d) Offerors and contractors may obtain information on registration and annual confirmation requirements by calling 1-888-227-2423, or via the Internet at http://www.ccr.gov.

(End of clause)

252.236-7008 CONTRACT PRICES - BIDDING SCHEDULES. (DEC 1991)

(a) The Government's payment for the items listed in the Bidding Schedule shall constitute full compensation to the Contractor for --

(1) Furnishing all plant, labor, equipment, appliances, and materials; and

(2) Performing all operations required to complete the work in conformity with the drawings and specifications.

(b) The Contractor shall include in the prices for the items listed in the Bidding Schedule all costs for work in the specifications, whether or not specifically listed in the Bidding Schedule.

SECTION 00110
PROPOSAL SUBMISSION AND EVALUATION

1. INTRODUCTION.

1.1. Your firm is invited to submit a proposal in response to Request for Proposal No. **DACA67-03-R-0223** entitled "**Renovate Dormitory 737 at Malmstrom AFB**, Montana". Prospective offerors are required to prepare and submit proposals that will be evaluated in accordance with this section of the solicitation. In accordance with Federal Acquisition Regulations (FAR), Part 15.101-2, proposals will be evaluated using the lowest price technically acceptable source selection process. The evaluation process will be to first determine those proposals that are technically acceptable and then from those proposals determine which firm is the lowest price. The firm offering the technically acceptable lowest price will be awarded the contract. It is the intent of the government to award on initial offers.

1.2. Project Description: The project provides upgrades of both the interior and exterior, including new shared kitchens and bathrooms, walk-in closets, entry doors/hardware, storage space, central mail distribution, overbuilt sloped standing seam metal roof/soffit system, roof and exterior wall insulation, new thermal break windows, exterior stairwell enclosures, new mechanical and electrical systems, and new landscaping, irrigation, and site improvements

2. EVALUATION FACTORS.

2.1. Technical Evaluation Factors.

2.1.1. The technical evaluation factors identified below will be evaluated on a technically ACCEPTABLE/NON-ACCEPTABLE basis only:

2.1.1.1. Relevant Experience of the proposed firms

2.1.1.2. Qualifications of Proposed Team Members

2.1.1.3. Past Performance

2.2. Basis of the source selection evaluation - This Section establishes the method to be implemented with regard to the evaluation of the proposals. Evaluation is to be based exclusively on the merits and contents of the proposal and subsequent discussions should they be required. Offerors not meeting the minimum requirements of ***all*** technical evaluation factors shall be determined to be **NON-ACCEPTABLE** and will not be considered for award. Technical Proposals will be evaluated on an **ACCEPTABLE** or **NON-ACCEPTABLE** basis only**.** Proposals must set forth full, accurate, and complete information as required by this RFP. Absence of information will be deemed as if no support for that factor was provided. Award will be made to the lowest price technically acceptable offeror.

2.2.1. Technical Evaluation Ratings - Definitions

2.2.1.1. Acceptable: An acceptable rating indicates that the offeror has provided sufficient information to meet the **minimum** qualifications/standards described in the technical evaluation factor.

2.2.1.2. Non-Acceptable: A non-acceptable rating indicates that the offeror has not provided sufficient information to meet the **minimum** qualifications/standards described in the technical evaluation factor.

3. GENERAL SUBMITTAL REQUIREMENTS.

3.1. Proposals shall be submitted in two parts: (a) **technical proposal**, and (b) **price proposal**. Each shall be submitted in a separate envelope or package with the type of proposal (i.e., technical or price) clearly printed on the outside of the envelope or package. The maximum number of pages in the technical proposal should not exceed 60 one-sided pages with a font size no smaller than 10 point. Offerors submitting proposals should limit submission to data essential for evaluation of proposals so that a minimum of time and moneys are expended in preparing information required by the RFP. Proposals are to be on 8 ½ x 11-inch paper, to the maximum extent practicable, and submitted in standard letter (8½ x 11-inch) hardback loose-leaf binders. Contents of binders shall be tabbed and labeled to afford easy identification from the proposal Table of Contents. No material shall be incorporated by reference or reiteration of the RFP. Any such material will not be considered for evaluation. It shall be presented in a manner, which allows it to "STAND ALONE" without need for evaluators to reference other documents. Table of Contents, Index Tabs, and Photographs **will not** be considered a page. Unnecessarily elaborate brochures or other presentation materials beyond those sufficient to present complete and effective responses are not desired and

may be construed as an indication of the Offeror's lack of cost-consciousness. Penalty for making false statements in proposals is prescribed in 18 U.S.C. 1001.

4. MINIMUM SUBMITTAL REQUIREMENTS

4.1. Relevant experience of the prime firm. The Offeror shall submit three (3) projects demonstrating relevant experience. "Relevant experience" is defined as experience constructing facilities similar in scope, cost, and complexity to the project in this solicitation, such as renovation and alteration of dormitories, apartments or other similar multiple living quarters with similar features as described in paragraph 1.2, for either civilian or military use. Only those projects for which the Offeror was the Prime Contractor and were within the past seven (7) years should be submitted. The projects selected should clearly demonstrate the construction capabilities of the Offeror. One of the projects is to demonstrate construction experience performed in specific locations sharing similar climatic conditions to those of Malmstrom AFB, Montana. For purposes of evaluation, a severe climate is defined as climates that may experience a shortened construction season due to severe or harsh cold weather conditions.

1) Project title and location
2) Dollar value of construction
3) Construction period (month/year start to month/year end)
4) Description of the project scope of work to include complete descripton of renovation features which are relevant to this project.
5) Brief description of how the project is relevant, and meets the requirements of this RFP project.
6) Current primary point of contact for the customer (name, relationship to project, agency/firm affiliation, city and state, phone number).

4.2. Qualifications of key team members. The Offeror should submit the names and résumés for key construction personnel that will be assigned to this project. In addition, the Offeror will provide a concise summary of the duties and responsibilities for each of the proposed individuals which clearly indicates separate duties and responsibilities for each of the following positions; Project Superintendent, Project Manager, and Contractor Quality Control System Manager. The proposal should clearly present the separate credentials for each position of each person performing the duties of the position to which they are identified. Resumes should include examples of similar project experience (experience in the same position as proposal for this project on at least one similar dormitory/apartment construction project) and educational qualifications, if applicable. **Experience should clearly demonstrate the number of years experience required for each team member selected.** It is expected that the key individuals in your proposal will be the individuals who perform work under the contract. The contracting officer must approve substitute personnel. Resumes should be no more than two (2) pages per individual and submitted in a format similar to the one below: As a minimum, this factor should include data on the following personnel:

4.2.1. Project Superintendent: The Project Superintendent shall have no less than 5 years experience as a project superintendent on construction projects of similar scope, size and complexity. The experience must demonstrate construction knowledge and ability to manage construction projects and be consistent with the type of renovations provided for in this solicitation.

4.2.2. Project Manager: The Project Manager shall have a baccalaureate degree in a relevant field such as engineering, architecture or construction management with a minimum of three (3) projects as a Project Manager that demonstrates the ability to construct projects similar in scope, cost and complexity to this contract **or** a person in the construction field with a minimum of 5 years in as a project manager on projects of the same scope, size and complexity of this contract.

4.2.3. CQC System Manager: The CQC (Contractor Quality Control) System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this solicitation **or** a construction person with a minimum of 10 years of construction experience and experience as a QC on at least one project.. **Experience must have occurred with the past 10 years.**

4.2. Resume Format For Key Team Members. Resumes should be no more than two (2) pages per individual and submitted in a format similar to the one below

RESUME FORMAT

Name and Title

1. ***Proposed Duties/Functions for this project***
2. ***Firm Affiliation and Years Affiliated***
3. ***Number of years in the construction industry***
4. ***Years of Experience performing duties/functions as proposed for this project.***
5. ***Education – School attended, Degree, Certification, Year, and Specialization***
6. ***List Active Registrations (Professional or Technical Licenses/Certifications)***
7. ***Describe Specific Qualifications for this project***
8. ***List Projects worked on to Include:***

Project Title & Location

Scope, Size and Complexity

Duties/Functions

Date of project

8. Demonstrate how each project submitted is relevant to the project to be constructed under this solicitation.

4.3. Past Performance of the Prime. Past performance of the prime contractor shall be evaluated using the CCASS database. All performance ratings for the past 7 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 found at the end of this section. For each project constructed for Private Industry or for non-Federal governmental projects not listed in CCASS, provide a completed Customer Satisfaction Survey for each applicable project within the last 7 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 at the top of the Customer Satisfaction Survey. It is requested that only

relevant projects be included. A relevant project is one of the same scope, cost and complexity as this solicitation. Should the offerors want to review the CCASS ratings contained in the Corps of Engineers CCASS Database, they may request the information by fax on company letterhead at the following tele-fax number: (503) 808-4596. The Government reserves the right to contact the evaluator 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)). An overall rating of satisfactory or above on CCASS performance evaluations and an overall acceptable rating on Customer Satisfaction Surveys will be given an acceptable rating.

4.3.1. Offeror Submitted Surveys. Surveys submitted directly by the offeror may not be considered. Please ensure envelopes containing surveys being submitted to this office do not contain the offeror's return address.

4.3.2 As a maximum, no more than five (5) customer satisfaction surveys will be considered for the prime firm (i.e., the firm signing the Standard Form 1442, Solicitation, Offer and Award) for work not listed (i.e. civilian projects) in the Government CCASS system.

5. PROPOSAL CONTENTS/FORMAT.

5.1. Technical Proposal Format. As a minimum, each copy of the technical proposal should contain the information and follow the general format specified below. Pages should be numbered from beginning to end, without repeating for new sections.

5.2. Technical Proposal Format- Five (5) sets required, original plus four (4) copies

TECHNICAL PROPOSAL FORMAT

1. ***Technical Proposal Cover Letter, to include:***

   a. Solicitation Number

   b. Name, address, and telephone and facsimile numbers of the Offeror (and electronic address, if available)

   c. A statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered.

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

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

   f. Table of Contents. List all sections for the technical proposal. Any future amendments, additions and/or revisions to proposal shall include updated Table of Contents for each set.

2. ***Relevant Experience data***
3. ***Qualifications of key team members.***
4. ***Past Performance data.***

5.3. Price Proposal Format. The price proposal shall be submitted in an **ORIGINAL plus 1 copy** and must be signed by an official authorized to bind your firm. Note that Standard Form 1442, Block 13D, provides the number of calendar days after the date of the offer for which the proposal is firm. The price proposal, to be submitted at the same time as the technical proposal, should include:
5.4 Price Proposal - Original and one (1) copy

- ***SF 1442, Solicitation, Offer and Award and Award and Corporate certificate***
- ***Acknowledge all amendments by number an date in Block 19 on SF 1442 BACK***
- ***Pricing Schedule***
- ***Section 00600, Representation, Certifications and Other Statements of Offerors and Pre-award Information***
- ***Banking and Bonding information***
- ***Bid Bond***
- ***Subcontracting plan (large business only)***

5.5. Additional Instructions.

5.5.1. Small Business Subcontracting - Plan Offerors must submit pricing for all items in the Schedule. In addition, **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.) Provide the name, point of contact, phone number, and address for the bank and bonding company of the firm signing the SF 1442.

5.5.2. Bid Bonds - 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.

6. PROPOSAL EVALUATIONS AND AWARD. A firm fixed-price contract will be awarded to one firm submitting the proposal that:

6.1. Conforms to this request for proposals (RFP),

6.2. Is the technically acceptable, lowest price offer, and

6.3. Is determined to be in the best interest of the Government.

6.4. To be considered for award, proposals shall conform to the terms and conditions contained in the RFP. No proposal shall be accepted that does not address all factors specified in this solicitation or which includes stipulations or qualifying conditions.

6.5. Price. Price will be evaluated for reasonableness. Financial capacity and bonding ability will be checked.

6.6. Award. It is the intent of the Government to make award based upon the lowest price technically acceptable initial offer, without further discussions or additional information. Therefore, proposals shall be submitted initially on the most favorable terms from a price and technical standpoint. Do not assume you will be afforded the opportunity to clarify, discuss or revise your proposal. If award is not made on initial offers, discussion will be conducted as described below.

6.7. Competitive Range. (FAR 15.306(c))

6.7.1. Competitive Range. After initial evaluation of proposals, if the Contracting Officer determines that discussions are required, the Contracting Officer will establish a competitive range comprised of the technically acceptable proposals. Discussions will be held with firms in the competitive range.

6.7.2. Discussions. Should it be necessary for discussions, the Government will conduct written discussions with only those offerors determined to be technically acceptable. If all proposals are determined to be non-acceptable, at the Contracting Officer's discretion, all firms may be requested to participate in discussions. As a result of discussions, offerors may make revisions to their initial offers. Discussions will culminate in a request for Final Proposal Revision, the date and time of which will be common to all offerors.

7. DEBRIEFINGS.

7.1 Pre-award. Offerors excluded from the competition before award will receive a notice and may request a debriefing before award by submitting a written request for a debriefing to the Contracting Officer within three (3) days after receipt of the notice of exclusion from the competition.

7.2 Post-award. Unsuccessful Offerors shall request post-award debriefing within three (3) days after the date on which the offeror received notification of contract award. Point-by-point comparisons with other offerors' proposals will not be made, and debriefings will not reveal any information that is not releasable under the Freedom of Information Act.

8. PROPOSAL EXPENSES AND PRECONTRACT COSTS PROPOSAL EXPENSES AND PRECONTRACT COSTS: This RFP does not commit the Government to pay costs incurred in preparation and submission of the initial and any subsequent proposals or any other costs incurred prior to execution of a formal contract.

END OF SECTION 00110 -
SEE CUSTOMER SATISFACTION SURVEY

FOLLOWING THIS PAGE

CUSTOMER SATISFACTION SURVEY
RFP DACA67-03-R-0223 – RENOVATE DORM 737 at MALMSTROM AFB, MONTANA

SECTION 1 -- TO BE COMPLETED BY THE OFFEROR AND PROVIDED TO THE CUSTOMER REFERENCED

Name of Firm Being Evaluated: _____

Project Title & Location: _____

Project Dollar Value: _____

Year Completed: _____ Project Manager: _____

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

U.S. Army Corps of Engineers, Seattle District
Attn: CENWS-CT-CB-MU (Susan K. Sherrell)
P.O. Box 3755
Seattle, WA 98124-3755
E- Mail: (susan.k.sherrell@nws02.usace.army.mil)

FAX: (206) 764-6817

Street Address:
4735 E. Marginal Way S.
Seattle WA 98134-2329

OVERVIEW: The firm shown above is submitting a proposal on a Seattle District Corps of Engineers project and provided your name as a customer reference. Part of our evaluation process requires information on the firm's past performance. Your participation is important to us and responses are required by the date proposals are due **06 September 2003** for inclusion in our evaluation. Your assistance is greatly appreciated.

In the blocks below, please indicate your overall level of satisfaction with the work performed by the firm shown in Section 1. Please include additional comments on a separate sheet of paper, including project number found in heading.

ITEM	*ITEMS TO EVALUATED FOR THIS PROJECT*	*ACCEPTABLE*	NON - ACCEPTABLE
1	Provided project schedules and completed most major milestones for the project on time.	☐	☐
2	Delivered Quality Construction?	☐	☐
3	Demonstrated a Willingness to Cooperate	☐	☐
4	Demonstrated Problem Solving Skills?	☐	☐
5	Managed the Project Effectively (including adequate Cost Controls)?	☐	☐
6	Managed Workforce Effectively, to include subcontractors?	☐	☐
7	Provided Adequate Warranty Support?	☐	☐
8	Kept You Informed on current status, problems, conditions, etc that affected the project?	☐	☐
9	Were payments withheld or liquidated damages assessed?	☐	☐
10	Effective subcontract/management plan? Did the firm make subcontracting goals?	☐	☐
11	Would they be your choice on future projects?	☐	☐
	Your OVERALL Level of Customer Satisfaction	**ACCEPTABLE**	**NON-ACCEPTABLE**

Your Name _____Phone Number_____

Firm Name_____

Relationship to this Project: _____

Your assistance in providing this past performance information is appreciated.

CUSTOMER SATISFACTION SURVEY
RFP DACA67-03-R-0223 – RENOVATE DORM 737 at MALMSTROM AFB, MONTANA

SECTION 1 -- TO BE COMPLETED BY THE OFFEROR AND PROVIDED TO THE CUSTOMER REFERENCED

Name of Firm Being Evaluated: _____

Project Title & Location: _____

Project Dollar Value: _____

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

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

U.S. Army Corps of Engineers, Seattle District
FAX: (206) 764-6817

Attn: CENWS-CT-CB-MU (Susan K. Sherrell)
P.O. Box 3755
Seattle, WA 98124-3755
E- Mail: (Kevin.T.Mulvihill@nws02.usace.army.mil)

Street Address:
4735 E. Marginal Way S.
Seattle WA 98134-2329

OVERVIEW: The firm shown above is submitting a proposal on a Seattle District Corps of Engineers project and provided your name as a customer reference. Part of our evaluation process requires information on the firm's past performance. Your participation is important to us and responses are required by the date proposals are due **08 September 2003** for inclusion in our evaluation. Your assistance is greatly appreciated.

In the blocks below, please indicate your overall level of satisfaction with the work performed by the firm shown in Section 1. Please include additional comments on a separate sheet of paper, including project number found in heading.

ITEM	ITEMS TO EVALUATED FOR THIS PROJECT	ACCEPTABLE	NON - ACCEPTABLE
1	Provided project schedules and completed most major milestones for the project on time.	☐	☐
2	Delivered Quality Construction?	☐	☐
3	Demonstrated a Willingness to Cooperate	☐	☐
4	Demonstrated Problem Solving Skills?	☐	☐
5	Managed the Project Effectively (including adequate Cost Controls)?	☐	☐
6	Managed Workforce Effectively, to include subcontractors?	☐	☐
7	Provided Adequate Warranty Support?	☐	☐
8	Kept You Informed on current status, problems, conditions, etc that affected the project?	☐	☐
9	Were payments withheld or liquidated damages assessed?	☐	☐
10	Effective subcontract/management plan? Did the firm make subcontracting goals?	☐	☐
11	Would they be your choice on future projects?	☐	☐
	Your OVERALL Level of Customer Satisfaction	**ACCEPTABLE**	**NON-ACCEPTABLE**

Your Name _____ **Phone Number** _____

Firm Name _____

Relationship to this Project: _____

Your assistance in providing this past performance information is appreciated.

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Section 00600 - Representations & Certifications

INDEX OF CLAUSES 00600

INDEX OF CLAUSES SECTION 00600

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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.

(1) 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 $28,500,000.

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

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

(2) (Complete only if 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)

52.219-4 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)

52.219-19 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)

52.223-4 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 (JUN 2003)

(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 the United States or its outlying areas.

(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)

252.247-7023 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)

PRE AWARD INFORMATION

SUBMIT THE FOLLOWING INFORMATION WITH YOUR OFFER
NOTICE TO OFFERORS REGARDING PRE-AWARD INFORMATION

It is requested that the following information be provided with your bid:

1. Company Name and Address: _____

   _____

   _____

2. Point of Contact:

   Name:_____ Phone: (_____)_____

   Alt Phone: (_____) _____ Fax: (_____)_____

3. Electronic Transfer Payments will now be required for all new contracts. Do you currently receive Electronic Transfer Payments from this agency? (agency codes 00005524/00006482)

   Yes( ) NO( )

4. Name of Bank and Branch _____

   _____

   Personal Banker _____

   Telephone Number _____

   Fax Number _____

5. Name of Bonding Agent Company _____

   Agents Name _____

   Telephone _____

6. List three projects that are substantially complete or have been completed within the last two years that are similar to this project. Projects should be listed in the following order: Federal Projects, state projects, city and county projects, than commercial projects. Please provide in the following format:

   a) Title & Location of Project _____

      Agency/Company _____

      Award Amount _____

      Point of Contact (Name & Title) _____

      Telephone Number _____
      Year of Completion_____

b) Title & Location of Project _____

Agency/Company _____

Award Amount _____

Point of Contact (Name & Title) _____

Telephone Number _____
Year of Completion_____

c) Title & Location of Project _____

Agency/Company _____

Award Amount _____

Point of Contact (Name & Title) _____

Telephone Number _____
Year of Completion_____

7) List all outstanding uncompleted projects, in the following format:

a) Title of Project _____

Agency/Company _____

Est. Completion Date _____

Award Amount _____

b) Title of Project _____

Agency/Company _____

Est. Completion Date _____

Award Amount _____

c) Title of Project _____

Agency/Company _____

Est. Completion Date _____

Award Amount _____

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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 (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 supervision 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 2003)

(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, or an outlying area 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)

52.211-13 TIME EXTENSIONS (SEP 2000)

Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

(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 exa mine 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)

52.219-4 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 disadvantaged 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 PLA N (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 (JUN 2003)

(a) Except as provided in paragraph (b) of this clause, the Contractor shall not employ in the performance of this contract any person undergoing a sentence of imprisonment imposed by any court of a State, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, or the U.S. Virgin Islands.

(b) The Contractor is not prohibited from employing persons--

(1) On parole or probation to work at paid employment during the term of their sentence;

(2) Who have been pardoned or who have served their terms; or

(3) Confined for violation of the laws of any of the States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, or the U.S. Virgin Islands who are authorized to work at paid employment in the community under the laws of such jurisdiction, if--

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

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

(iii) 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;

(iv) 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

(v) 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.

(2) 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.

(ii) 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).

(3) 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
3.2%	**6.9%**

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 [Contracting Officer shall insert description of the geographical areas where the contract is to be performed, giving the State, county, and city].

(End of provision)

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 also 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 commu nity 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)

52.222-29 NOTIFICATION OF VISA DENIAL (JIUN 2003)

It is a violation of Executive Order 11246 for a Contractor to refuse to employ any applicant or not to assign any person hired in the United States, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, or Wake Island, on the basis that the individual's race, color, religion, sex, or national origin is not compatible with the policies of the country where or for whom the work will be performed (41 CFR 60-1.10). The Contractor shall notify the U.S. Department of State, Assistant Secretary, Bureau of Political-Military Affairs (PM), 2201 C Street NW., Room 6212, Washington, DC 20520, and the U.S. Department of Labor, Deputy Assistant Secretary for Federal Contract Compliance, when it has knowledge of any employee or potential employee being denied an entry visa to a country where this contract will be performed, and it believes the denial is attributable to the race, color, religion, sex, or national origin of the employee or potential employee.

(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)

52.223-3 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)

52.223-14 TOXIC CHEMICAL RELEASE REPORTING (JUN 2003)

(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 in the United States or its outlying areas.

(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)

52.225-5 TRADE AGREEMENTS (JUN 2003)

(a) Definitions. As used in this clause.

Caribbean Basin country means any of the following countries: Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, El Salvador, Grenada, Guatemala, Guyana, Haiti, Jamaica,

Montserrat, Netherlands Antilles, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago.

Caribbean Basin country end product means an article that--

(1) Is wholly the growth, product, or manufacture of a Caribbean Basin country; or

(2) In the case of an article that consists in whole or in part of materials from another country, has been substantially transformed in a Caribbean Basin country into a new and different article of commerce with a name, character, or use distinct from that of the article or articles from which it was transformed. The term refers to a product offered for purchase under a supply contract, but for purposes of calculating the value of the end product includes services (except transportation services) incidental to the article, provided that the value of those incidental services does not exceed that of the article itself. The term excludes products that are excluded from duty-free treatment for Caribbean countries under 19 U.S.C. 2703(b), which presently are--

(i) Textiles and apparel articles that are subject to textile agreements;

(ii) Footwear, handbags, luggage, flat goods, work gloves, and leather wearing apparel not designated as eligible articles for the purpose of the Generalized System of Preferences under Title V of the Trade Act of 1974;

(iii) Tuna, prepared or preserved in any manner in airtight containers;

(iv) Petroleum, or any product derived from petroleum; and

(v) Watches and watch parts (including cases, bracelets, and straps) of whatever type including, but not limited to, mechanical, quartz digital, or quartz analog, if such watches or watch parts contain any material that is the product of any country to which the Harmonized Tariff Schedule of the United States (HTSUS) column 2 rates of duty apply.

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, Honduras, Hong Kong, Iceland, 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 end product means an article that--

(1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of an article 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 article of commerce with a name, character, or use distinct from that of the article or articles from which it was transformed. The term refers to a product offered for purchase under a supply contract, but for purposes of calculating the value of the end product includes services, (except transportation services) incidental to the article, provided that the value of those incidental services does not exceed that of the article itself.

End product means supplies delivered under a line item of a Government contract.

North American Free Trade Agreement country means Canada or Mexico.

North American Free Trade Agreement country end product means an article that--

(1) Is wholly the growth, product, or manufacture of a North American Free Trade Agreement (NAFTA) country; or

(2) In the case of an article 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 article of commerce with a name, character, or use distinct from that of the article or articles from which it was transformed. The term refers to a product offered for purchase under a supply contract, but for purposes of calculating the value of the end product includes services, (except transportation services) incidental to the article, provided that the value of those incidental services does not exceed that of the article itself.

United States means the 50 States, the District of Columbia, and outlying areas.

U.S.-made end product means an article that is mined, produced, or manufactured in the United States or that is substantially transformed in the United States into a new and different article of commerce with a name, character, or use distinct from that of the article or articles from which it was transformed.,

(b) Implementation. This clause implements the Trade, Agreements Act (19 U.S.C. 2501, et seq.) and the North American Free Trade Agreement Implementation Act of 1993, (NAFTA) (19 U.S.C. 3301 note), by restricting the acquisition of end products that are not U.S.-made, designated country, Caribbean Basin country, or NAFTA country end products.,

(c) Delivery of end products. The Contracting Officer has determined that the Trade Agreements Act and NAFTA apply to this acquisition. Unless otherwise specified, these trade agreements apply to all items in the Schedule. The Contractor shall deliver under this contract only U.S.-made, designated country, Caribbean Basin country, or NAFTA country end products except to the extent that, in its offer, it specified delivery of other end products in the provision entitled “Trade Agreements Certificate.”

(End of clause)

52.225-9 BUY AMERICAN ACT—CONSTRUCTION MATERIALS (JUN 2003)

(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 a 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.

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.

United States means the 50 States, the District of Columbia, and outlying areas.

(b) Domestic preference. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) by providing a preference for domestic construction material. The Contractor shall use only domestic construction material in performing this contract, except as provided in paragraphs (b)(2) and (b)(3) of this clause.

(2) This requirement does not apply to the construction material or components listed by the Government as follows:
"**NONE"**

(3) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(2) 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 requirements 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)(3) 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)(3)(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...	.....	.....	.....

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 (JUN 2003)

(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 and its outlying areas 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)

52.227-4 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)

52.228-2 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)

52.228-11 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 (APR 2003)

(a) As used in this clause--

"Contract date" 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" 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" 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" 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.

Local taxes includes taxes imposed by a possession or territory of the United States, Puerto Rico, or the Northern Mariana Islands, if the contract is performed wholly or partly in any of those areas.

(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)

52.232-5 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)

52.232-17 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)

52.232-27 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.

(4) 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)

52.236-21 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)

52.242-13 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)

52.243-4 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)

52.244-6 SUBCONTRACTS FOR COMMERCIAL ITEMS (APR 2003)

(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 (APR 2003) (46 U.S.C. Appx 1241 and 10 U.S.C. 2631) (flow down required in accordance with paragraph (d) of FAR clause 52.247-64).

(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)

52.246-12 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 premis es.

(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)

52.248-3 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 disadvantages 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 maximum 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)

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:

As indicated on the Alterations of contract page.
(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.

(5) 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.

(6) 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)

252.204-7003 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)

252.223-7004 DRUG-FREE WORK FORCE (SEP 1988)

(a) Definitions.

(1) "Employee in a sensitive position," as used in this clause, means an employee who has been granted access to classified information; or employees in other positions that the Contractor determines involve national security; health or safety, or functions other than the foregoing requiring a high degree of trust and confidence.

(2) "Illegal drugs," as used in this clause, means controlled substances included in Schedules I and II, as defined by section 802(6) of title 21 of the United States Code, the possession of which is unlawful under chapter 13 of that Title. The term "illegal drugs" does not mean the use of a controlled substance pursuant to a valid prescription or other uses authorized by law.

(b) The Contractor agrees to institute and maintain a program for achieving the objective of a drug-free work force. While this clause defines criteria for such a program, contractors are encouraged to implement alternative approaches comparable to the criteria in paragraph (c) that are designed to achieve the objectives of this clause.

(c) Contractor programs shall include the following, or appropriate alternatives:

(1) Employee assistance programs emphasizing high level direction, education, counseling, rehabilitation, and coordination with available community resources;

(2) Supervisory training to assist in identifying and addressing illegal drug use by Contractor employees;

(3) Provision for self-referrals as well as supervisory referrals to treatment with maximum respect for individual confidentiality consistent with safety and security issues;

(4) Provision for identifying illegal drug users, including testing on a controlled and carefully monitored basis. Employee drug testing programs shall be established taking account of the following:

(i) The Contractor shall establish a program that provides for testing for the use of illegal drugs by employees in sensitive positions. The extent of and criteria for such testing shall be determined by the Contractor based on considerations that include the nature of the work being performed under the contract, the employee's duties, and efficient use of Contractor resources, and the risks to health, safety, or national security that could result from the failure of an employee adequately to discharge his or her position.

(ii) In addition, the Contractor may establis h a program for employee drug testing--

(A) When there is a reasonable suspicion that an employee uses illegal drugs; or

(B) When an employees has been involved in an accident or unsafe practice;

(C) As part of or as a follow-up to counseling or rehabilitation for illegal drug use;

(D) As part of a voluntary employee drug testing program.

(iii) The Contractor may establish a program to test applicants for employment for illegal drug use.

(iv) For the purpose of administering this clause, testing for illegal drugs may be limited to those substances for which testing is prescribed by section 2..1 of subpart B of the "Mandatory Guidelines for Federal Workplace Drug Testing Programs" (53 FR 11980 (April 11, 1988), issued by the Department of Health and Human Services.

(d) Contractors shall adopt appropriate personnel procedures to deal with employees who are found to be using drugs illegally. Contractors shall not allow any employee to remain on duty or perform in a sensitive position who is found to use illegal drugs until such times as the Contractor, in accordance with procedures established by the Contractor, determines that the employee may perform in such a position.

(e) The provisions of this clause pertaining to drug testing program shall not apply to the extent that are inconsistent with state or local law, or with an existing collective bargaining agreement; provided that with respect to the latter, the Contractor agrees those issues that are in conflict will be a subject of negotiation at the next collective bargaining session.

(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)

252.227-7033 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.

252.247-7024 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

SC-1. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984) (FAR 52.211-10).

The Contractor shall be required to (a) commence work under this Contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 365 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 Item(s) 0006 through 0010 at any time, or not at all, but no later than 120 calendar days after contract award, including any extensions. The notice to proceed on work Items added by exercise of the options will be given upon execution of consent of surety.

b. The parties hereto further agree that any options herein shall be considered to have been exercised at the time the Government deposits written notification to the Contractor in the mail.

c. The time allowed for completion of the optional item awarded under this contract will be the same as that for the base items, and will be measured from the date of receipt of the notice to proceed for the base items.

SC-1.2 EXCEPTION TO COMPLETION PERIOD

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 (APR 1984) (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 $1,452.00 for each day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, the resulting damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess cost of repurchase under the Termination clause in the CONTRACT CLAUSES.

(c) Exception to Liquidated Damage: In case the Contracting Officer determines that completion of work stated above in paragraph Exception to Completion Period is not feasible during the completion period 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 (SEP 1989) (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.

SC-5.1 REQUIRED INSURANCE IN ACCORDANCE WITH 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 twenty five percent (25%) 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. THROUGH SC-13. DELETED.

SC-14. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)-(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 IV. 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) only and can be viewed or downloaded at http://www.usace.army.mil/inet/usace-docs/eng-pamplets/cecw.htm. Copies of the CD-ROM (Volumes 1-12) are also 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 (MAR 1995)-(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 Contractor shall comply with the provisions of the Executive Order EO 13101 within the scope of his operations. The attached APPENDIX R contains procurement guidelines for products containing recovered materials. The Contractor shall fill out RECOVERED MATERIALS DETERMINATION FORM attached at the end of APPENDIX R and submit it to the Contracting Officer.

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 (coverboard).
(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 blocks 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.

RECOVERED MATERIALS DETERMINATION FORM

Instructions

This form is to be completed by the procurement originator when EPA-designated items included in the Affirmative Procurement Program for Recovered Materials are being procured from outside vendors. For questions on whether the product counts as "EPA designated" or what the required recycled content is, refer to product descriptions on EPA's website at http://www.epa.gov/cpg. This form is not required for items requisitioned from established Federal supply sources.

1. The procurement originator lists which item(s) apply to the procurement request, the required recycled content, the actual recycled content, and signs and dates the appropriate Certification on the back of this form.

2. If an exemption is being claimed, the procurement originator's unit commander also signs the Certification on the back of this form.

3. The completed form becomes part of the contracting office contract file.

Procurement Request No._____

The EPA-designated items being procured are:

___ Building insulation
___ Flowable fill
___ Latex paint
___ Floor tiles
___ Laminated paperboard
___ Structural fiberboard
___ Polyester carpet
___ Carpet Backing
___ Carpet Cushion
Cement & concrete containing:
___ Coal fly ash
___ Ground granulated blast furnace slag
___ Binders (paper, solid plastic or plastic covered)
___ Plastic presentation folders
___ Plastic file folders
___ Plastic clip portfolios
___ Plastic clipboards
___ Plastic envelopes
___ Office recycling containers
___ Office waste receptacles
___ Plastic desktop accessories
___ Printing and writing papers

___ Printer ribbons
___ Toner cartridges
___ Awards and plaques
___ Playground surfaces
___ Park and recreational furniture
___ Running tracks
___ Playground equipment
___ Traffic barricades
___ Signage
___ Traffic cones
___ Channelizers
___ Delineators
___ Flexible delineators
___ Parking stops
___ Plastic fencing (snow or erosion control, safety barriers)
___ Engine coolants
___ Re-refined lubricating oils
___ Retread tires
___ Garden and soaker hoses
___ Lawn and garden edging
___ Patio blocks
___ Landscaping timbers and posts (plastic lumber)
___ Compost from yard trimmings or food waste
___ Commercial/industrial sanitary tissue products
___ Sorbents
___ Industrial Drums
___ Railroad grade crossings/ surfaces
___ Pallets
___ Paperboard and packaging
___ Strapping and stretch wrap
___ Shower & restroom dividers/partitions
___ Plastic trash bags
___ Mats
___ Hydraulic mulch
___ Tray liners
___ Newsprint

CERTIFICATION

Procurement Request No._____

Complete Part A or Part B as appropriate:

****

A. I hereby certify the Statement of Work/Specifications for the requisition of all materials listed on this form complies with EPA standards for recycled/recovered materials content.

_____ _____
Procurement Originator's Signature Date

****

B. The following item does not comply with EPA standards for recycled/recovered materials *(please complete a separate justification for each noncompliant item purchased as part of this procurement action*): _____
The exemption being claimed for this purchase is:

___ The product does not meet appropriate performance standards

___ The product is not available within a reasonable time frame

___ The product is not available competitively (from two or more sources)

___ The product is only available at an unreasonable price (it costs more than a comparable non-recycled-content product). The recycled-content product costs $_____ per _____ and the non-recycled-content product costs $_____ per _____

_____ _____
Procurement Originator Date

_____ _____
Commander Date

END OF SECTION

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INDEX OF DRAWINGS

RENOVATE DORMITORY 737,
MALMSTROM AFB, MONTANA
DRAWING NO. 93-9012

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	CIVIL			
2	C-0	Site Demo Plan		4/03/03
3	C-1	Site/Grading Plan		4/03/03
	LANDSCAPING			
4	L-1	Planting Plan		4/03/03
5	L-2	Irrigation Plan		4/03/03
6	L-3	Planting Details		4/03/03
7	L-4	Irrigation Details		4/03/03
	FIRE PROTECTION			
8	F-1	Fire Plans		4/03/03
	ABATEMENT			
9	AB-1	Roof & First Floor Abatement Plans		4/03/03
	ARCHITECTURAL			
10	A-1	First Floor Demo Plan		4/03/03
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12	A-3	First Floor Plan		4/03/03
13	A-4	Second & Third Floor Plans		4/03/03
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16	A-7	Building Section/Wall Sections		4/03/03
17	A-8	Wall Sections/Details		4/03/03

SHEET NUMBER	PLATE NUMBER	TITLE	REVISION NUMBER	DATE
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19	A-10	1st Floor Finish Plan/Details		4/03/03
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21	A-12	Enlarged Plans/Modules/Equip. Schedules		4/03/03
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27	A-18	Miscellaneous Details		4/03/03
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33	FP-2	First Floor Fire Sprinkler Plan		4/03/03
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36	P-2	First Floor Plumbing Demolition Plans		4/03/03
37	P-3	Plumbing Demolition Plans		4/03/03
38	P-4	First Floor Plumbing Remodel Plans		4/03/03
39	P-5	Plumbing Remodel Plans		4/03/03
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41	P-7	Plumbing Details		4/03/03

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51	M-10	Temperature Control Schematics (STAFA)		4/03/03
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59	E-6	2nd & 3rd Floor Electrical Demo Plan		4/03/03
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63	E-10	2nd & 3rd Floor Power Plans		4/03/03
64	E-11	1st Floor & Roof Special Systems Plan		4/03/03
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REVISIONS TO DRAWINGS

Plate C.1

At notation for gazebo which reads “GAZEBO PROPOSAL OPTION #1 CLIN 0004 SEE 7 & 8/ L-3.” change to read “GAZEBO - OPTIONAL ITEM; SEE 7 & 8/ L-3.”

Plate L.1

At notation for gazebo which reads “GAZEBO IN PROPOSAL OPTION #1 CLIN 0004.” change to read “GAZEBO - OPTIONAL ITEM.”

Plate L.2

At notation for gazebo which reads “INSTALL SPRINKLERS THIS AREA AS SHOWN IF PROPOSAL ITEM #1 CLIN 0004 - GAZEBO IS NOT BUILT.” change to read “INSTALL SPRINKLERS THIS AREA AS SHOWN IF GAZEBO OPTIONAL ITEM IS NOT BUILT.”

Plate L.3

Refer to title of Detail 7 and change to read “GAZEBO PLAN / OPTIONAL ITEM.”

STANDARD DETAILS BOUND IN THE SPECIFICATIONS

DRAWING NUMBER	SHEET NUMBER	TITLE	DATE
SECTION 01501 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS			
	1	Hard Hat Sign	10SEP90
	1 & 2	U.S. Air Force Project Construction Sign	84JUN20

GENERAL DECISION MT030026 06/13/2003 MT26

Date: June 13, 2003
General Decision Number MT030026

Superseded General Decision No. MT020026

State: Montana

Construction Type:
RESIDENTIAL

County(ies):
CASCADE

RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	06/13/2003

COUNTY(ies):
CASCADE

SUMT4033A 03/24/1992

	Rates	Fringes
BRICKLAYERS	17.00	2.70
CARPENTERS	13.15	3.31
CEMENT MASONS	12.30	1.00
ELECTRICIANS	15.90	3.5%+1.45
IRONWORKERS	17.18	6.18
LABORERS:		
Unskilled	10.50	1.75
Pipelayer	10.66	1.75
Hod Carrier		
PAINTERS:		
Brush	12.42	1%+1.09
Spray	14.67	1%+1.09
PLUMBERS	16.20	2.17
ROOFERS	11.40	1.20
SHEET METAL WORKERS	15.19	1.82
SOFT FLOOR LAYERS	12.50	
SPRINKLER FITTERS	14.81	2.43
TERRAZZO & TILE SETTERS	14.45	1.45
TRUCK DRIVERS:		
Pickup	10.95	1.66
Flatbed:		
3 tons & under	11.00	1.66
over 3 tons	11.20	1.66
Combination truck, concrete mixer, transit mixer	11.10	1.66

WELDERS - Receive rate prescribed for craft performing operation

to which welding is incidental.
==

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment

data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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

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

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

END OF GENERAL DECISION

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01312 Quality Control System (QCS)
01320 Project Schedule
01330 Submittal Procedures
01451 Contractor Quality Control
01501 Construction Facilities And Temporary Controls
01572 Construction and Demolition Waste Management
01670 Recycled / Recovered Materials
01701 Operations And Maintenance Manuals
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01703 Warranty Of Construction
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SECTION 01001

SUPPLEMENTARY REQUIREMENTS

PART 1 GENERAL

1.1 DEFINITIONS

The references listed below are to be defined as indicated wherever they may be used in the TECHNICAL SPECIFICATIONS.

1.1.1 General

"GENERAL CONDITIONS," “GENERAL PROVISIONS,” "SPECIAL CONDITIONS," and “SUPPLEMENTARY CONDITIONS” of the Contract shall be read to pertain to the Contract Clauses included under Section 00700 and Special Clauses under Section 00800 as designated in the contract.

"SUPPLEMENTARY REQUIREMENTS " shall be read to pertain to any of the sections of the DIVISION 1 as required by the content of the section or paragraph containing the reference.

Specification “SECTION 01300 – SUBMITTALS” shall be read as the specification “SECTION 01330 – SUBMITTAL PROCEDURES”.

Specification “SECTION 01400 – CONTRACTOR QUALITY CONTROL” shall be read as the specification “SECTION 01451 – CONTRACTOR QUALITY CONTROL”.

1.1.2 Contracting Officer (CO), Contracting Officer’s Representative (COR)

Wherever in these specifications or upon the drawings the words "Base Contracting Officer" (CO) or "Malmstrom Contracting Office” or any other references of similar import are used, it shall be understood to mean "U. S. Army Corps of Engineers Administrative Office” and the “USACE Administrative Contracting Officer" as designated in the contract.

1.1.3 As Shown, As Indicated, As Detailed

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 "provided complete in-place," that is "furnished and installed." (FAR 52.236-21 (b and c).)

1.1.4 Directed, Required, Ordered, Designated, Prescribed

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.

1.2 CONSTRUCTION SCHEDULING

The instructions for preparation and submittal of the Contractor-prepared Network Analysis System are found in SECTION 01320, PROJECT SCHEDULE.

1.3 CORRESPONDENCE

1.3.1 All correspondence shall be addressed to the Contracting Officer, shall be serially numbered commencing with Number 1, with no numbers missing or duplicated and shall be forwarded in quintuplicate, as directed by the authorized representative of the Contracting Officer, and shall include an additional copy forwarded to a separate designated location. All copies provided shall be legible. Enclosures attached or transmitted with the correspondence shall also be furnished with the original and each copy. Each serial letter shall make reference to the contract name, contract number and shall have only one subject.

1.3.2 For submission of Contractor payment requests, See Section 01025 – MEASUREMENT AND PAYMENT.

1.4 ADVANCED NOTICE OF CONTRACTOR PERFORMED ACCEPTANCE TESTING

The Contractor shall notify the Contracting Officer a minimum of 20 days prior to performing any acceptance or "buy off" testing of the following systems: (1) Fire Detection/Protection, and (2) HVAC. Advance notification is not required for testing performed as part of fabrication or installation.

1.5 CONTRACTOR'S FILES

Contractor shall maintain "Approved (Action Code "A") and "Approved Except as Noted (Action Code "B") shop drawing files in fabrication shops and at project sites for government use.

1.6 IDENTIFICATION OF EMPLOYEES AND MILITARY REGULATIONS:

(a) The Contractor shall be responsible for compliance with all regulations and orders of the Commanding Officer of the Military Installation, respecting identification of employees, movements on installation, parking, truck entry, and all other military regulations which may affect the work.

(b) The work under this Contract is to be performed at an operating Military Installation with consequent restrictions on entry and movement of nonmilitary personnel and equipment.

1.7 SPECIAL SAFETY REQUIREMENTS:

All construction activities shall be conducted in strict compliance with the Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, and Occupational Safety and Health Administration regulations, as applicable.

1.7.1 In addition to Safety and Health Requirements Manual EM 385-1-1, and all applicable OSHA standards, the Contractor shall comply with the requirements listed below. Paragraph numbers refer to EM 385-1-1 or are added thereto.

(a) Paragraph 01.A.12: Add new paragraph: Safety Personnel. The Contractor shall designate a person on his staff to manage the Contractor's safety and accident prevention program. This person will provide a point of contact for the Contracting Officer on matters of job safety, and shall be responsible for ensuring the health and safety of on site personnel.

(b) Paragraph 01.D.02, revise as follows:

(1) Replace paragraph 01.D.02c with the following:
"c. Property damage in excess of $2,000.00

(2) Add new paragraph d as follows:
"An injury resulting in a lost workday, not including the day of injury."

1.8 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (ER 415-1-15 31 OCT 89)

This Paragraph specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE entitled "Default (Fixed Price Construction)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

1.8.1 The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

1.8.2 The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

1.8.3 The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
19	15	16	10	4	4	2	2	3	6	13	17

1.8.4 Upon acknowledgment of the notice to proceed (NTP) and continuing throughout the contract, the contractor will record on the daily QCQ report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delays must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day.

1.8.5 The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph 1.8.3, above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled " Default (Fixed Price Construction)".

1.9 COLOR BOARDS

Two sets of color boards shall be submitted within 60 calendar days after receipt of Notice to Proceed. The board shall include samples of colors and finishes of every finish such as on walls, floors, and ceilings. This would include, but not be limited to, paint, floor and wall tile, acoustical panels, carpet, wall base, plastic laminate, etc. Where special finishes such as architectural concrete or prefinished metal panels are required, samples of not less than 305 mm (12 inches) square shall be submitted with the board. Boards shall include, where applicable, color samples of integrally colored block, brick, and prefinished metal roofing and siding. The board shall be 610 mm by 610 mm (24 inches by 24 inches). If more space is needed, more than one board per set may be submitted. This is not meant to replace the samples called for in other portions of the specifications. The Contractor shall certify that he has reviewed the color boards in detail and that they are in strict accordance with the contract drawings and specifications, except as may be otherwise explicitly stated.

1.10 COMPLIANCE WITH DAVIS-BACON ACT

1.10.1 Contractor POC

Within 14 days after award of the contract, the Contractor shall designate a point of contact (POC) within their organization who will be responsible for the Davis-Bacon Act Labor Program for the Contractor and all subcontractors under this contract as required by the Contract Clauses and FAR 52.222.

1.10.2 Responsibilities

The designated Contractor POC shall be responsible for Davis-Bacon Act Labor Program activities including, but not limited to:

- Documentation and record keeping
- Submittal and accuracy of certified payrolls
- Submittal of required labor forms including requests for additional classifications and rates, Statements and Acknowledgement, etc.
- Posting of the wage determination, approved additional classifications and rates, labor and EEO posters
- Coordination with the Contracting Officer's Labor Program POC

Prior to submittal to the Government, payrolls shall be reviewed for compliance to all applicable labor standards, to include, but not be limited to the following items: correct wage rates, correct overtime classification and pay, misclassification of workers for work actually performed, apprentice to journeyman ratios, and registration of apprentice. Corrective actions shall be taken as necessary to ensure Contractor compliance with applicable contract and FAR clauses.

1.10.3 Certification

The Contractor POC shall provide a signed certification stating the following: “I certify that the submitted items being forwarded have been reviewed in detail and are correct and in strict conformance with the Labor Standards of the contract except as otherwise stated.”

PARTS 2 AND 3 NOT USED

END OF SECTION

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SECTION 01005

SITE SPECIFIC
SUPPLEMENTARY REQUIREMENTS

1. CONDUCT OF WORK:

1.1 COORDINATION AND ACCESS TO SITE

1.1.1 Coordination with using agencies shall be made through the Contracting Officer to assist the Contractor in completing the work with a minimum of interference and inconvenience.

1.1.2 Work hours in the construction area will be restricted to 7:00 a.m. to 4:30 p.m. daily, Monday through Friday, excluding holidays. Work hours other than as specified above shall be coordinated with and approved by the Contracting Officer.

1.2 FIRE REGULATIONS

Contractor shall comply with base fire regulations and NFPA 241 Building Construction and Demolition requirements. Contractor shall provide adequate fire extinguishers for the construction site and remove them upon acceptance of the facility.

1.3 GENERAL AREA REQUIREMENTS

Security requirements and procedures shall be coordinated with the 341 Security Forces Squadron, Resource Protection (telephone 406-731-4344), Malmstrom AFB. Activities of the Contractor and Contractor's employees and subcontractors and their employees while on the base, will be conducted in accordance with base regulations, including those of the fire marshall, as well as security directives. This includes, but is not limited to, obtaining an excavation permit before any digging and giving way to alert vehicles during alerts if located on a marked alert route.

1.3.1 Identification Credentials

All Contractor personnel, except those not under the Contractor's direct control such as –concrete trucks and material deliveries, will be required to process in and obtain an Application for Civilian Identification Card (DD Form 1172) from the Corps of Engineers Malmstrom AFB Project Office in Building 1085. The Contractor shall provide the employee with a letter or form, identifying the employee and company name. After completion of the DD Form 1172, proceed to the Pass and ID Section at the Visitor Control Center in Building 192 (working hours - Monday through Friday - 7:30 a.m. to 4:30 p.m.) to obtain a base personnel access pass and vehicle pass. Current vehicle registration and proof of insurance are required for vehicle passes. The Contractor shall notify the Pass and ID Section of all losses of passes, within 48 hours after the loss, by name and address. Employees who have terminated employment or who have been dismissed must surrender their personnel and vehicle passes to the Visitors Control Center through the Contracting Officer. Employees without a personnel or vehicle pass in their possession will be denied access to the base and work areas and may be subject to detainment until proper identification is made. The passes shall not be worn or displayed off the military base.

1.3.2 Commercial or company vehicles will be allowed access to the base provided company emblems are attached to the sides of the vehicles.

1.3.3 Equipment and storage areas will as shown on the contract plans. See specification Section 01501 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS for more information.

1.4 CONSTRUCTION SITE FENCE

The Contractor shall provide fence around the construction site. The fence shall be chain link, 1.8 m high.

1.5 MOTORIZED EQUIPMENT

1.5.1 Truck Load Limits

Truck load limits on base are restricted to:

a. 1 April - 1 June: 350 pounds per inch width of tire.
b. All other times: 400 pounds per inch width of tire.

1.5.2 Fire Extinguishers

Motorized equipment shall be equipped with fire extinguishers as follows:

a. Pickup truck or other light passenger vehicles, one extinguisher per vehicle, rating 5 BC.
b. All other trucks and heavy motorized equipment, two extinguishers per vehicle, rating 10 BC.

1.6 NUCLEAR DENSOMETERS

Where nuclear densometers or other devices containing radioactive elements are used on the project, the Contractor must have a proof of a Nuclear Regulatory Committee (NRC) permit for its use. The Contractor must also keep all radioactive equipment locked up when not in use and remove it from the base at completion of the work day.

1.7 UTILITY OUTAGES

Contractor shall schedule and coordinate unavoidable utility outages with the Contracting Officer and Base Civil Engineer at least 10 days in advance. Unless indicated otherwise, the Contractor shall give 14 days preliminary notice of future outage. Final notice shall be given 10 calendar days before outage and shall specify date and time of the outage. The 'Utility Outage Notice' shall be completed by the Contractor and submitted to the Contracting Officer for approval. No interruptions shall be made until the approved Notice is returned to the Contractor. Outage durations shall be kept to a minimum. All outages longer than 2 hours shall be after normal duty hours or on a weekend at the Government option. Outages in dormitories or housing units shall be performed during business hours to minimize disruption to occupants. All outages that affect heating system motors or controls during heating season shall require the Contractor to connect backup power during the outage, as requested by the Government.

1.8 PROTECTION OF GOVERNMENT PROPERTY

In addition to requirements of the CONTRACT CLAUSES, Contractor shall protect all Government property within the buildings in which he is working, except for such property as is required to be demolished. Property which is to be demolished shall be protected until its scheduled demolition time. Protection shall include, but not be limited to, protection from construction generated dust, debris, water, and vibration.

PART 2. NOT USED.

END OF SECTION

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 GENERAL

The contract price for each item shall constitute full compensation for furnishing all plant, labor, materials, appurtenances, and incidentals and performing all operations necessary to design, construct and complete the work under the items in accordance with these specifications and the applicable drawings, including surveying performed by the Contractor. Payment for each item shall be considered as full compensation, notwithstanding that minor features may not be mentioned herein. Material and work paid for under one item will not be paid for under any other item. No separate payment will be made for the work, services, or operations required by the Contractor, as specified in DIVISION 1, GENERAL REQUIREMENTS, to complete the project in accordance with these specifications; all costs thereof shall be considered as incidental to the work.

1.2 PAYMENT ITEMS

The payment items for the work of this contract are listed on the Schedule and described below.

1.2.1 Item No. 0001 (BASE ITEM):

Payment will be made at the contract lump sum price listed on the Schedule for Item, "All Work for Renovate Dormitory 737, Except Items Separately Priced," payment of which shall constitute full compensation for costs associated with the item of work as shown on the drawings and as specified.

1.2.2 Item No. 0002 (BASE ITEM):

Payment will be made at the contract lump sum price listed on the Schedule for Item, "Minor Construction," payment of which shall constitute full compensation for costs associated with the item of work as shown on the drawings and as specified for the following items of work: complete construction of air conditioning chiller and associated pad, fence, and piping; complete site irrigation system; the camera system conduit and the additional concrete at the basketball court. These are the only items of the work to be included in the item for "Minor Construction."

1.2.3 Item No. 0003 (BASE ITEM):

Payment will be made at the contract lump sum price listed on the Schedule for Item, "All Work for As-Built Drawings as specified in Section 01702 from preparation to final approval," payment of which shall constitute full compensation for all costs associated with the item of work, complete. No partial or total payment will be made for this item until the as-built drawings, both marked up blue prints and electronic files are fully approved by the Government (A or B action) and all copies of approved drawings and electronic media received by the Government.

1.2.4 Item No. 0004 (BASE ITEM):

Payment will be made at the contract lump sum price listed on the Schedule for Item, "All Work for O&M Manuals as specified in Section 01701 from preparation to final approval Final," payment of which shall constitute full compensation for all costs associated with the item of work, complete. No partial or total payment will be made for this item until all O&M manuals are fully approved by the Government (A or B action) and all copies of final manuals are received by the Government in their final binders.

1.2.5 Item No. 0005 (BASE ITEM):

Payment will be made at the contract lump sum price listed on the Schedule for Item, "All Work for Form 1354 Checklist and Equipment in Place List as specified in Sections 01704 and 01705 from preparation to final approval;" payment of which shall constitute full compensation for all costs associated with the item of work, complete. No partial or total payment will be made for this item until both the 1354 Checklist and Equipment in Place List are fully approved by the Government (A or B action) and all copies of approved lists received by the Government.

1.2.6 Item 0006 (OPTIONAL ITEM)

Payment will be made at the contract lump sum price listed on the Schedule for Item, "Gazebo," payment of which shall constitute full compensation for costs associated with the item of work as shown on the drawings and as specified. The Contract Unit Price shall include the cost of the completed gazebo, clean-up, and all labor, material, and other items required for a complete and usable product.

1.2.7 Item 0007 (OPTIONAL ITEM)

1.2.7.1 Payment

Payment will be made at the contract unit price listed on the schedule for Item "UNIT PRICE 1 (Remove/Replace Damaged Floor Leveling Compound at Existing Unit Bathrooms." The Contract Unit Price shall include the cost of removal and disposal of existing leveling compound including; clean-up, and all labor, material, and other items required for a complete and usable product.

1.2.7.2 Measurement

Measurement shall be to the nearest square footage of replacement leveling compound, in place.

1.2.8 Item 0008 (OPTIONAL ITEM)

1.2.8.1 Payment

Payment will be made at the contract unit price listed on the schedule for Item "UNIT PRICE 2 (Asbestos mudded pipe fitting Abatement)." The Contract Unit Price shall include the cost of removal and disposal of existing asbestos insulation from mudded pipe fitting with; clean-up, and all labor, material, and other items required for a complete and usable product.

1.2.8.2 Measurement

Measurement shall be the number of pipe elbow fittings abated by removal of asbestos containing materials.

1.2.9 Item 0009 (OPTIONAL ITEM)

1.2.9.1 Payment

Payment will be made at the contract unit price listed on the schedule for Item "UNIT PRICE 3 (Asbestos pipe insulation Abatement)." The Contract Unit Price shall include the cost of removal and disposal of existing asbestos insulation from pipe with; clean-up, and all labor, material, and other items required for a complete and usable product.

1.2.9.2 Measurement

Measurement shall be by linear feet of pipe insulation removed.

1.2.10 Item 0010 (OPTIONAL ITEM)

1.2.10.1 Payment

Payment will be made at the contract unit price listed on the schedule for Item "UNIT PRICE 4 (Asbestos floor tile and mastic Abatement)." The Contract Unit Price shall include the cost of removal and disposal of existing 9 inch x 9 inch asbestos composition tile and mastic; clean-up, and all labor, material, and other items required for a complete and usable product.

1.2.10.2 Measurement

Measurement shall be to the nearest square footage of flooring removed.

1.3 PAYMENT INVOICE

1.3.1 Progress Payment Invoice

Requests for payment shall be submitted in accordance with Federal Acquisition Regulations (FAR) Subpart 32.9, entitled "PROMPT PAYMENT", and Paragraphs 52.232-5 and 52.232-27, entitled "Payments Under Fixed-Price Construction Contracts", and "Prompt Payment for Construction Contracts", respectively. In addition each request shall be submitted in the number of copies and to the designated billing office as shown in the Contract.

1.3.1.1 When submitting payment requests, the Contractor shall complete Blocks 1 through 12 of the "PROGRESS PAYMENT INVOICE" Form as directed by the Contracting Officer. (A sample form is attached at the end of this Technical Specification Section.) The completed form shall then become the cover document to which all other support data shall be attached.

1.3.1.2 One additional copy of the entire request for payment, to include the "PROGRESS PAYMENT INVOICE" cover document, shall be forwarded to a separate address as designated by the Contracting Officer.

1.3.1.3 The Contractor shall submit with each pay request, a list of subcontractors that have worked during that pay period. The listing shall be broken down into weeks, identifying each subcontractor that has worked during a particular week, and indicate the total number of employees that have worked on site for each subcontractor for each week. The prime Contractor shall also indicate the total number of employees for its on-site staff for each week.

PARTS 2 and 3 NOT USED

PROGRESS PAYMENT INVOICE

See Federal Acquisition Regulations (FAR) 32.900, 52.232-5, & 52.232-27

1. PROJECT AND LOCATION	2. DATE
3. CONTRACTOR NAME AND ADDRESS (Must be the same as in the Contract)	4. CONTRACT NO. 5. INVOICE NO.
6. DESCRIPTION OF WORK	7. PERIOD OF PERFORMANCE From: To:
8. DISCOUNT TERMS	
9. OFFICIAL TO WHOM PAYMENT IS TO BE FORWARDED Name: Title: Phone: ( ) -	10. OFFICIAL TO BE NOTIFIED OF DEFECTIVE INVOICE Name: Title: Phone ( ) -

11. CERTIFICATION: I hereby certify, to the best of my knowledge and belief, that

(1) The amounts requested are only for the performance in accordance with the specifications, terms, and conditions of this contract;

(2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, 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; and

(3) This request for progress payment 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.

_____ _____ _____

(Signature) **(Title)** **(Date)**

12. OTHER INFORMATION OR DOCUMENTATION required by Contract. Provide two (2) copies of each (check and attach if applicable): _____ Updated Progress Chart/Schedule _____ Progress Narrative _____ Certified Payrolls (submitted weekly) _____ Safety Exposure Report _____ Updated Submittal \register _____ Progress Photos _____ Subcontractor/Employee Listings	(FOR GOVERNMENT USE ONLY) Retainage: _____% Amt: $_____ Withholdings: $ _____ Reason: _____ _____ Following items are current: As-Builts _____ Yes _____ No O & M Manuals _____ Yes _____ No 1354 Data _____ Yes _____ No Submittal Register _____Yes _____No

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SECTION 01035

MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 PROPOSED PROJECT MODIFICATIONS:

Price proposals for proposed modifications shall be submitted in accordance with the requirements of the Contract Clause MODIFICATION PROPOSALS - PRICE BREAKDOWNS. If change order work impacts or delays other unchanged contract work, the costs of such impacts or delays shall be included in the proposals and separately identified. Additional instructions for submitting price proposals can be found in NPSP-415-1-1, INSTRUCTION AND INFORMATION FOR CONTRACTORS, a copy of which will be furnished to the Contractor at the Preconstruction Conference. For information applicable to equipment rates used in contract modifications, refer to 00800 - SPECIAL CLAUSES, clause "EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE".

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 01061

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 SCOPE

This Section covers prevention of environmental pollution and damage as the result of construction operations under this contract. For the purpose of this specification, environmental pollution, and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for esthetic, cultural, and/or historical purposes. The control of environment pollution and damage requires consideration of air, water, and land, and includes management of visual esthetics, noise, and solid waste, as well as other pollutants.

1.2 QUALITY CONTROL

The Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. The Contractor shall record any problems in complying with laws, regulations, and ordinances, and corrective action taken.

1.2.1 Subcontractors

Assurance of compliance with this Section by subcontractors will be the responsibility of the Contractor.

1.3 NOTIFICATION

When the Contracting Officer notifies the Contractor in writing of any observed noncompliance with Federal, state, or local laws, regulations, or permits, the Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or costs or damage allowed to the Contractor for any such suspension.

1.4 PROTECTION OF ENVIRONMENTAL RESOURCES

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications. Environmental protection shall be as stated in the following subparagraphs:

1.4.1 Protection of Land Resources

The Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from the Contracting Officer except as otherwise specified or indicated. See Paragraph 1.5 for additional requirements relating to protection of trees during excavation in the vicinity of a tree.

1.4.2 Disposal of Garbage

Garbage shall be placed in containers which are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination.

1.4.3 Refuse Disposal and Cleanup

Refuse shall be defined as debris other than organic materials such as brush or tree stumps.

1.4.3.1 Refuse Disposal

The cost of refuse disposal, such as transportation, handling, dumping fees as applicable, and similar cost, shall be included in the contract price. Refuse shall be disposed of off site, in accordance with all local, state, and Federal rules and regulations, at the Contractor's expense.

1.4.3.2 Fire Hazard

Cloths, cotton waste, and other combustible materials that might constitute a fire hazard shall be placed in closed metal containers and placed outside or destroyed at the end of each day.

1.4.4 Restrictions

The Contractor will not be permitted to deposit refuse in existing garbage cans or refuse dumpsters. Cleaners shall not be poured, drained, or washed into plumbing fixtures or sanitary or storm sewers. Debris, dirt, dust, and stains attributable to or resulting from the work effort shall be removed, cleaned, or effaced by the Contractor to the satisfaction of the Contracting Officer prior to acceptance of the job. Refuse shall not be burned. Burning of vegetation or tree stumps will not be allowed unless the worksite is in an area approved for burning.

1.4.4.1 Waste Management and Disposal

State of Montana environmental regulations classify disposal sites for their respective abilities to handle various types of solid waste. Asphalt and concrete waste products are to be disposed of in licensed Class II and Class III disposal sites respectively. Contractor shall be responsible for complying with the "Montana Solid Waste Management Act" and the "Administrative Rules of Montana" concerning waste management and disposal.

1.4.5 Disposal of Chemical or Hazardous Waste

Hazardous waste generated by construction operations remains the property of the Contractor and shall be removed from Malmstrom AFB. Except as specified below, removal of this hazardous waste shall be coordinated with Waste Management, Inc., through the Contracting Officer. Contractor operations shall be, at all times, in compliance with the Resource Conservation and Recovery act (RCRA), 40 CFR, and Montana State Department of Health and Environmental Sciences (MSDHES). The Contractor shall maintain Material Safety Data Sheets (MSDS) for all material used on base and the MSDS' shall be on file on site at the job shack.

1.4.5.1 No more than 200 liters, total, of hazardous waste shall be accumulated by the Contractor on site. Once the 200-liter limit is reached, the Contractor has 72 hours to remove the waste from Malmstrom AFB. If any materials will be used that are corrosive, flammable, toxic, or reactive, the Contractor shall submit a Hazardous Materials/Hazardous Waste Control Plan to the CO for approval and coordination with 341 CES/CEVV. Contractor shall submit Material Safety Data Sheets (MSDS) to the CO for approval and coordination with 341 CES/CEVV for all paints and protective coatings, solvents, adhesives, and all other chemical products.

1.4.5.2 All hazardous materials used by the Contractor on base shall be stored properly in special areas in accordance with all regulatory requirements. The Contractor shall:

- Keep containers closed when not in use.
- Label containers with warning labels.
- Post hazardous signs if required.
- Check routinely for leaks and spills.
- Keep materials at central location.

1.4.5.3 PCBs

1.4.5.3.1 Turn in all light ballasts or electrical equipment with PCB's to the Environmental Flight. Transformers, capacitors, switching gear, etc., often contain PCB's for cooling purposes.

1.4.5.3.2 If hermetically sealed equipment, then turn into Environmental Flight assuming it has a PCB concentration greater than the 500 ppm limit.

1.4.5.3.3 The Contractor shall:

- Count the number of units for turn in.
- Place units in a DOT shipping container furnished by him.
- Call Construction Management three days in advance to schedule Contractor delivery to Bldg 411 on base.
- Deliver materials containing PCB to Bldg 411.

1.4.5.4 Spills

No hazardous materials shall be sprayed or spilled on the ground, asphalt, or concrete covered surfaces at job sites. The Contractor will be charged for any cleanups and disposal costs done by base personnel. All spill cleanups shall be handled by trained personnel only. Refer to CFR 1910.120. Any hazardous product cleanup on base shall be disposed of through Malmstrom AFB only.

1.4.5.4.1 Spill Response Procedure:

The Contractor shall:

- Notify Construction Management and Base Fire Department of any spills.
- Stop source of spill without undue risk of personnel injury. Use on site containment, safety equipment, and materials.
- Make spill scene off limits to all non-cleanup personnel.
- Restrict all sources of ignition if flammable material in spill.
- Report to Environmental Flight, (telephone (406) 731-6165).

1.4.6 Disposal of Solid Waste

1.4.6.1 The Contractor is responsible for handling and disposal of all solid waste generated at the job site. The Contractor shall make all arrangements for disposal of any wastes including wastes requiring special handling such as asbestos, rubble, or non-hazardous chemical wastes. The Contractor is responsible for laboratory testing and any documentation submittals required by the landfill owner. Montana State Department of Health and Environmental Sciences (MSDHES) written approval is required for any non-inert materials such as asphalt containing materials, asphalt roofing materials, steel containing materials, etc., that are to be disposed of in the Class III landfill site.

1.4.6.2 All non-hazardous wastes shall be properly disposed of through a licensed landfill site. No landfill site is available on base. Demolition rubble shall not be buried anywhere on base or at the work site. Any cleanups and the costs of these cleanups of improper waste disposals or removals of improperly placed hazardous waste materials shall be the responsibility of the Contractor.

1.4.7 Disposal of Discarded Materials

Discarded materials, other than those which can be included in the solid waste category, shall be handled as directed.

1.4.8 Disposal of Asbestos Containing Materials (ACM)

Asbestos containing materials shall be disposed of off Government property as specified in Section 02080 - ASBESTOS ABATEMENT. No disposal area is available on the base.

1.4.9 Protection of Water Resources

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters.

1.4.9.1 Waste Water System Discharge

1.4.9.1.1 The Contractor shall not dump any restricted materials down the sanitary sewer or waste water disposal system without approval of the Air Force. All discharges to the sewer shall meet Federal, State, and Local regulatory requirements and shall meet the permit requirements limiting Malmstrom AFB discharges. The base sewer discharge is tested weekly by the City of Great Falls for conformance requirements.

1.4.9.1.2 Restricted waste water materials include those that create a fire or explosion hazard; are toxic or poisonous; waters or wastes having a pH lower than 5.5 or higher than 9.0; solid or viscous substances that can obstruct the sewer flow; interfere with the biological activity of a treatment plant; inhibit biological activity by increasing the temperature too much; any fats, wax, grease, or oils in excess of 100 mg/1, noxious or malodorous liquids; contain metals in excess of iron-0.03 mg/1, chromium-16.72 mg/1, copper-15.13 mg/1, zinc-0.51 mg/1, arsenic-1.36 mg/1, cadmium-5.0 mg/1, lead-2.63 mg/1, mercury-0.06 mg/1, nickel-15.57 mg/1 or silver-0.70 mg/1, exceed Malmstrom AFB industrial permit allowable limits; contain phenols or dyes; are radioactive; contain over 100 lbs per day of total suspended solids (TSS) or five day biochemical oxygen demand (BOD), or cause the base waste water discharge to exceed 200 mg/1 BOD or 250 mg/1 TSS.

1.4.9.1.3 The Contractor shall not discharge any contaminated waters to the storm drain system. Prior approval from the Environmental Flight (telephone (406) 731-6165) is required for any questionable liquid discharges. The Contractor is solely responsible for treating all groundwater removed from the trenches and all storm water that flows on or through the construction site.

1.4.9.2 Erosion and Sediment Controls

1.4.9.2.1 MPDES General Permit for Storm Water Discharges Associated with Construction Activity is required for construction activity in which clearing, grading and excavation will result in disturbance of 1 acre or more of land. A completed Notice of Intent package must be sent to MTDEQ and consists of the following:

a. Notice of Intent Form

b. A Storm Water Pollution Prevention Plan. This plan must meet the basic requirements of the SWPPP provided in Part IV of the General Permit.

c. Fees

1.4.9.2.2 The NOI package shall be routed through 341 CES/CEV 10 days prior to construction start date.

1.4.9.2.3 The SWPPP must be maintained on the construction site.

1.4.9.2.4 During construction the contractor shall perform inspections as outlined in Part III of the General Permit.

1.4.9.2.5 After the site has achieved final stabilization the contractor will submit the Notice of Termination.

1.4.9.2.6 The contractor should reference MTDEQ's website: http://www.deq.state.mt.us/wqinfo/mpDES/stormwaterconstruction.asp for Notice of Intent Forms, instructions, SWPPP information, and other guidelines for complying with Montana storm water requirements.

1.4.10 PROTECTION OF AIR RESOURCES

1.4.10.1 Burning of material is not allowed on base by the Contractor.

1.4.10.2 The maintenance and repair work to air conditioning and refrigeration systems shall require that all CFC handling standards be met. Maintenance and repair work on any equipment used or covered by this contract shall require all CFC handling standards be met.

1.4.10.3 The Contractor shall not vent or cause to be vented CFC and HCFC refrigerants (R-11, R-12, R-22, R-113, R-114, R-115, R-500, R-501, R-502 or other mixtures containing CFCs) to the atmosphere during repair or maintenance work on any equipment covered by this contract.

1.4.10.4 The Contractor shall have available refrigerant recovery or reclaim equipment to perform the work. Any recovered refrigerant from Government owned equipment shall be provided to the Government in EPA approved containers after coordination with the Project Inspector.

1.4.10.5 The Contractor personnel who operate refrigerant reclaim or recycling equipment shall possess the necessary state and local certifications for operating the equipment.

1.4.10.6 The Contractor shall be responsible for meeting all requirements, permitting, licensing and certification required by state or local ordinance to work on refrigeration systems.

1.4.10.7 Replacement compressors and other replacement equipment used in repairing CFC-Containing systems shall be compatible with CFC replacement refrigerants.

1.4.10.8 Particulates

Dust particles, aerosols, and gaseous byproducts from construction activities, processing, and preparation of materials shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and state allowable limits at all times.

1.4.10.8.1 Paint Hazards

a. Existing Paint: Existing painted surfaces may contain lead based paint. The Contractor is responsible for ensuring that no employee is exposed to concentrations of lead in excess of the permissible exposure limit (PEL) equal to an eight hour time weighted average of 50 micrograms per cubic meter (ug/m3). The Contractor shall conform to all the requirements of 29 CFR 1926.62 Lead Exposure in Construction. Workers are to wear respirators unless air testing establishes that lower protection factors are sufficient. Engineering and work practice controls may be sufficient to reduce exposure to or below the PEL. Protective clothing shall be worn by all workers if required due to

exceedance of the lead PEL. All other requirements of 29 CFR 1926.62 shall be adhered to by the Contractor. The Contractor shall keep a steady spray of water on any demolition work that may cause exposures. Runoff shall be contained on the work site to prevent contamination to any watersheds or the sanitary sewer system. The Contractor shall not contaminate the soil with lead due to excessive use of water. The site shall be limited to access by the public and the Contractor is responsible for non-exposure of the public to any lead concentrations above the PEL.

b. New Paint: The Contractor shall not furnish or use any paints or coatings containing mercury in excess of 200 parts per million for interior applications or lead in excess of 0.06 percent lead by weight of the nonvolatile solids for interior or exterior applications.

1.5 PROTECTION OF TREES DURING EXCAVATION

Care shall be exercised by the Contractor when excavating trenches in the vicinity of trees. Where roots are 50 mm in diameter or greater, the trench shall be excavated by hand and tunneled. When large roots are exposed, they shall be wrapped with a heavy burlap for protection and to prevent drying. Trenches dug by machines adjacent to trees having roots less than 50 mm in diameter shall have the sides hand trimmed making a clean cut of the roots. Trenches having exposed tree roots shall be backfilled within 24 hours unless adequately protected by moist burlap or canvas.

1.6 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

1.7 ARCHAEOLOGICAL OR CULTURAL DISCOVERIES

Any items of archaeological or cultural significance found during excavation or construction shall be left in place, all work stopped, and the Contracting Officer notified and the Installation Cultural Resource Manager (x6438) immediately notified. Items of archaeological or cultural significance include but are not limited to dinosaur bones, bison bones, teepee rings, Native American artifacts, arrowheads and any man made items over 50 years old which were not part of the original construction.

1.8 RESTORATION OF LANDSCAPE (VEGETATION - SUCH AS TREES, PLANTS, AND GRASS) DAMAGE

All landscape features (vegetation - such as trees, plants, and grass) damaged or destroyed during Contractor operations outside and within the work areas shall be restored to a condition similar to that which existed prior to construction activities unless otherwise indicated on the drawings or in the specifications. This restoration shall be done at no additional cost to the Government. 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.

Trees shall be replaced in kind with a minimum 100 mm caliper nursery stock. Shrubs, vines, and ground cover shall be replaced in kind; size to be approved by the Contracting Officer.

All plant material shall meet specifications outlined in ANSI Z60.1 - current publication, "American Standard for Nursery Stock."

Grass areas shall be replaced in kind by sodding. Sod shall be required in all regularly maintained lawn areas and shall be installed according to specification section: SODDING.

END OF SECTION

SECTION 01312

QUALITY CONTROL SYSTEM (QCS)

1.1 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01320, PROJECT SCHEDULE, Section 01330, SUBMITTAL PROCEDURES, and Section 01451, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on (3-1/2 inch) high-density diskettes or CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.3 SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

Hardware

- IBM-compatible PC with 200 MHz Pentium or higher processor
- 32+ MB RAM
- 4 GB hard drive disk space for sole use by the QCS system
- 3 1/2 inch high-density floppy drive
- Compact disk (CD) Reader
- Color monitor
- Laser printer compatible with HP LaserJet III or better, with minimum 4 MB installed memory.
- Connection to the Internet, minimum 28 BPS

Software

- MS Windows 95 or newer version operating system (MS Windows NT 4.0 or newer is recommended)
- Word Processing software compatible with MS Word 97 or newer
- Internet browser
- The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.
- Electronic mail (E-mail) compatible with MS Outlook

1.4 RELATED INFORMATION

1.4.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website; the Contractor can obtain the current address from the Government. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control(CQC) Training

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government shall provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by files attached to E-mail. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government shall be submitted by E-mail with file attachments, e.g., daily reports, schedule updates, payment requests. If permitted by the Contracting Officer, a data diskette or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM). The QCS database typically shall include current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format via E-mail.

1.6.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format via E-mail.

1.6.1.3 Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main) office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.6.2 Finances

1.6.2.1 Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet and include it with the payment request. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment requests with supporting data by E-mail with file attachment(s). If permitted by the Contracting Officer, a data diskette may be used instead of E-mail. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01451, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a data diskette or CD-ROM reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01451, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the Government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.6.3.3 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.6.3.4 Accident/Safety Tracking.

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 200.

1.6.3.5 Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC testing, transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.6.4 Submittal Management

The Contractor will provide the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Schedule

The Contractor shall develop a construction schedule consisting of pay activities, in accordance with Contract Clause "Schedules for Construction Contracts", or Section 01320, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01320, PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.6.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data, and schedule data using SDEF.

1.7 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of updates, payment requests, correspondence and other data is by E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of computer diskettes or CD-ROM for data transfer. Data on the disks or CDs shall be exported using the QCS built-in export function. If used, diskettes and CD-ROMs will be submitted in accordance with the following:

1.8.1 File Medium

The Contractor shall submit required data on 3-1/2 inch double-sided high-density diskettes formatted to hold 1.44 MB of data, capable of running under Microsoft Windows 95 or newer. Alternatively, CD-ROMs may be used. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.8.2 Disk or CD-ROM Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The Government will provide the file names to be used by the Contractor with the QCS software.

1.9 MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet

with the Government representative to review the planned progress payment data submission for errors and omissions. The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

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SECTION 01320

PROJECT SCHEDULE

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

GA Preliminary project schedule, two (2) copies.

GA initial project schedule, two (2) copies
Activity No. Sort
Predecessor/successor listing
Cost Schedule
Floppy Disk with schedule data in Standard Data Exchange Format (SDEF).
Activity Code Dictionary.

FIO Periodic schedules updates, monthly updates two (2) copies.
Floppy Disks with schedule data in Standard Data Exchange Format (SDEF).
Narrative
Activity No. Sort
Cost Schedule
Cash Flow Report (S-Curve)

SD-07 Certificates

Qualifications; GA .

Documentation showing qualifications of personnel preparing schedule reports.

1.2 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports. This person shall have previously created and reviewed computerized schedules. Qualifications of this individual shall be submitted to the Contracting Officer for review with the Preliminary Project Schedule submission.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS a Project Schedule as described below shall be prepared. The scheduling of construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project should also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.2 BASIS FOR PAYMENT

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule or scheduling personnel will result in an inability of the Contracting Officer to evaluate Contractor progress for the purposes of payment. Failure of the Contractor to provide all information, as specified below, shall result in the disapproval of the entire Project Schedule submission and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. In the case where Project Schedule revisions have been directed by the Contracting Officer and those revisions have not been included in the Project Schedule, then the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until revisions to the Project Schedule have been made.

3.3 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification including the SDEF (Standard Data Exchange Format). Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer.

3.3.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in Precedence Diagram Method (PDM)

3.3.2 Level of Detail Required

With the exception of the initial and preliminary schedule submission, the Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the Contracting Officer at the appropriate level of detail, as specified by the Contracting Officer, shall result in the disapproval of the schedule. The Contracting Officer will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule.

3.3.2.1 Activity Durations

Contractor submissions shall be required to follow the direction of the Contracting Officer regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods. A rule of thumb, that the Contractor should use, is that less than 2 percent of all non-procurement activities' Original Durations shall be greater than 20 days.

3.3.2.2 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing.

3.3.2.3 Government Activities

Government and other agencies activities that could impact progress shall be shown. These activities include, but are not limited to: approvals, inspections, utility tie-in, Government Furnished Equipment (GFE) and notice to proceed for phasing requirements.

3.3.2.4 Responsibility

All activities shall be identified in the project schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the subcontracting firm, (at the lowest tier), Contractor work force, or Government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

3.3.2.5 Work Areas

All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

3.3.2.6 Modification or Claim Number

Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number. Whenever possible, changes shall be added to the schedule by adding new activities. Existing activities shall not normally be changed to reflect modifications.

3.3.2.7 Bid Item

All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

3.3.2.8 Phase of Work

All activities shall be identified in project schedule by phases of work in which the activity occurs. Activities shall not contain work in more than one phase of work. The project phase of each activity shall be by the unique Phase of Work Code.

3.3.2.9 Category of Work

All Activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited , to the procurement chain of activities including such items as submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

3.3.2.10 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

3.3.2.11 Critical Activities

The following activities shall be listed as separate line activities on a Contractor's project schedule:

- Submission and approval of mechanical/electric layout drawings
- Submission and approval of O&M manuals
- Submission and approval of as-built drawings
- Submission and approval of 1354 data and installed equipment lists
- Submission and approval of testing and air balance (TAB) firm
- Submission of TAB specialist design review report
- Submission and approval of fire protection specialist
- Submission and approval of testing and balancing and HVAC commissioning plans and data
- Air and water balance dates
- HVAC commissioning dates
- Controls testing plan
- Controls testing
- Performance Verification testing
- Other systems testing, if required
- Prefinal inspection
- Correction of punchlist from prefinal inspection
- Final inspection

3.3.3 Scheduled Project Completion

The schedule interval shall extend from notice-to-proceed to the contract completion date.

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date that the Notice to Proceed (NTP) was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have: a "ES" constraint, a constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity call "End Project". The "End Project" activity shall have: a "LF" constraint, a constraint date equal to the completion date for the project, and a zero day duration.

3.3.3.3 Early Project Completion

In the event the project schedule shows completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted at every project schedule update period to assist the Contracting Officer to evaluate the Contractor's ability to actually complete prior to the contract period.

3.3.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

3.3.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" were "X" refers to the phase of work. "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

The Contractor shall include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

3.3.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in progress or completed activity and ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes.

3.3.6 Out-of-Sequence Progress

Activities that have posted progress without predecessors being completed (Out-of-Sequence Progress) shall be allowed only by the case-by-case approval of the Contracting Officer. The Contracting Officer may direct that changes in schedule logic be made to correct any or all out-of-sequence work.

3.3.7 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 60 calendar days shall be submitted for approval within 10 calendar days after Notice to Proceed is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after Notice to Proceed.

3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 40 calendar days after Notice to Proceed. The schedule shall provide a reasonable sequence of activities which represent work through the entire project and shall be at a reasonable level of detail.

3.4.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the Contracting Officer or to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative, is necessary for verifying the contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Standard Activity Coding Dictionary

The Contractor shall submit, with the Initial Project Schedule, a coding scheme that shall be used throughout the project for all activity codes contained in the schedule. The coding scheme submitted shall list the values for each activity code category and translate those values into project specific designations. For example, a Responsibility Code Value, "ELE", may be identified as "Electrical Subcontractor." Activity code values shall represent the same information throughout the duration of the contract. Once approved with the Initial Project Schedule submission, changes to the activity coding scheme must be approved by the Contracting Officer.

3.5 SUBMISSION REQUIREMENTS

The as noted in paragraph 1.1 items shall be submitted by the Contractor for the preliminary submission, initial submission, and every periodic project schedule update throughout the life of the project:

3.5.1 Data Disks

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

3.5.1.1 File Medium

Required data shall be submitted on 89 mm (3.5 inch) disks, formatted to hold 1.44 MB of data.

3.5.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the version used to prepare the C.P.M.

3.5.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the Contracting Officer for approval.

3.5.2 Narrative Report

A Narrative Report shall be provided with each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the critical path, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to relay to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis.

3.5.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in-progress or completed.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number. For completed activities the Actual Start Date shall be used as the secondary sort.

3.5.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort. Preceding and succeeding activities shall include all information listed above in paragraph Schedule Reports. A blank line shall be left between each activity grouping.

3.5.4.3 Total Float Report

A list of all activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.

3.5.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the Notice to Proceed until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and Contracting Officer at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), Earnings to Date.

3.5.4.5 Cash Flow Report

A report showing scheduled cost of work-in-place by week (tabular report) and a cash flow curve by week (S-curve plot), both based on early dates.

3.5.5 Network Diagram

The time scaled network diagram shall be required on the initial schedule submission and on quarterly update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity or event number, description, duration, and estimated earned value shall be shown on the diagram.

3.5.5.2 Project Milestone Dates

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

3.5.5.3 Critical Path

The critical path shall be clearly shown.

3.5.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5 S-Curves

Earnings curves shall be provided showing projected early and late earnings and earnings to date.

3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly on-site meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor will describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The Contracting Officer will approve activity progress, proposed revisions, and adjustments as appropriate.

3.6.1 Meeting Attendance

The Contractor's Project Manager and Scheduler shall attend the regular progress meeting.

3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

3.6.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost to Date shall be subject to the approval of the Contracting Officer. The following minimum set of items which the Contractor shall address, on an activity by activity basis, during each progress meeting.

3.6.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed activities.

3.6.3.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations must be based on Remaining Duration for each activity.

3.6.3.3 Cost Completion

The earnings for each activity started. Payment shall be based on earnings for each in-progress or completed activity. Payment for individual activities shall not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

3.6.3.4 Logic Changes

All logic changes pertaining to Notice to Proceed on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

3.6.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities are those delays beyond the Contractors control such as strikes and unusual weather. Also included are delays encountered due to submittals, Government Activities, deliveries or work stoppage which makes re-planning the work necessary, and when the schedule does not represent the actual prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, he shall furnish such justification, project schedule data and supporting evidence as the Contracting Officer may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

3.7.1 Justification of Delay

The project schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension, shall be based upon the project schedule updates in effect for the

time period in question and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, shall not be a cause for a time extension to the contract completion date.

3.7.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under two weeks based upon the most recent schedule update at the time of the Notice to Proceed or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number.

b. A brief explanation of the causes of the change.

c. An analysis of the overall impact of the changes proposed.

d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

3.7.3 Additional Submission Requirements

For any request for time extension for over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's request.

3.8 DIRECTED CHANGES

If Notice to Proceed (NTP) is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until the Contractor submits revisions, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, then the Contractor shall advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor will continue to update their schedule with the Contracting Officer's revisions until a mutual agreement in the revisions may be made. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

3.10 NAS DATA

The Contractor shall provide the Government with the means to electronically transfer all required NAS data into the Resident Management System (RMS) program using the Standard Data Exchange Format (SDEF). The Contractor may use network analysis software different from that used by the Contracting Officer in the Resident Office, however, the Contractor shall also furnish the following:

NAS data that complies with the Standard Data Exchange Format (SDEF). This is a standard ASCII format for exchanging scheduling data and is compatible with our resident management system. Many software developers provide the capability to convert and export schedule data to the SDEF at no additional cost. The SDEF specifications are in a separate publication, available from the Internet http://www.usace.army.mil/search.html - Publications.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 CONTROL AND SCHEDULING OF SUBMITTALS

1.1.1 Submittal Coordination Meeting

After the preconstruction conference and before any submittals are sent to the Contracting Officer's Representative (COR), the Contractor shall meet with the COR and develop an approved preliminary submittal register, ENG Form 4288. The Contractor shall provide a suitable electronic copy for import to the RMS system prior to the submittal coordination meeting. During the meeting all required items will be identified and grouped into three categories:

- Government Approved (G)

Government approval is required for extensions of design, critical materials, variations/deviations, an "or equal" decision, equipment whose compatibility with the entire system must be checked, architectural items such as Color Charts/Patterns/Textures, and other items as designated by the COR. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," these submittals will be acted on as "shop drawings."

- For Information Only (FIO)

Submittals not requiring Government approval, but require submission, will be for information only. These are items such as Installation Procedures, Certificates of compliance, Samples, Qualifications, etc. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," these submittals will not be acted on as "shop drawings."

- For Contractor Only (KIO)

Those items that can be visually inspected by the Contractor's Quality Control Representative (CQC) on site or are provided to the Government other than with an ENG Form 4025: The items that fall into this category shall not be included on the register and shall not be submitted to the COR. For these items, the contractor shall maintain a separate method of tracking and make them available at the appropriate preparatory inspection(s).

1.1.2 Final Submittal Register

The final submittal register shall be coordinated with the progress schedule and submitted within 40 days of Notice to Proceed. In preparing the final document, adequate time (minimum of 30 days) shall be allowed for review and approval, and possible resubmittal of each item on the register.

1.1.3 Submittal Register Updates

The Contractor's quality control representative shall review the listing at least every 30 days and take appropriate action to maintain an effective system. Copies of updated or corrected listings shall be submitted to the COR at least every 30 days in the quantity specified.

1.2 SUBMITTAL TYPES

Throughout these specifications submittals may be identified into general groupings as described hereinafter. This is for bookkeeping and record sorting in the system:

Preconstruction Submittals

Certificates of insurance.
Surety bonds.
List of proposed subcontractors.
List of proposed products.
Construction Progress Schedule.
Submittal register.
Schedule of values.
Health and safety plan.
Work plan.
Quality control plan.
Environmental protection plan.

Shop Drawings

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

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

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

Product Data

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

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

Samples

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

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

the project and those which will be removed at conclusion of the work.

Design Data

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

Test Reports

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

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

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

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

Certificates

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

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

Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

Closeout Submittals

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

1.3 APPROVED SUBMITTALS

The approval of submittals by the COR shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error that may exist. The Contractor, under the CQC requirements of this contract, is responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. After submittals have been approved by the COR, no resubmittal for the purpose of substituting materials or equipment will be given consideration.

1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the COR and promptly furnish a corrected submittal in the format and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, written notice, as required under the Contract Clause entitled "Changes," shall be given to the COR.

1.5 PAYMENT

Separate payment will not be made for submittals, and all costs associated therein shall be included in the applicable unit prices or lump sum prices contained in the schedule. Payment will not be made for any material or equipment which does not comply with contract requirements.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

Prior to submittal, all items shall be checked and approved by the Contractor's CQC and each item of the submittal shall be stamped, signed, and dated. Each respective transmittal form (ENG Form 4025) shall be signed and dated by the CQC certifying that the accompanying submittal complies with the contract requirements. This procedure applies to all submittals. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including, but not limited to, catalog cuts, diagrams; operating charts or curves; test reports; test cylinders; samples; O&M manuals including parts lists; certifications; warranties and other such required items. Units of weights and measures used on all submittals shall be the same as the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Government-approval submittals shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. The COR may request submittals in addition to those listed when deemed necessary to adequately describe the work covered in the respective sections. The Contractor shall maintain a complete and up-to-date file of all submittals/items on site for use by both the Contractor and the Government.

3.2 SUBMITTAL REGISTER (ENG Form 4288)

An electronic copy of the submittal register - ENG Form 4288 – for Divisions 1 through 16 in a format compatible for import into RMS shall be provided by the Contractor (see sample of preliminary submittal register attached to end of this section) and a hard copy shall be further developed by the Contractor prior to the submittal coordination meeting and list each item of equipment and material for which submittals are required in the Technical Specifications. (See paragraph SUBMITTALS at the beginning of each specification section.) The Contractor shall approve all items listed on the submittal register. During the submittal coordination meeting, a preliminary submittal register will be created by annotating this Form 4288. When the final submittal register is submitted for approval, the Contractor shall complete the column entitled “Item No.” and all data under “Contractor Schedule Dates” and return five completed copies to the COR for approval. The Contractor shall review the list to ensure its completeness and may expand general category listings to show individual entries for each item. The numbers in column “Item No.” are to be assigned sequentially starting with "1" for each specification section. DO NOT preassign transmittal numbers when preparing the submittal register. When a conflict exists between the submittal register and a submittal requirement in the technical sections, other than those submittals referenced in Paragraph 3.9: Field Test Reports, the approved submittal register shall govern. The preliminary, and then the final approved submittal register, will become the scheduling documents and will be updated monthly and used to control submittals throughout the life of the contract. Names and titles of individuals authorized by the Contractor to approve shop drawings shall be submitted to COR with the final 4288 form. Supplier or subcontractors certifications are not acceptable as meeting this requirement.

3.3 SCHEDULING

Submittals covering component items forming a system, or items that are interrelated, shall be coordinated and submitted concurrently. Certifications shall be submitted together with other pertinent information and/or drawings. Additional processing time beyond 30 days, or number of copies, may be shown by the COR on the submittal register attached in the “Remarks” column, or may be added by the COR during the coordination meeting. No delays damages or time extensions will be allowed for time lost due to the Contractor not properly scheduling and providing submittals.

3.4 TRANSMITTAL FORM (ENG Form 4025)

Transmittal Form 4025 (sample at end of this section) shall be used for submitting both Government-approval and information-only submittals in accordance with the instructions on the reverse side of the form. Transmittal numbers shall be assigned sequentially. Electronic generated 4025 forms shall be printed on carbonless paper and be a reasonable facsimile of the original 4025. If electronic forms are not used, the original 4025 forms shall be used (do not photo copy) and will be furnished by the COR. These forms shall be filled in completely prior to submittal. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.. Each submittal item shall be listed separately on the form, naming subcontractor, supplier, or manufacturer, applicable specification paragraph number(s), drawing/sheet number, pay item number, and any other information needed to identify the item, define its use, and locate it in the work. One or more 4025 forms may be used per specification section, however, DO NOT include more than one specification section per transmittal.

3.5 CROSS-REFERENCE (ENG FORM 4288/ENG FORM 4025)

To provide a cross-reference between the approved submittal register and transmittal forms, the Contractor shall record the "transmittal numbers" assigned when submitting items in column “Transmittal No.” of the ENG FORM 4288. The item numbers in column “Item No.” of submittal register shall correspond to the item numbers on ENG Form 4025.

3.6 SUBMITTAL PROCEDURE

3.6.1 General

Shop drawings with 4025 forms shall be submitted in the number of copies specified in subparagraphs "Government Approved Submittals" and "Information Only Submittals," or as indicated on the submittal register in the “Remarks” column. Submit a complete collated “reviewers copy” with one 4025 form and attachments (not originals). The remaining copies (4 for Government-approval, 2 for information-only) of 4025 forms and attachments shall not be collated. This would not apply to a series of drawings.

3.6.2 Approval of Submittals by the Contractor

Before submittal to the COR, the Contractor shall review and correct shop drawings prepared by subcontractors, suppliers, and itself, for completeness and compliance with plans and specifications. The Contractor shall not use red markings for correcting material to be submitted. Red markings are reserved for COR’s use. Approval by the Contractor shall be indicated on each shop drawing by an approval stamp containing information as shown in this section. Submittals not conforming to the requirements of this section will be returned to the Contractor for correction and resubmittal.

3.6.3 Variations

For submittals which include proposed variations requested by the Contractor, column “h” of ENG Form 4025 shall be checked and the submittal shall be classified as G, and submitted accordingly. The Contractor shall set forth in writing the justification for any variations and annotate such variations on the transmittal form in the REMARKS block. Variations are not approved unless there is an advantage to the Government. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted variations.

3.6.4 Drawings

Each drawing shall be not more than 28 inches high by 40 inches wide, with a title block in lower right hand corner and a 3 by 4 inch clear area adjacent. The title block shall contain the subcontractor's or fabricator's name, contract number, description of item(s), bid item number, and a revision block. Provide a blank margin of 3/4 inch at bottom, 2 inches at left, and 1/2 inch at top and right. Where drawings are submitted for assemblies of more than one piece of equipment or systems of components dependent on each other for compatible characteristics, complete information shall be submitted on all such related components at the same time. The Contractor shall ensure that information is complete and that sequence of drawing submittal is such that all information is available for reviewing each drawing. Drawings for all items and equipment, of special manufacture or fabrication, shall consist of complete assembly and detail drawings. All revisions after initial submittal shall be shown by number, date, and subject in revision block.

3.6.4.1 Submittals Containing Drawings Larger than 11 inch by 17 inch

For Government-approval submittals containing drawings larger than 11 inch by 17 inch, one reproducible and one blue line copy will be required to be submitted with five copies of the ENG Form 4025. The marked-up reproducible (and/or any review comments contained on the page-size comment sheet(s) at the Government's option) will be returned to the Contractor upon review. The Contractor shall provide three copies of blue line drawings (generated from the reviewed reproducible) to the Government within 10 days of Contractor's receipt of the reviewed reproducible. The Contractor shall not incorporate approved work into the project until the Government has received the three blue line copies. The Contractor shall use the marked-up reproducible to make any additional copies as needed. For information-only submittals, one reproducible and two blue line copies shall be submitted with the appropriate number of copies of ENG Form 4025.

3.6.5 Printed Material

All requirements for shop drawings shall apply to catalog cuts, illustrations, printed specifications, or other data submitted, except that the 3 inch by 4 inch clear area adjacent to the title block is not mandatory. Inapplicable portions shall be marked out and applicable items such as model numbers, sizes, and accessories shall be indicated by arrow or highlighted.

3.7 SAMPLES REQUIRING LABORATORY ANALYSIS

See Section 01451 CONTRACTOR QUALITY CONTROL for procedures and address for samples requiring Government testing.

3.8 SAMPLES REQUIRING VISUAL INSPECTION

Samples requiring only physical inspection for appearance and suitability shall be coordinated with the on-site Government quality assurance representative (QAR).

3.9 FIELD TEST REPORTS

Routine tests such as soil density, concrete deliveries, repetitive pressure testing shall be delivered to the QAR with the daily Quality Control reports. See SECTION: 01451 CONTRACTOR QUALITY CONTROL.

3.10 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.11 GOVERNMENT APPROVED SUBMITTALS (G)

The Contractor shall submit 5 copies of G submittals with 5 corresponding 4025 forms. Upon completion of G submittal review, copies as specified below will be marked with an action code, dated, and returned to the Contractor. See “Drawings” above for special instructions if drawings larger than size 11 inch by 17 inch are used.

3.11.1 Processing of G Submittals

Submittals will be reviewed and processed as follows:

a. Approved as Submitted (Action Code "A"): Shop drawings which can be approved without correction will be stamped "Approved" and two copies will be returned to the Contractor. No resubmittal required.

b. Approved Except as Noted (Action Code "B"): Shop drawings which have only minor discrepancies will be annotated in red to indicate necessary corrections. Marked material will be stamped "Approved Except as Noted" and two copies returned to the Contractor for correction. No resubmittal required.

c. Approved Except as Noted (Action Code "C"): Shop drawings which are incomplete or require more than minor corrections will be annotated in red to indicate necessary corrections. Marked material will be stamped "Approved Except as Noted - Resubmission Required" and two copies returned to the Contractor for correction. Resubmittal of only those items needing correction required.

d. Disapproved (Action Code "E"): Shop drawings which are fundamentally in error, cover wrong equipment or construction, or require extensive corrections, will be returned to the Contractor stamped "Disapproved." An explanation will be furnished on the submitted material or on ENG Form 4025 indicating reason for disapproval. Complete resubmittal required.

e. Resubmittal will not be required for shop drawings stamped "A" or "B" unless subsequent changes are made by Contractor or a contract modification. For shop drawings stamped "C" or "E," Contractor shall make corrections required, note any changes by dating the revisions to correspond with the change request date, and promptly resubmit the corrected material. Resubmittals shall be associated with the “parent” by use of sequential alpha characters (for example, resubmittal of transmittal 8 will be 8A, 8B, etc). Government costs incurred after the first resubmittal may be charged to the Contractor.

3.12 INFORMATION ONLY SUBMITTALS

The Contractor shall submit three copies of data and four copies of ENG Form 4025. Information-only submittals will not be returned. Government approval is not required on information-only submittals. These submittals will be used for information purposes. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the Contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications and will not prevent the COR from requiring removal and replacement if nonconforming material is incorporated in the work. This does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or check testing by the Government in those instances where the technical specifications so prescribe.

3.12.1 Processing of Information-Only Submittals

Information-only submittals shall be submitted prior to delivery of the material or equipment to the job site. ENG Form 4025 shall be marked with the words "contractor approved - information copy only" in the REMARKS block of the form. Submittals will be monitored and spot checks made. When such checks indicate noncompliance, the Contractor will be notified by the same method used for Government-approval submittals. Resubmittal of nonconforming information-only submittals shall be reclassified Government-approval and shall be in five copies.

3.13 CONTRACTOR APPROVAL STAMP

The stamp used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR:
_____

CONTRACT NUMBER
_____

TRANSMITTAL NUMBER _____

ITEM NUMBER _____

SPECIFICATION SECTION _____

PARAGRAPH NUMBER _____

_____ APPROVED AS SUBMITTED

_____ APPROVED WITH CORRECTIONS AS NOTED

SIGNATURE: _____

TITLE: _____
DATE _____

CONTRACTORS REVIEW STAMP

MAXIMUM SIZE:

3 INCHES BY 3 INCHES

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITT/_____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FID ☐ GOV'T. APPROVAL

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 8)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

_____

NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

ENG FORM 4025-R, MAR 95 *(ER 415-1-10)* EDITION OF SEP 91 IS OBSOLETE. SHEET ___ OF ___ (Reverse, CEMP-CD)

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288-R for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A	--	Approved as submitted.	E	--	Disapproved (See attached).
B	--	Approved, except as noted on drawings.	F	--	Receipt acknowledged.
C	--	Approved, except as noted on drawings. Refer to attached sheet resubmission required.	FX	--	Receipt acknowledged, does not comply as noted with contract requirements.
D	--	Will be returned by separate correspondence.	G	--	Other *(Specify)*

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

(Reverse of ENG Form 4025-R)

SCHEDULE OF MATERIALS SUBMITTALS																							
											Project Number NZAS 93-9012			Project Title: Renovate Dormitory 737								Solicitation/Contract No.
TO BE COMPLETED BY PROJECT ENGINEER											TO BE COMPLETED BY CONTRACTOR/ADMINISTRATOR												
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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
1	COLOR BOARDS 01001-1.9										2												
2	HAZARDOUS MATERIAL LIST 01061-1.4.5																						
3	Notice of Intent Storm Water Discharges 01061-1.4.9.2.1																						
4	Preliminary project schedule 01320-1.1										2												
5	Initial project schedule 01320-1.1										2												
6	Periodic schedules updates 01320-1.1										2												
7	Qualifications 01320-1.1																						
8	Eng Form 4288, Preliminary Draft 01330-1.1.1																						
9	Eng Form 4288, Final 01330-1.1.2																						
10	CQC Plan 01451-3.2.1																						
11	Temporary power connections 01501-1.3.3																						
	Housekeeping plan 01501-1.7																						

SCHEDULE OF MATERIALS SUBMITTALS												Project Number NZAS 93-9012			Project Title: Renovate Dormitory 737						Solicitation/Contract No.
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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
	Fall protection system 01501-1.12																				
	Waste management plan 01572-1.3																				
	Waste disposal records 01572-1.4																				
	Preliminary O&M Manual 01701-1.2.1																				
	Final O&M Manual 01701-1.2.2																				
	As-Built Field Data 01702-1.1																				
	As-Built Prints for System Acceptance Testing 01702-1.1																				
	As-Built Drawings 01702-1.1																				
	Warranty Management Plan 01703-1.1																				
	Warranty Tags 01703-1.1																				
	FORM 1354 CHECKLIST 01704-1.2																				
12	Equipment-in-place list 01705-3.1										4										

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
13	SCHEDULE OF SELECTIVE DEMOLITION 02070-1.4.C										4										
14	SUBMITTALS 02300-1.4.B										4										
15	PRODUCT DATA LITERATURE 02751-1.4.B							4													
16	MATERIAL TEST REPORTS 02751-1.4.D										4										
17	MATERIAL CERTIFICATION 02751-1.4.E										4										
18	CONCRETE TEST RESULTS REPORT 02751-3.9.C										4										
19	PRODUCT DATA LITERATURE 02813-1.5.B							4													
20	TEST REPORTS 02813-1.5.D										4										
21	OPERATION & MAINTENANCE LITERATURE 02813-1.5.E										4										
22	EXTRA SPRINKLER COMPONENTS EQUIPMENT 02813-1.10.A										4										
23	SHOP DRAWINGS 02831-1.3C		4																		
24	SAMPLES 02831-1.3D			4																	

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
25	PRODUCT DATA LITERATURE 02920-1.4.B							4													
26	PRODUCT CERTIFICATION 02920-1.4.C										4										
27	TEST REPORTS 02920-1.4.E										4										
28	PLANTING SCHEDULE 02920-1.4.F										4										
29	MAINTENANCE INSTRUCTIONS 02920-1.4.G										4										
30	PRODUCT CERTIFICATIONS 02930-1.4.D										4										
31	PRODUCT DATA LITERATURE 03300-1.3.C							4													
32	PRODUCT TEST REPORTS 03300-1.3.F										4										
33	QUALITY CONTROLS REPORT 03300-1.3.G										4										
34	PRODUCT DATA LITERATURE 04200-1.3.B							4													
35	PRODUCT CERTIFICATE 04200-1.3.D										4										
36	PRODUCT TEST REPORTS 04200-2.14.A										4										

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
37	QUALIFICATION DATA LITERATURE 04200-3.11.A										4										
38	SHOP DRAWINGS 05425-1.4B,C,D		4																		
39	PRODUCT DATA LITERATURE 05500-1.3.B							4													
40	SHOP DRAWINGS 05500-1.3.C		4																		
41	PRODUCT DATA LITERATURE 06100-1.3.B							4													
42	PRODUCT DATA LITERATURE 06402-1.3.B							4													
43	SHOP DRAWINGS 06402-1.3.C		4																		
44	SAMPLES FOR INITIAL SELECTION 06402-1.3.D			4																	
45	PRODUCT CERTIFICATE 07190-1.2.C										4										
46	PRODUCT DATA LITERATURE 07210-1.3.C							4													
47	PRODUCT TEST REPORTS 07210-1.3.D										4										
48	PRODUCT DATA LITERATURE 07241-1.5.B							4													

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
49	SHOP DRAWINGS 07241-1.5.C		4																		
50	INITIAL SELECTION SAMPLES 07241-1.5.D			4																	
51	PRODUCT TEST REPORTS 07241-1.5.H										4										
52	QUALIFICATIONS FOR AWARD OF CONTRACT LITERATURE 07241-1.5.G										4										
53	WRITTEN SUBMITTALS LITERATURE 07410-1.3.2										4										
54	SUBMITTALS 3-6 LITERATURE 07410-1.3.4							4													
55	SHOP DRAWINGS 07410-1.3.6		4																		
56	AF FORM 1063 QUALITY CONTROL RECORD 07410-1.3.8										4										
57	AS-BUILT ROOF DRAWINGS 07410-1.3.9.1										4										
58	PRODUCT SAMPLES 07410-1.3.7										4										
59	FINAL ACCEPTANCE CERTIFICATE 07410-1.4.1										4										
60	PRODUCT DATA LITERATURE 07620-1.4.B							4													

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
61	SHOP DRAWINGS 07620-1.4.C		4																		
62	PRODUCT SAMPLES 07620-1.4.D										4										
63	PRODUCT DATA LITERATURE 07841-1.4.B							4													
64	SHOP DRAWINGS 07841-1.4.C			4																	
65	PRODUCT DATA LITERATURE 07901-1.3.C										4										
66	PRODUCT TEST REPORTS 07901-1.3.H										4										
67	PRODUCT LITERATURE 08110-1.2.C							4													
68	SHOP DRAWINGS 08110-1.2.D		4																		
69	DOOR SCHEDULE SUBMITTAL SCHEDULE 08110-1.2.E		4																		
70	PRODUCT DATA MANUFACTURER LITERATURE 08211-1.2.B							4													
71	SHOP DRAWINGS 08211-1.2.C		4																		
72	SAMPLES FOR INITIAL 08211-1.2.D			4																	

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73	SAMPLES FOR VERIFICATION 08211-1.2.E			4																	
74	DOOR MANUFACTURER WARRANTY 08211-1.6.B						4														
75	SHOP DRAWINGS 08410-1.3C		4																		
76	SAMPLES 08410-1.3D			4																	
77	TECHNICAL PRODUCT DATA - MANUFACTURER LITERATURE 08520-1.2.C							4													
78	SHOP DRAWINGS 08520-1.2.D		4																		
79	MANUFACTURER PRODUCT SAMPLES 08520-1.2.E			4																	
80	MANUFACTURER PRODUCT DATA LITERATURE 08711-1.2.B							4													
81	FINAL HARDWARE SCHEDULE 08711-1.2.F			4																	
82	PRODUCT DATA SAMPLES 08711-1.2.E			4																	
83	PRODUCT DATA LITERATURE 08720-1.4.A							4													
84	SHOP DRAWINGS 08720-1.4.B		4																		

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
85	PRODUCT DATA LITERATURE 08800-1.4.B							4													
86	MANUFACTURER WARRANTY 08800-1.8.B						4														
87	PRODUCT DATA 08817-1.4.B							4													
88	PRODUCT DATA 09215-1.2.B										4										
89	PRODUCT DATA LITERATURE 09255-1.4.C							4													
90	SHOP DRAWINGS 09255-1.4.D		4																		
91	PRODUCT CERTIFICATE 09255-1.4.E										4										
92	PRODUCT DATA LITERATURE 09511-1.2.B							4													
93	REFLECTED CEILING PLANS 09511-1.2.C		4																		
94	INITIAL SELECTION SAMPLES 09511-1.2.D			4																	
95	SAMPLES FOR VERIFICATION 09511-1.2.E			4																	
96	PRODUCT TEST REPORTS 09511-1.2.F										4										

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97	PRODUCT DATA LITERATURE 09651-1.2.B							4													
98	PRODUCT DATA SAMPLES 09651-1.2.C			4																	
99	PRODUCT DATA CERTIFICATE 09651-1.2.D										4										
100	PRODUCT DATA LITERATURE 09652-1.3.B							4													
101	PRODUCT SAMPLES 09652-1.3.C			4																	
102	PRODUCT DATA LITERATURE 09653-1.3.B							4													
103	SAMPLES FOR VERIFICATION 09653-1.3.C			4																	
104	PRODUCT DATA LITERATURE 09680-1.3.B							4													
105	SAMPLES FOR VERIFICATION 09680-1.3.C			4																	
106	MAINTENANCE DATA 09680-1.3.D										4										
107	GENERAL WARRANTY 09680-1.7.A						4														
108	MATERIAL LIST LITERATURE 09900-1.3.B.1							4													

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
109	PRODUCT DATA MANUFACTURERS LITERATURE 09900-1.3.B							4													
110	QUALIFICATION DATA LITERATURE 09900-1.3.D										4										
111	SHOP DRAWINGS 10260-1.2.C		4																		
112	PRODUCT DATA LITERATURE 10425-1.2.C							4													
113	SHOP DRAWINGS 10425-1.2.D		4																		
114	COLOR AND PATTERN SAMPLES 10425-1.2.E			4																	
115	PRODUCT DATA LITERATURE 10512-1.2.B							4													
116	SHOP DRAWINGS 10512-1.2.C		4																		
117	PRODUCT DATA LITERATURE 10522-1.2.C							4													
118	SAMPLE FOR INITIAL SELECTION 10522-1.2.D			4																	
119	PRODUCT DATA LITERATURE 10801-1.2.B							4													
120	PRODUCT SCHEDULE 10801-1.2.D										4										

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		CERTIFICATION OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS		OTHER						APPROVED	DIS-APPROVED			
121	SETTING DRAWINGS 10801-1.2.C		4																		
122	MAINTENANCE INSTRUCTIONS 10801-1.2.E										4										
123	SAMPLES FOR VERIFICATION 12491-1.4C			4																	
124	PRODUCT DATA LITERATURE 12690-1.2.B							4													
125	SHOP DRAWINGS 12690-1.2.C		4																		
126	PRODUCT SAMPLES 12690-1.2.E			4																	
127	PRODUCT DATA 13110-1.4.B							4													
128	SHOP DRAWING 13910-1.4.C		4																		
129	WELDER CERTIFICATION 15050-1.3.B										4										
130	PRODUCT DATA LITERATURE 15050-1.3.C							4													
131	AS-BUILT DRAWINGS 15050-1.4		4																		
132	O&M MANUALS 15050-1.5										4										

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133	CONTROLS SCHEMATIC DIAGRAM 15075-2.1.H										4										
134	VALVE SCHEDULE LITERATURE 15075-3.1.C							4													
135	PRODUCT DATA LITERATURE 15110-1.3.C							4													
136	PRODUCT DATA LITERATURE 15135-1.3							4													
137	PRODUCT DATA LITERATURE 15145-1.4.B							4													
138	PRODUCT DATA LITERATURE 15181-1.3.B							4													
139	HVAC CHEMICALS MATERIAL 15181-1.3.B										4										
140	HYDRONIC TEST RESULTS REPORTS 15181-3.7.B									4											
141	WATER ANALYSIS REPORT 15181-3.8.B									4											
142	PRODUCT DATA LITERATURE 15250-1.3.B							4													
143	PRODUCT DATA LITERATURE 15330-1.5.C							4													
144	STATEMENT OF QUALIFICATIONS 15330-1.5.D										4										

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145	HYDRONIC CALCULATIONS 15330-1.5.E										4										
146	FIRE/SPRINKLER DRAWINGS 15330-1.6.B		4																		
147	AF FORM 592 15330-1.7.E										4										
148	FIRE PROTECTION SYSTEM ACCEPTANCE TEST 15330-3.13.B	4																			
149	FIRE PROTECTION O&M LITERATURE 15330-3.16.B										4										
150	PRODUCT DATA LITERATURE 15410-1.3.B							4													
151	PLUMBING INSPECTION REPORTS 15410-3.9.A	4																			
152	WATER DISTRIBUTION TEST REPORTS 15410-3.9.B	4																			
153	DRAINAGE & VENT PIPING TEST REPORTS 15410-3.9.C	4																			
154	PURGING & DISINFECTING ACTIVITIES REPORTS 15410-3.10	4																			
155	PRODUCT DATA LITERATURE 15430-1.4.B							4													
156	O&M MANUALS 15430-1.4.B		4																		

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157	PRODUCT DATA LITERATURE 15440-1.4.C							4													
158	O&M MANUALS 15440-1.4.E		4																		
159	PRODUCT DATA LITERATURE 15455-1.4.B							4													
160	HYDROSTATIC WATER STORAGE TEST REPORTS 15455-3.3.C										4										
161	PURGING & DISINFECTING ACTIVITIES REPORTS 15455-3.4.C										4										
162	PRODUCT DATA LITERATURE 15460-1.2.B							4													
163	WATER HEATER WARRANTY 15460-1.4.A										4										
164	PRODUCT DATA LITERATURE 15496-1.5.B							4													
165	NATURAL GAS PIPING TEST REPORTS 15496-3.10.C	4																			
166	PRODUCT DATA LITERATURE 15540-1.2.B							4													
167	PRODUCT DATA LITERATURE 15683-1.3.B							4													
168	SHOP DRAWINGS 15683-1.3.C		4																		

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169	WIRING DIAGRAMS 15683-1.3.D		4																		
170	MAINTENANCE DATA 15683-1.3.E								4												
171	CERTIFICATE OF PERFORMANCE 15683-1.3.F	4																			
172	AIR COOLED CHILLER WARRANTY 15683-1.5						4														
173	PRODUCT DATA LITERATURE 15755-1.3.B							4													
174	PRODUCT DATA LITERATURE 15766-1.3.B							4													
175	PRODUCT DATA LITERATURE 15815-1.4.B							4													
176	PRODUCT DATA LITERATURE 15820-1.3.B							4													
177	PRODUCT DATA LITERATURE 15831-1.3.B							4													
178	PRODUCT DATA LITERATURE 15832-1.3.B							4													
179	PRODUCT DATA LITERATURE 15835-1.3.B							4													
180	PRODUCT DATA LITERATURE 15838-1.4.B							4													

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181	SHOP DRAWINGS 15838-1.4.C		4																		
182	MAINTENANCE DATA 15838-1.4.D								4												
179	PRODUCT DATA LITERATURE 15845-1.3.B							4													
180	PRODUCT DATA LITERATURE 15846-1.3.C							4													
181	PRODUCT DATA LITERATURE 15855-1.4.B							4													
182	ENERGY MONITORING AND CONTROL SYSTEMS, SHOP DRAWINGS 15915-1.3.A		4																		
183	ENERGY MONITORING AND CONTROL MAINTENANCE DATA 15915-1.3.B								4												
184	ENERGY MONITORING AND CONTROL SYSTEMS, TEST PLAN 15915-3.6.B										4										
185	CONTROL SYSTEMS, PRODUCT DATA 15975-1.4.B							4													
186	CONTROL SYSTEMS, SHOP DRAWINGS 15975-1.4.D		4																		
187	CONTROL SYSTEMS, WIRING DIAGRAMS 15975-1.4.E		4																		

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188	CONTROL SYSTEMS, MAINTENANCE DATA 15975-1.4.F								4												
189	CONTROL SYSTEMS, RECORD DRAWINGS 15975-1.4.G										4										
190	DDC COPY OF ALL DATABASES 15975-3.4.B									4											
191	PONTS SUMMARY DOCUMENT, SOFTWARE 15975-3.5.A									4											
192	TESTING AGENCY QUALIFICATIONS DOCUMENT 15990-1.3.B									4											
193	SYNOPSIS OF TAB DOCUMENT 15990-1.3.C									4											
194	SAMPLE AABC OR NEBB FORMS 15990-1.3.D									4											
195	TAB REPORT 15990-1.3.E								4												
196	CALIBRATION REPORT 15990-1.3.F								4												
197	REPORT ON MECHANICAL DEFICIENCIES 15990-3.5								4												
198	PRODUCT DATA LITERATURE 16050-1.4.B							4													

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199	SHOP DRAWINGS 16050-1.4.C		4																		
200	FIELD TEST REPORT 16050-1.4.D										4										
201	PRODUCT DATA LITERATURE 16060-1.3.B							4													
202	FIELD TEST REPORT 16060-1.3.C							4													
203	PRODUCT DATA LITERATURE 16120-1.3.A							4													
204	PRODUCT DATA LITERATURE 16140-1.4.B							4													
205	SHOP DRAWINGS 16140-1.4.C		4																		
206	MAINTENANCE DATA LITERATURE 16140-1.4.D									4											
207	PRODUCT DATA LITERATURE 16170-1.2.B							4													
208	MAINTENANCE DATA LITERATURE 16170-1.2.C								4												
209	PRODUCT DATA LITERATURE 16420-1.2.B							4													
210	PRODUCT DATA LITERATURE 16442-1.4.B							4													

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211	SHOP DRAWINGS 16442-1.4.C		4																		
212	PANELBOARD SCHEDULES 16442-1.4.D									4											
213	MAINTENANCE DATA LITERATURE 16442-1.4.E								4												
214	PRODUCT DATA LITERATURE 16460-1.3.A							4													
215	MAINTENANCE DATA LITERATURE 16460-1.3.B								4												
216	OIL ANALYSIS REPORT 16460-1.3.C									4											
217	PRODUCT DATA LITERATURE 16478-1.3.B							4													
218	FIELD TEST REPORTS 16478-1.3.C									4											
219	MAINTENANCE DATA 16478-1.3.D									4											
220	WARRANTY 16478-1.3.E									4											
221	PRODUCT DATA LITERATURE 16481-1.3.B							4													
222	FIELD TEST REPORTS 16481-1.3.C								4												

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																	APPROVED	DIS-APPROVED			
223	MAINTENANCE DATA LITERATURE 16481-1.3.D								4												
224	MOTOR HEATER SCHEDULE 16481-1.3.E										4										
225	PRODUCT DATA LITERATURE 16511-1.3.B							4													
226	SHOP DRAWINGS 16511-1.3.C		4																		
227	MAINTENANCE DATA LITERATURE 16511-1.3.D								4												
228	PRODUCT DATA LITERATURE 16720-1.5.B							4													
229	SHOP DRAWINGS 16720-1.5.C		4																		
230	PRODUCT CERTIFICATES 16720-1.5.D										4										
231	INSTALLER CERTIFICATES 16720-1.5.E										4										
232	FIELD TEST REPORTS 16720-1.5.F										4										
233	MAINTENANCE DATA LITERATURE 16720-1.5.G								4												
234	CERTIFICATE OF COMPLETION 16720-1.5.H	4																			

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235	INSTALLER QUALIFICATIONS 16720-1.6.A										4										
236	MANUFACTURER QUALIFICATIONS 16720-1.6.B										4										
237	PRODUCT DATA LITERATURE 16740-1.3.C							4													
238	QUALIFICATION DATA 16740-1.3.D			4																	
239	FIELD TEST REPORTS 16740-1.3.E									4											
240	MAINTENANCE DATA LITERATURE 16740-1.3.F								4												
241	SCHEDULES DISKETTE 16740-1.3.G										4										
242	SHOP DRAWINGS 16775 1.3.A		4																		
243	PRODUCT DATA LITERATURE 16856-1.3.C							4													
244	COORDINATION DRAWINGS 16856-1.3.D		4																		
245	WIRING DIAGRAM DRAWINGS 16856-1.3.E		4																		
246	QUALIFICATION DATA 16856-1.3.F	4																			

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247	TEST REPORTS 16856-1.3.G									4											

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																	APPROVED	DIS-APPROVED			

Schedule of Abbreviations

AWC	=	After Work Completed	BMF	=	Before Material Delivery
PTSW	=	Prior to Starting Work	SN	=	Advance Notification
AFA	=	After Final Acceptance	SRO	=	After Each Occurrence
PTO	=	Prior to Outage	PTFI	=	Prior to Final Inspection
PTNT	=	Prior to Notice to Proceed	PTFP	=	Prior to Final Payment
ANTP	=	After Notice to Proceed	PTCW	=	Prior to Completing Work
EWD	=	Each work day AF Form 3000 not required	AFI	=	After Final Inspection
PTFA	=	Prior to Final Acceptance	PT	=	Prior To
ACA	=	After Contract Award			

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

1.3 LABORATORY VALIDATION

The testing laboratory shall be validated by Corps of Engineers Material Testing Center (MTC) for all tests required by contract. See paragraph 3.7 TESTS.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will consider an interim plan for the first 60 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.2 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project manager. If the project manager and project superintendent is the same person, the CQC System Manager shall report to someone higher in the Contractor’s organization than the project manager.

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

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Laboratory facilities will be validated by the Corps of Engineers Material Testing Center and approved by the Contracting Officer.

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

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

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health manager shall receive direction and authority from the CQC System manager and shall serve as a member of the CQC staff. Personnel identified in technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC

organization. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawings submittals, schedules and all other project documentation shall be promptly furnished to the CQC organization by the Contractor. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this contract or a construction person with a minimum of 10 years in related work. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors." This course is periodically offered at AGC offices throughout the state of Washington and Oregon.

3.4.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements. Submittals required in Section 15990 TESTING, ADJUSTING, AND BALANCING shall be coordinated with Section 01330 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required. All Contractor forms for submitting test results are subject to Contracting Officer approval.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 24 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, onsite production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements, see individual specification sections for test types, locations and frequencies. Contractor shall submit all materials test reports on forms

standard to industry standards such as ACI, ASTM and AASHTO or with laboratory accreditation forms such as AALA, NIST or NVLAP. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers validated testing laboratory or establish a testing laboratory at the project site which can be validated by the Corps of Engineers in advance of any and all required testing; and in addition, submit proof of validation for approval. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

a. Validation

The testing laboratory shall be validated by the Corps of Engineers Materials Testing Center (MTC) for all tests required by the contract prior to the performance of any such testing. The validation of a laboratory is site specific and cannot be transferred or carried over to a facility at a different location. Any and all costs associated with this Government laboratory validation shall be borne by the laboratory and/or the Contractor. Validation of a laboratory is not granted for the entire laboratory activity, but only for the specific procedures requested by the inspected laboratory. The inspected laboratory has full choice of the procedures to be inspected except that the Quality Assurance portion of ASTM E 329 is mandatory to be inspected.

(1) Validation Procedures

Validation of a laboratory may consist of either an inspection or audit as defined herein. Validation of all material testing laboratories shall be performed by the MTC. Validation may be accomplished by one of the following processes:

(a) Inspection. Inspection shall be performed by the MTC in accordance with American Society for Testing and Materials (ASTM) standards E329 and D3740.

(b) Audit. A laboratory may be validated by auditing if it has been accredited by the Concrete and Cement Reference Laboratory (CCRL) or AASHTO Materials Reference Laboratory (AMRL) within the past two years in accordance with ASTM E329. Audit shall be performed by the MTC. Inspection by MTC may be required after auditing if one or more of the critical testing procedures required in the project specification were not included in the CCRL or AMRL inspection report or if there is any concern that the laboratory may not be able to provide required services.

b. Standards of Acceptability

(1) Aggregate, concrete, bituminous materials, soil, and rock. Laboratories for testing aggregate, concrete, bituminous materials, soil, and rock shall be validated for compliance with ASTM E 329, Engineer Manual (EM) 1110-2-1906, or project specifications, as applicable.

(2) Water, sediment, and other samples. Laboratories engaged in analysis of water, sediment, and other samples for chemical analysis shah be inspected to assure that they have the capability to perform analyses and quality control procedures described in references in Appendix A as appropriate. The use of analytical methods for procedures not addressed in these references will be evaluated by the CQAB for conformance with project or program requirements.

(3) Steel and other construction materials, Laboratories testing steel and other construction materials shall be validated for capabilities to perform tests required by project requirements and for compliance with ASTM E329.

c. Validation Schedule

(1) For all contracted laboratories and project Quality Assurance (QA) laboratories testing aggregate, concrete, bituminous materials, soils, rock, and other construction materials, an initial validation shall be performed prior to performance of testing and at least every two (2) years thereafter.

(2) Laboratories performing water quality, wastewater, sludge, and sediment testing shall be approved at an interval not to exceed eighteen (18) months.

(3) All laboratories shall be revalidated at any time at the discretion of the Corps of Engineers when conditions are judged to differ substantially from the conditions when last validated.

d. Validation Process

If a validated laboratory is unavailable or the Contractor selects to use a laboratory which has not been previously validated, Contractor shall coordinate with Corps of Engineers Material Testing Center (MTC) to obtain validation and pay all associated costs. Point of contact at MTC is Daniel Leavell, telephone (601) 634-2496, fax (601) 634-4656, email daniel.a.leavell@erdc.usace.army.mil, at the following address:

U.S. Army Corps of Engineers
Materials Testing Center
Waterways Experiment Station
3909 Hall Ferry Road
Vicksburg, MS 39180-6199

Procedure for Corps of Engineers validation, including qualifications and inspection/audit request forms are available at the MTC web site:

http://www.wes.army.mil/SL/MTC/mtc.htm

Contractor shall coordinate directly with the MTC to obtain validation. Contractor is cautioned the validation process is complicated and lengthy, may require an onsite inspection by MTC staff, correction of identified deficiencies, and the submittal and approval of significant documentation. Estimate a minimum of 60 days to schedule an inspection/submittal and receive a validation. Schedule of costs:

Full Onsite Inspection	0 - 10 procedures	$3000 + travel expenses
	11 - 45 procedures	$4000 + travel expenses
	46 + procedures	$5000 + travel expenses
Full Desk Audit (AASHTO inspected)		$2500
Abbreviated Audit by AASHTO Accreditation		$1250
Additional Procedures after Validation		$250 each to a maximum of two

Travel time and associated costs will be determined from Vicksburg MS. The Contractor will be invoiced for actual travel costs and shall submit payment direct to the MTC made payable to the ERDC Finance and Accounting Officer prior to the scheduling of the inspection and/or audit. The Contractor shall copy the Contracting Officer of all correspondence and submittals to the MTC for purposes of laboratory validation.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b., at the following address:

U.S. Army Corps of Engineers
Materials Testing Center
Waterways Experiment Station
3909 Hall Ferry Road
Vicksburg, MS 39180-6199
Phone: (601) 634-2496 or (601) 634-3261

ATTN: Project _____, Contract Number _____

Coordination for each specific test, exact delivery location and dates will be made through the Area Office. If samples are scheduled to arrive at the laboratory on a weekend (after 1700 Friday through Sunday) notify the laboratory at least 24 hours in advance at (601) 634-2496 to arrange for delivery.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a punch list of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause

for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals reviewed, with contract reference, by whom, and action taken.

g. Off-site surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms are attached at the end of this specification section.

3.11 NOTIFICATION OF NONCOMPLIANCE

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

(sample of typical Contractor's Daily Report)
DAILY CONSTRUCTION QUALITY CONTROL REPORT

Contract Number: _____ Date: _____ Rpt. No._____

Contract Title: _____ Location: _____

Weather: Clear __ P. Cloudy __ Cloudy __ Rainfall __ (__% of workday)

Temperature during workday: High ____ degrees F. Low ___ degrees F.

1. WORK PERFORMED BY CONTRACTOR/SUBCONTRACTOR(S):

Contractor Name	No. of Workers	Crafts/Hours	Work performed

2. EQUIPMENT DATA:

Type, Size, Etc.	Owned/Rented	Hours Used	Hours Standby

3. QUALITY CONTROL INSPECTIONS AND RESULTS: (Include a description of preparatory, initial, and/or follow up inspections or meetings; check of subcontractors work and materials delivered to the site compared to submittals and/or specifications; comments on the proper storage of materials; include comments on corrective actions to be taken):

_____

_____

_____

_____

4. QUALITY CONTROL TESTING AND RESULTS (comment on tests and attach test reports):

_____

_____

_____

5. DAILY SAFETY INSPECTIONS (Include comments on new hazards to be added to the Hazard Analysis and corrective action of any safety issues):

_____

_____

6. REMARKS (Include conversations with or instructions from the Government representatives; delays of any kind that are impacting the job; conflicts in the contract documents; comments on change orders; environmental considerations; etc.):

_____

_____

_____

_____

_____

CONTRACTOR'S VERIFICATION: The above report is complete and correct. All material, equipment used, and work performed during this reporting period are in compliance with the contract documents except as noted above.

_____
CONTRACTOR QC REPRESENTATIVE

(Sample of Typical Contractor's Test Report)

TEST REPORT

STRUCTURE OR BUILDING _____

CONTRACT NO. _____

DESCRIPTION OF ITEM, SYSTEM, OR PART OF SYSTEM TESTED:
_____

_____

DESCRIPTION OF TEST: _____

_____

_____

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR THE CONTRACTOR:

NAME_____

TITLE_____

SIGNATURE_____

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM, OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR
QUALITY CONTROL INSPECTOR_____

DATE_____

REMARKS
_____

_____

_____

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SECTION 01501

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 AVAILABILITY OF UTILITY SERVICES

All reasonable quantities of utilities will be made available from existing utilities to the Contractor without charge. Any temporary connection or lines that may be required will be installed, maintained, and removed by the Contractor at its own expense and in such a manner satisfactory to the Contracting Officer. Removal of such connections or lines will be accomplished prior to final acceptance of the construction. The Contractor shall provide any necessary portable power.

1.2 SANITARY PROVISIONS

Contractor shall provide sanitary accommodations for the use of employees as may be necessary and shall maintain accommodations approved by the Contracting Officer and shall comply with the requirements and regulations of the State Health Department, County Sanitarian, or other authorities having jurisdiction.

1.3 TEMPORARY ELECTRIC WIRING

1.3.1 Temporary Power and Lighting

The Contractor shall provide construction power facilities in accordance with the safety requirements of the National Electric Code NFPA No. 70 and the SAFETY AND HEALTH REQUIREMENTS MANUAL EM 385-1-1. The Contractor, or its delegated subcontractor, shall enforce the safety requirements of electrical extensions for the work of subcontractors. Work shall be accomplished by journeyman electricians.

1.3.2 Construction Equipment

In addition to the requirements of SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385-1-1, temporary wiring conductors installed for operation of construction tools and equipment shall be either Type TW or THW contained in metal raceways, or shall be hard usage or extra hard usage multiconductor cord. Temporary wiring shall be secured above the ground or floor in a workmanlike manner and shall not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in accordance with the provisions of the National Electric Code.

1.3.3 Submittals

Submit detailed drawings of temporary power connections. Drawings shall include, but not be limited to, main disconnect, grounding, service drops, service entrance conductors, feeders, GFCI'S, and all site trailer connections.

1.4 FIRE PROTECTION

During the construction period, the Contractor shall provide fire extinguishers in accordance with the safety requirements of the SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385-1-1. The Contractor shall remove the fire extinguishers at the completion of construction.

1.5 UTILITY LOCATOR/IDENTIFICATION TAPE

Unless specified otherwise elsewhere in the Contract, all installed utility lines shall have a plastic marker tape (minimum 150 mm wide and 0.125 mm thick, installed 200 mm to 260 mm below grade. The plastic marker tape shall include a metallic wire or metal foil backing for detection purposes, and shall bear a continuous printed inscription describing the type of utility line buried below. All underground exterior gas lines shall be provided with a continuous tracer wire (#12 wire) taped to the pipe. Utility line monument markers (concrete with brass identification plugs) shall be installed every 60 meters along straight runs and at each change of direction. Any existing marker tapes or tracer wires damaged during construction shall be repaired to original condition.

1.6 STAGING AREA

Contractor will be provided adequate open staging area as directed by the Contracting Officer. Area is unsecured, and Contractor shall make provisions for its own security.

Contractor shall be responsible for keeping staging area, and office area clean and free of weeds and uncontrolled vegetation growth. Weeds shall be removed by pulling or cutting to within 1-inch of ground level. Lawn areas shall be mown to keep growth to less than 2-inches. All loose debris and material subject to being moved by prevailing winds in the area shall be picked up or secured at all times.

Temporary storage buildings (excluding tractor trailers) sited in the area shall conform to the base color scheme (Antique Linen, Fed. No. 23578). Architectural and structural features of all temporary facilities, including tractor trailers, shall be maintained in good repair as required by the Contracting Officer. Staging area shall be enclosed by chain link fence 1.8 m high, with access gates. Spare keys to any locked gates shall be provided to the base Fire Department dispatch office. Area shall be kept clean, orderly and free of debris , demolished materials, etc. at all times. If the area is not maintained in a safe and clean condition as defined above, the Contracting Officer may direct the Contractor to perform such actions as necessary to bring the area and facilities up to base standards at no additional cost to the Government, or have the area cleaned by others with the costs being deducted from the Contractor's payment.

1.7 HOUSEKEEPING AND CLEANUP

Pursuant to the requirements of Clause CLEANING UP and Clause ACCIDENT PREVENTION, of the CONTRACT CLAUSES, the Contractor shall assign sufficient personnel to ensure compliance. The Contractor shall submit a detailed written plan for implementation of this requirement. The plan will be presented as part of the preconstruction safety plan and will provide for keeping the total construction site, structures, and accessways free of debris and obstructions at all times. Work will not be allowed in those areas that, in the opinion of the Contracting Officer, have unsatisfactory cleanup and housekeeping at the end of the preceding day's normal work shift. At least once each day all areas shall be checked by the Quality Control person of the Contractor and the findings recorded on the Quality Control Daily Report. In addition, the Quality Control person shall take immediate action to ensure compliance with

this requirement. Housekeeping and cleanup shall be assigned by the Contractor to specific personnel. The name(s) of the personnel shall be available at the project site.

1.8 CONSTRUCTION NEAR UTILITIES SYSTEMS

1.8.1 Work Clearance Request (AF Form 103)

A work clearance permit (AF Form 103) must be obtained from Construction Management prior to any excavation work. Information on location of existing utilities will be available with the permit. All Contractors shall be responsible for processing their own Work Clearance Request (AF Form 103) and coordinating with Government inspectors as required. The Contractor is responsible for obtaining all coordination signatures for the permit. The approved permit will be valid for a period not to exceed 90 calendar days.

1.8.2 Marking of Excavations

All markings shall be accomplished with water-based chalk (Aervoe Pacific Inc. 1-800-227-0196 or equal). No paints will be used. TO THE MAXIMUM EXTENT POSSIBLE, ELIMINATE PERMANENT MARKINGS ON PAVEMENT AND CURBS. Location marks shall be removed after 14 calendar days. Detailed permit procedures and guidelines will be provided to the Contractor during the Pre-performance Conference.

1.8.3 Excavation Near Communication Cables

Digging within .9144 meters (3 feet) of buried communication cables (including fiber optic cables), electrical cables, and natural gas lines shall be performed by hand digging until the utility is exposed. The Project Inspector shall be notified 3 days prior to digging within a .9144 meter (3-foot) area near this utility. A representative from Communications (Telco) must be present during excavation of Communications Cables. The cable piping routes must be marked prior to excavation in the area. Air Force personnel will locate the utilities only one time for digging permit purposes. It is the Contractor's responsibility from then on, through acceptance of the project. The Contractor shall be held responsible for any damage to the utility by excavation procedures. Once the utility is exposed, mechanical excavation may be used if there is no chance of damage occurring to the cable or piping systems.

1.8.4 Reburial of Exposed Utilities

When existing utility lines are reburied a locator/identification tape, detectable by pipe detector systems, shall be installed above the uncovered length of the utility. See paragraph UTILITY LOCATOR/IDENTIFICATION TAPE above for detailed tape and installation requirements.

1.8.5 Access to Communications Manhole or Handhole

No communications manhole or handhole shall be entered without first obtaining a fiber optic cable briefing. Coordinate through the Contracting Officer with the Base Communications Officer.

1.8.6 Cable Cuts or Damage

If a communications cable is cut or damaged the Contractor shall immediately notify the Contracting Officer (CO) and begin gathering personnel and equipment necessary to repair the cut, or damage. Contractor shall begin repairs within one hour of the cut or damage, unless notified otherwise, and continue repairs without interruption until full service is restored.

1.9 PROJECT SIGN

Contractor shall furnish and install one project sign(s) in accordance with conditions hereinafter specified and layout shown on drawing No. 49s-40-05-15, Sheets 1 and 2, except Corps of Engineers' castle and Department of Air Force seal will be Government furnished. All letters shall be block type, upper case. Letters shall be painted as indicated using exterior-type paint. Sign shall be maintained in excellent condition throughout the life of job. Project sign shall be located as directed. Upon completion of project, sign shall be removed and shall remain the property of Contractor.

1.10 CONCEALED WORK

All items of work to be concealed shall be Government inspected prior to concealment.

1.11 REPAIR OF ROAD CUTS

Asphaltic surface shall be completely in place within 48 hours after placement of base gravel. Between placement of base gravel and pavement, road shall be kept in driveable and passable condition.

1.12 ELEVATED WORK AREAS

Workers in elevated work areas in excess of 2 meters (6 feet) above an adjoining surface require special safety attention. In addition to the provisions of SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385-1-1, the following safety measures are required to be submitted to the Contracting Officer's Representative. Prior to commencement of work in elevated work areas, the Contractor shall submit drawings depicting all provisions of his positive fall protection system including, but not limited to, all details of guardrails. Positive protection for workmen engaged in the installation of structural steel and steel joist shall be provided by safety nets, tie-offs, hydraulic man lifts, scaffolds, or other required means. Decking crews must be tied-off or work over nets or platforms not over 2 meters (6 feet) below the work area. Walking on beams and/or girders and the climbing of columns is prohibited without positive protection. Perimeter guardrails shall be installed at floor, roof, or wall openings more than 2 meters (6 feet) above an adjoining surface and on roof perimeters. Rails shall be designed to protect all phases of elevated work including, but not limited to, roofing operations and installation of gutters and flashing. Rails around roofs may not be removed until all work on the roof is complete and all traffic on or across the roof ceases. Rails shall be designed by a licensed engineer to provide adequate stability under any anticipated impact loading. As a minimum, the rails shall consist of a top rail at a height of 1067 mm (42 inches), a mid-rail, and a toe board. Use of tie-offs, hydraulic man lifts, scaffolds, or other means of roof edge protection methods may be utilized on small structures such as family housing, prefabricated metal buildings, etc. If safety belts and harnesses are used, the positive fall protection plan will address fall restraint versus fall arrest. Body belts will ONLY be used for fall restraint, they will not be used for fall arrest.

1.13 CONSTRUCTION PLANNING MEETINGS

Contractor shall attend a weekly scheduling meeting with the Contracting Officer's Representative and a representative of the using service. During the meeting, the Contractor shall be required to present in writing, and discuss his specific construction plans for, the following 2-week period. The first week's schedule shall be firm and the second weeks' schedule may be tentative and subject to change as conditions warrant. The schedule shall be detailed describing planned work activities, crew sizes and locations, and any utility and access restrictions to base activity which may be caused by planned construction. Any scheduling of outages will be performed at this meeting. Any Contractor activity affecting base security needs, such as scattered crews and number of workers per crew, will be detailed in the written schedule and discussed during the meeting. This weekly meeting is in addition to the construction progress charts or network analysis submission requirements.

1.14 TRAFFIC CONTROL

The Contractor shall provide for movement of traffic through and around the construction zone in a manner that is conducive to the safety of motorists, pedestrians, and workers. This shall include placement and maintenance of traffic control devices in accordance with the U.S. Department of Transportation, Federal Highway Administration publication, Manual on Uniform Traffic Control Devices. Streets (except dead end) may be closed to traffic temporarily by approved written request to the Contracting Officer at least 10 working days prior to street closure. Street closures shall at all times allow street access to a building from one direction. Excavations shall not remain open for more than 1 working day without approval.

1.15 UTILITIES NOT SHOWN

The Contractor can expect to encounter, within the construction limits of the entire project, utilities not shown on the drawings and not visible as to the date of this contract. The Contractor shall scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground where existing utilities are discovered. The Contractor shall verify the elevations of existing utilities, piping and any type of underground obstruction not indicated, or indicated and not specified to be removed. If such utilities interfere with construction operations, he shall immediately notify the Contracting Officer verbally and then in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are removed or relocated as directed, the Contractor shall be entitled to equitable adjustment for any additional work or delay. The types of utilities the Contractor may encounter are waterlines, sewer lines (storm and sanitary), gas lines, fueling lines, steam lines, buried fuel tanks, septic tanks, other buried tanks, communication lines, cathodic protection cabling, and power lines. These utilities may be active or abandoned utilities.

1.16 GOVERNMENT WITNESSING AND SCHEDULING OF TESTING

The Contractor shall notify the Contracting Officer, by serial letter, of dates and agenda of all performance testing of the following systems: mechanical (including fire protection and EMCS), electrical (including fire protection) medical and food service systems a minimum of 10 calendar days prior to start of such testing. In this notification, the Contractor shall certify that all equipment, materials, and personnel necessary to conduct such testing will be available on the scheduled date and that the systems have been prechecked by him and are ready for performance and/or acceptance testing. Contractor shall also confirm that all operations and maintenance manuals have been submitted and

approved. NO PERFORMANCE AND/OR ACCEPTANCE TESTING WILL BE PERMITTED UNTIL THE OPERATIONS AND MAINTENANCE MANUALS HAVE BEEN APPROVED.

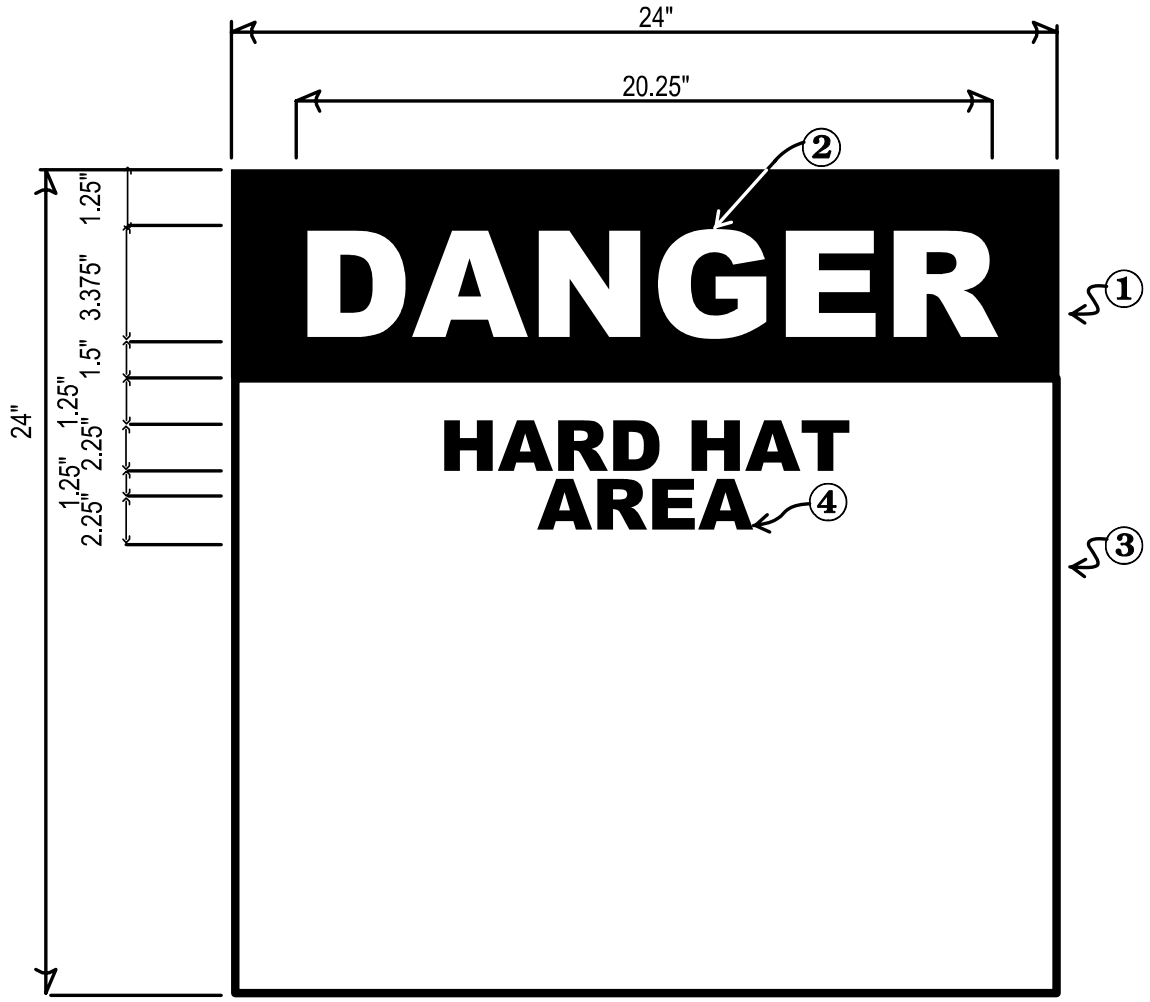
Government personnel, at the option of the Government, will travel to the site to witness testing. If the testing must be postponed or canceled for whatever reason not the fault of the government, the Contractor shall provide the Government not less than 3 working days advance notice (notice may be faxed) of this postponement or cancellation. Should this 3 working day notice not be given , the Contractor shall reimburse the Government for any and all out of pocket expenses incurred for making arrangements to witness such testing including, but not limited to airline, rental car, meal, and lodging expenses. Should testing be conducted, but fail and have to be rescheduled for any reason not the fault of the Government, the Contractor shall similarly reimburse the Government for all expenses incurred.

1.17 HARD HAT SIGNS

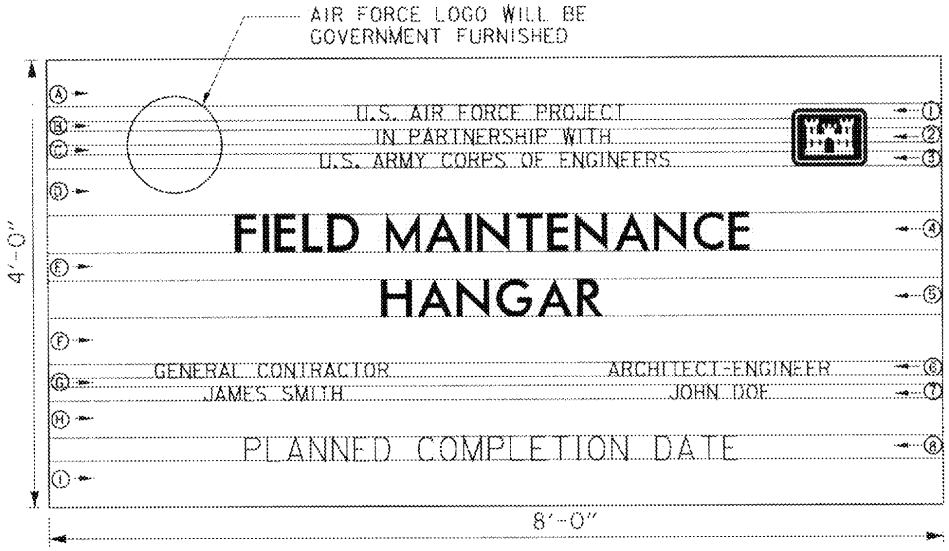
The Contractor shall provide 610 mm by 610 mm (24 by 24 inch) square Hard Hat Area signs at each entry to the project or work area as directed by the Contracting Officer. A minimum of two signs will be required. Signs shall be in accordance with the sketch at the end of this section.

PART 2 PRODUCTS AND PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION



- SIGN SHALL BE FABRICATED FROM .125 THICK 6061-T6 ALUMINUM PANEL
- COLOR
    1. SAFETY RED (SR)
    2. WHITE
    3. WHITE
    4. BLACK
- LETTERING SHALL BE HELVETICA BOLD TYPOGRAPHY.
- LETTERS AND BACKGROUND SHALL BE REFLECTIVE SHEETING MATERIAL.
- SIGNS SHALL BE POSTED AT 6'-6" (BOTTOM SIGN TO GRADE) OR AS DIRECTED BY THE CONTRACTING OFFICER.
- LETTERING TO BE CENTERED ON PANEL.



SAMPLE CONSTRUCTION SIGN FOR MILCON PROJECTS

SCHEDULE

SPACE	HEIGHT	LINE	DESCRIPTION	LETTER HEIGHT	STROKE
A	5"	1	U.S. AIR FORCE PROJECT	1½"	3/16"
B	1"	2	IN PARTNERSHIP WITH	1½"	3/16"
C	1"	3	U.S. ARMY CORPS OF ENGINEERS	1½"	3/16"
D	5"	4	PROJECT NAME	4"	½"
E	3"	5	PROJECT NAME CONT'S (IF REQUIRED)	4"	½"
F	5"	6	GENERAL CONTRACTOR/A-E	1½"	3/16"
G	1"	7	GENERAL CONTRACTOR/A-E	1½"	3/16"
H	4"	8	PLANNED COMPLETION DATE	2½"	¼"
I	5"				

U.S. AIR FORCE

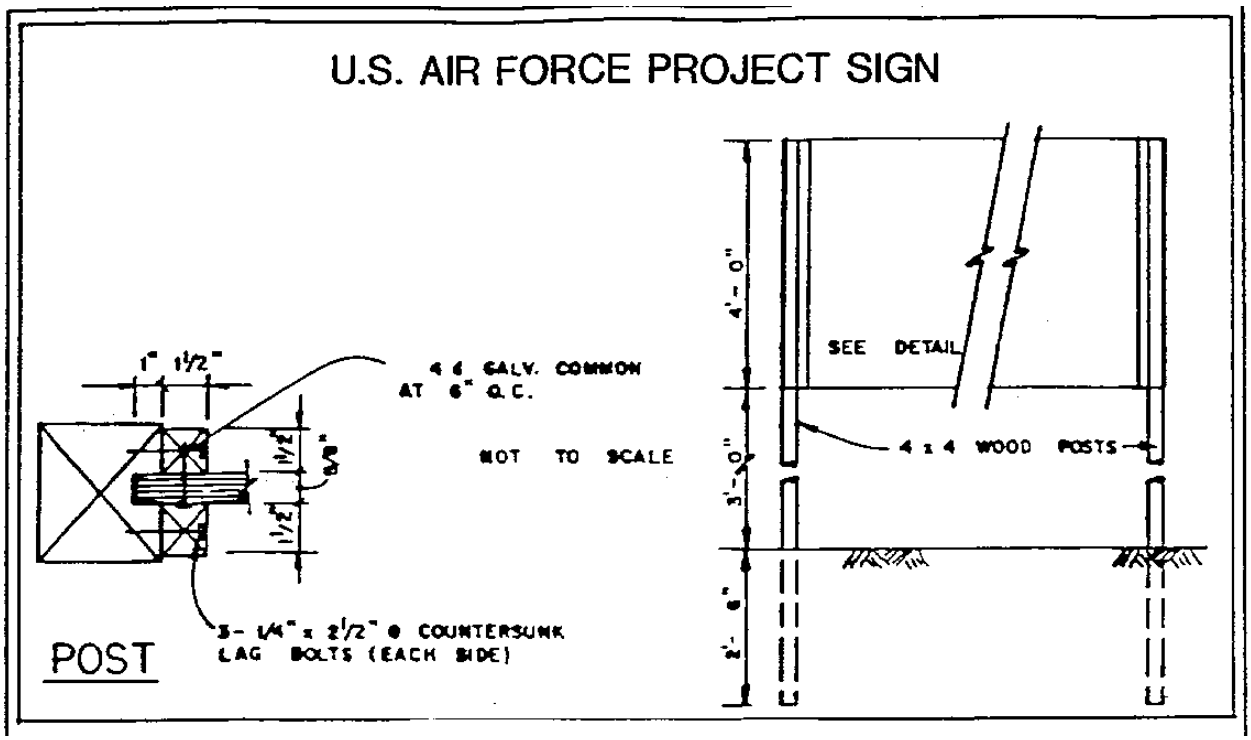
PROJECT CONSTRUCTION SIGN

SHEET: 1 OF 2 SAMPLE AS SHOWN

U.S. ARMY ENGINEER DISTRICT, SEATTLE, WA

DR: L.T. DATE: 14 NOV 97

FILE NO: 495/40-05-15



NOTES:

1. Signboard 4' x 8' x 5/8" grade A-C exterior type plywood with medium density overlay on both sides.

2. Paint both sides and edges with one prime coat and two coats of paint, accordance with FED. STD. 595b, color number brown 30118 exterior type enamel. Lettering shall be as shown on drawing and shall be antique linen 33578 gloss exterior type enamel.

3. Lettering shall be Helvetica medium.

4. Acceptable abbreviations may be used for Contractor's name.

5. Department of Air Force Seal and Corps of Engineers' Castle to be Government furnished.

6. No company logo shall be used.

7. Sign posts and 1½" wood trim shall be stained dark brown.

8. Upon completion of work under this contract, the project sign shall be removed from the job site and shall remain the property of the Contractor.

SHEET 2 OF 2

END OF SECTION

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SECTION 01572

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.2 MANAGEMENT

The Contractor shall take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling shall accrue to the Contractor. Firms and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

1.3 PLAN

A waste management plan shall be submitted within 15 days after notice to proceed and prior to initiating any site preparation work. The plan shall include the following:

a. Name of individuals on the Contractor's staff responsible for waste prevention and management.

b. Actions that will be taken to reduce solid waste generation.

c. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.

d. Characterization, including estimated types and quantities, of the waste to be generated.

e. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

f. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.

g. List of specific waste materials that will be salvaged for resale, salvaged and reused, or recycled. Recycling facilities that will be used shall be identified.

h. Identification of materials that cannot be recycled/reused with an explanation or justification.

i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

1.4 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. The records shall be made available to the Contracting Officer during construction, and a copy of the records shall be delivered to the Contracting Officer upon completion of the construction.

1.5 COLLECTION

The necessary containers, bins and storage areas to facilitate effective waste management shall be provided and shall be clearly and appropriately identified. Recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials and separated by one of the following methods:

1.5.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing.

1.5.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.5.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.6 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.6.1 Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

1.6.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

1.6.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

END OF SECTION

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SECTION 01670

RECYCLED / RECOVERED MATERIALS

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.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

END OF SECTION

SECTION 01701

OPERATIONS AND MAINTENANCE MANUALS

PART 1 GENERAL

1.1 GENERAL INFORMATION

Parts catalogs and operating instructions needed or useful in operation, maintenance, repairs, dismantling, or assembling, and for repair and identification of parts for ordering replacements, shall be especially prepared. The parts catalogs and operating instructions shall cover all equipment furnished under this contract and shall be assembled under a suitable common cover. The assembled material shall include complete identification of the spare parts furnished in compliance with the requirements of these specifications.

1.2 SUBMITTAL REQUIREMENTS

1.2.1 Preliminary O&M Manual And Data Submittal

1.2.1.1 General

To establish and assure uniform O&M manual format, the Contractor shall submit and receive Contracting Officer approval on three (3) complete sets of O&M data without the binders prior to submission of the final bound manuals. Initial O & M Manual data submittal shall be a minimum of 30 days prior to 90 percent project completion.

1.2.1.2 Review and Approval

The Contracting Officer will require thirty (30) days for review of submitted O&M manual(s) or data. The Contracting Officer will retain one copy of unacceptable O&M manual submittal and return remainder of copies to the Contractor marked "Returned for Correction." If "Returned for Correction." the Contractor shall resubmit the required number of copies of the manual(s) incorporating all comments, prior to substantial completion and/or use and possession. The Contractor may, at his option, update the copy retained by the Government in lieu of providing the added copy.

1.2.2 Final O&M Manual And Data Submittal

Six copies of the complete set of manuals shall be provided for each separate building and any separate support equipment.

1.2.2.1 Three of the six completed copies of the final O&M manuals (for each building or equipment) shall contain original manufacturer's data. Data in the remaining manuals may be duplicated copies of original data. All data furnished must be of such quality to reproduce clear, legible copies.

1.3 FORMAT

Binders shall be side-binding, telescoping-post, expandable-back, and shall have a supported vinyl cover with a stiff binder board for 8 1/2- by 11-inch sheets. Ring-type loose leaf binders will not be acceptable. The following identification shall be inscribed on the covers with similar information on a title page inside the binder:

(1) The words "OPERATIONS AND MAINTENANCE MANUAL."

(2) The name and location of the building, facility, and/or project.

(3) The volume number and total number of volumes.

(4) The systems and/or equipment therein.

(5) The name of the Contractor.

(6) The contract number.

(7) The year of completion of the contract.

1.3.1 Master Table Of Contents

Each manual shall contain a master table of contents. The master table of contents shall contain all chapters, appendixes, and a master index and shall be included in the front of the first volume if there is more than one volume. Each subsequent volume shall contain an index for the contents within that respective volume. Each volume shall not be broken between chapters, appendixes, and/or indexes. All chapters, appendixes, and indexes shall be adequately separated and identified by standard line indexes.

1.3.2 Drawings

One 11- by 17-inch copy of each of the drawings shall be furnished and shall be folded and bound for easy unfolding without removal from the binder. Each sheet in the binder shall be numbered and an index provided for ready reference to the data.

1.4 CONTENTS

1.4.1 Warning Page

A warning page shall be provided to warn of potential dangers (if they exist), such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, or high pressures. The warning page shall be placed inside the front cover, in front of the title page.

1.4.2 Operation Data

The operation data shall include specific operating instructions, functional description of operating parts, and special precautions or procedures to be considered. The Contractor shall be responsible for the necessary coordination between his subcontractors, suppliers, and manufacturers to assure complete submittals on individual interrelated equipment components.

1.4.3 Maintenance Data

Maintenance data shall include instructions for inspection, testing, and maintenance; parts catalogs; and a list of special tools required.

1.4.4 Preventative Maintenance (PM) Charts

PM charts shall be developed and provided in the manual. These charts shall include the following:

(a) Subject. A clear and descriptive name for the equipment requiring PM shall be given. Reference to shop drawings and catalog cuts shall be provided in a clear manner. "Checkpoints" shall be defined for each piece of equipment.

(b) Procedure. A detailed procedural description of the method in which to perform PM shall be provided for all equipment requiring PM work. Safety precautions shall be provided. Descriptions of "checkpoints" shall be provided.

(c) Dates. The PM charts shall include recommended PM intervals. The intervals shall be defined as requiring PM either daily, weekly, monthly, quarterly, semiannually, or annually. These charts shall be inserted in an appendix at the end of the manual. This appendix shall be for PM charts only. PM shall include inspection, testing, cleaning, replacement, and all routine maintenance work.

1.4.5 Warranties

In addition to the general warranty required by the contract, the O&M manuals 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. Extended warranties normally provided by manufacturers that are beyond the warranty of construction shall be specifically noted. The O&M manuals shall also include a specific warranty section itemizing all standard and extended warranty items. The warranty list shall be as indicated below. Warranties will not begin until the facility is accepted by the Contracting Officer. Copy of warranty shall be included in the manual.

WARRANTY INFORMATION

Project Title
Contract Number

General Contractors Name, Phone Number

ITEM DESCRIPTION	START DATE	END DATE	O & M REFERENCE	LOCATION
(in alphabetical order)				
Descriptive Name, Manufactures/ Warrantors Name Address & Phone No.				

1.4.6 Installed Equipment Lists

A copy of the completed Equipment in Place forms required in SECTION 01705: EQUIPMENT-IN-PLACE shall be included in the manual. The completed forms shall be located at the front of the catalog and O&M data for the equipment listed on the form.

1.4.7 Catalog Data Sheets And Spare Parts Listing

All catalog data sheets and the spare parts listing shall be inserted in an appendix at the end of the manual following the preventative maintenance (PM) charts appendix. This appendix shall be for catalog data sheets and the spare parts listing only. An index of the catalog data sheets shall be provided to provide clear and concise reference to shop drawings and individual pages within the manual.

1.4.7.1 Catalog data sheets shall be inserted into the manual such that positive identification of all parts on catalog data sheets are clearly identified by:

(a) Part Name. A clear and descriptive name shall be given to each component in the piece of equipment.

(b) Manufacturer and Part Number. The name, address, and telephone number of the manufacturer shall be given along with the catalog part number.

Standard catalog data sheets will not be acceptable unless irrelevant parts are marked out (with black "x") and relevant parts clearly identified. Any data on catalog sheets which does not directly relate to purchased equipment shall be marked out. Parts shall be so identified that they can be readily ordered from local area industrial supply outlets if not of special manufacture. A cross-reference between items described in catalogs, instructions, and drawings shall be provided to facilitate ease of location of parts described. Highlighting and "scribble notes" will not be acceptable for identification purposes.

1.4.7.2 The spare parts listing shall clearly state the spare parts supplied and a list of recommended spare parts to be stocked. The spare parts listing shall clearly identify:

(a) Part Name. A clear and descriptive name shall be given to each component listed as a spare part in the piece of equipment.

(b) Manufacturer and Part Number. The name, address, and telephone number of the manufacturer shall be given along with the catalog part number.

(c) Quantity. The quantity of each part listed as a spare part shall be given.

(d) Reference to Catalog Data Sheets. Each spare part shall be referenced to the corresponding catalog data sheet by page number.

1.5 PAYMENT

No partial or total payment will be made for the O & M manuals until all O&M manuals are fully approved by the Government (A or B action) and all copies of final manuals are received by the Government in their final binders (see the (Price) Schedule for details).

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

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SECTION 01702

AS BUILT RECORDS AND DRAWINGS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

As-Built Field Data; G

Two sets of the As-Built Field Data shall be submitted to the Contracting Officer for review and approval a minimum of 20 calendar days prior to the date of final inspection. If review of the preliminary as-built drawings reveals errors and/or omissions, the drawings will be returned to the Contractor for corrections. The Contractor shall make all corrections and return the drawings for backcheck to the Contracting Officer within 10 calendar days of receipt. When submitted drawings are accepted, one set of marked drawings will be returned to the Contractor for the completion of the as-built drawings.

As-Built Prints for System Acceptance Testing

One set of marked-up as-built prints shall be furnished at the time of system acceptance testing. These as-built prints shall be in addition to the submittals of marked-up as-built field data.

As-Built Drawings; G

Drawings showing as-built conditions of the project.

The Preliminary As-Built Drawings submittal shall consist of one set of Electronic AutoCAD CADD files on CD-ROM showing each drawing, and 2 sets of prints. The CD-ROMs shall be marked as “Preliminary As-Built Drawings.” One copy of the prints marked with review notations by the Contracting Officer, will be returned to the Contractor.

The final as-built drawings shall consist of two sets of Electronic AutoCAD CADD files on CD-ROM showing each drawing, and 2 sets of prints and one set of full size mylar drawings. Final drawings shall incorporate contract changes and plan deviations. Lines, letters, and details will be sharp, clear, and legible. Additions or corrections to the drawings will be drawn to the scale of the original drawing. Documents shall be current.

1.2 PAYMENT

Payment for the preparation and furnishing of as-built records and as built drawings in electronic file format will be made in accordance with the SCHEDULE and Section 01025 MEASUREMENT AND PAYMENT. Failure to submit final as-built drawing files and marked prints as specified shall be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of the final as-built record drawings shall be accomplished before final payment is made to the Contractor.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 AS-BUILT FIELD DATA

3.1.1 General

The Contractor shall keep at the construction site two complete sets of full size prints of the contract drawings, reproduced at Contractor expense, one for the Contractor's use, one for the Government. During construction, both sets of prints shall be marked to show all deviations in actual construction from the contract drawings. The color red shall be used to indicate all additions and green to indicate all deletions. The drawings shall show the following information but not be limited thereto:

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

b. The accurate location and dimension of all underground utilities and facilities.

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

d. Correct elevations if changes were made in site grading from the contract plans.

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

f. The locations and dimension of any changes within the building or structure.

g. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor including, but not limited to, fabrication erection, installation, and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

h Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

i. All changes or modifications from the original design and from the final inspection.

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

These deviations shall be shown in the same general detail utilized in the contract drawings. Marking of the prints shall be pursued continuously during construction to keep them up to date. In addition, the Contractor shall maintain full size marked-up drawings, survey notes, sketches, nameplate data, pricing information, description, and serial numbers of all installed equipment. This information shall be maintained in a current condition at all times until the completion of the work. The resulting field-marked prints and data shall be referred to and marked as "As-Built Field Data," and shall be used for no other purpose. They shall be made available for inspection by the Contracting Officer's representative whenever requested during construction and shall be jointly inspected for accuracy and completeness by the Contracting Officer's representative and a responsible representative of the Contractor prior to submission of each monthly pay estimate. Failure to keep the As-Built Field Data (including Equipment-in-Place lists) current shall be sufficient justification to withhold a retained percentage from the monthly pay estimate.

3.2 AS-BUILT ELECTRONIC FILE DRAWINGS

3.2.1 Government Furnished Computer Aided Design and Drafting (CADD) Drawings

No earlier than 30 days after award the Government will have available for the Contractor one set of AutoCAD electronic file format contract drawings, to be used for preparation of as-built drawings. The electronic file drawings will be available on either 89 mm (3-1/2 inch) 1.44 MB floppy disks or ISO-9660 CD-ROM, as directed by the Contracting Officer. The Contractor has 30 days after the receipt of the electronic file to verify the usability of the AutoCAD files, and bring any discrepancies to the attention of the Contracting Officer. Any discrepancies will be corrected within 15 days and files returned to the Contractor.

3.2.2 Contractor Prepared As Built Drawings

The Contractor shall incorporate all deviations from the original contract drawings as recorded in the approved 'As-built Field Data' (see paragraph 3.1). The Contractor shall also incorporate all the written modifications to the contract drawings which were issued by amendment during the bidding period or by modification after award of the contract. All revisions and changes shall be incorporated, i.e. items marked "deleted" shall be deleted, clouds around new items shall be removed, etc. The Contractor shall prepare the complete set of preliminary final and final as-built drawings in AutoCAD electronic file format. The electronic file format, layering standards and submittal requirements are specified in the paragraph "Electronic File Format Requirements."

3.2.2.1 Quality Standards

The drafting work shall be performed by Certified Engineering Technicians and/or personnel proficient in the preparation of CADD drawings. The as-built drawings shall be done in a quality equal to that of the originals. Line work, line weights, lettering, and use of symbols shall be the same as the original line work, line weights, and lettering, and symbols. If additional drawings are required they shall be prepared in electronic file format under the same guidance.

3.2.2.2 Marking of Final Drawings

When final revisions have been completed, each drawing shall be identified with the words "AS-BUILT" in block letters at least 3/8-inch high placed above the title block if space permits, or if not, below the title block between the border and the trim line. The date of completion and the words "REVISED AS-BUILT" shall be placed in the revision block above the latest revision notation.

3.2.3 Electronic File Format Requirements

3.2.3.1 General

The AutoCAD electronic file(s) deliverable shall be in AutoCAD release 14 'DWG' binary format. All support files required to display or plot the file(s) in the same manner as they were developed shall be delivered along with the files. These files include but are not limited to Font files, Menu files, Plotter Setup, and Referenced files. The AutoCad files shall be "bound" (merged).

3.2.3.2 Leveling

Leveling shall remain as provided in the electronic files. An explanatory list of which levels are used in each drawing, including any additional levels needed to complete incorporation of the As-Built data, shall be provided with each submittal.

3.2.3.3 Electronic File Deliverable Media

All electronic files shall be submitted in ISO 9660 format CD-ROM (CD). Zip drive disks shall not be provided. Each CD shall have a clearly marked label stating the Contractor's firm name, project name and location, submittal type (AS-BUILT), and date the CD was made. Each submittal shall be accompanied by a hard copy transmittal sheet that contains the above information along with tabulated information about all files submitted, as shown below:

Electronic File Name	Plate Number	Drawing Title

Electronic version of the table shall be included with each submittal set of disks.

3.3 SUBMITTAL OF AS-BUILT DRAWING DELIVERABLES

3.3.1 Preliminary Final As-Built Record Drawings

After substantial completion of all work and no later than 10 calendar days after completion of the pre-final inspection the Contractor shall submit preliminary final CADD as-built record drawings. The Contractor shall also submit two sets of prints of these drawings for Government review and approval (preliminary as-built drawings). The Government will promptly return one set of prints annotated with any necessary corrections. All drawings from the original contract drawings set shall be included, including the drawings where no changes were made. The Government will review all as-built record drawings for accuracy and conformance to the drafting standards and other requirements contained in DIVISION 1 GENERAL REQUIREMENTS. They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the specified CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval.

3.3.2 Final As-Built Record Drawings

After completion of all work and acceptance by the Contracting Officer and no later than 30 calendar days after completion of the final inspection the Contractor shall submit final CADD as-built record drawings. All drawings from the original contract drawings set shall be included, including the drawings where no changes were made. The Government will review all final as-built record drawings for accuracy and conformance to the drafting standards and other requirements contained in DIVISION 1 GENERAL REQUIREMENTS. The drawings will be returned to the Contractor if corrections are necessary. Within 7 calendar days the Contractor shall revise the CADD files accordingly at no additional cost.

A complete set of full size mylars shall be taken from the disk. The mylars are to be submitted only after all corrections are made, if any.

END OF SECTION

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SECTION 01703

WARRANTY OF CONSTRUCTION

PART 1 GENERAL

1.1 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:

Warranty Management Plan;

One set of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. The Contractor shall furnish with each warranty the name, address, e-mail address and telephone number of each of the guarantor's representatives nearest to the project location.

Warranty Tags;

Two record copies of the warranty tags showing the layout and design.

1.2 WARRANTY MANAGEMENT

1.2.1 Warranty Management Plan

The Contractor shall develop a warranty management plan which shall contain information relevant to the clause Warranty of Construction in SECTION 00700 – COE projects. At least 30 days before the planned pre-warranty conference, the Contractor shall submit the warranty management plan for Government approval. The warranty management plan shall include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase shall be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Approved information shall be assembled in a binder and shall be turned over to the Government upon acceptance of the work. Information to be turned over to a privatized Utility Contractor shall be separately bound. A joint 4 month and 9 month warranty inspection shall be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Information contained in the warranty management plan shall include, but shall not be limited to, the following:

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact, telephone numbers and e-mail addresses within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.

b. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.

c. A list for each warranted equipment, item, feature of construction or system indicating:

1. Name of item.
2. Model and serial numbers.
3. Location where installed.
4. Name and phone numbers of manufacturers or suppliers.
5. Names, addresses, e-mail addresses and telephone numbers of sources of spare parts.
6. Warranties and terms of warranty. This shall include one-year overall warranty of construction. Items which have extended warranties shall be indicated with separate warranty expiration dates.
7. Cross-reference to warranty certificates as applicable.
8. Starting point and duration of warranty period.
9. Summary of maintenance procedures required to continue the warranty in force.
10. Cross-reference to specific pertinent Operation and Maintenance manuals.
11. Organization, names, 24-hour emergency phone numbers and e-mail addresses of persons to call for warranty service.
12. Typical response time and repair time expected for various warranted equipment.

d. The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

e. Procedure and status of tagging of all equipment covered by extended warranties.

f. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.2.2 Performance Bond

The Contractor's Performance Bond shall remain effective throughout the construction period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification by the Contracting Officer or his representative of required construction warranty repair work, the Contractor shall respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.2.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor shall furnish the name, telephone number, e-mail address and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact shall be located within the local service area of the warranted construction, shall be continuously available, and shall be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this contract.

NOTE: Local service area is defined as the area in which the Contractor or his representative can meet the response times as described in paragraph 1.2.4 below and in any event shall not exceed 200 miles radius of the construction site.

1.2.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Government or utility owner, the Contractor shall respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. The Contractor shall submit a report on any warranty item that has been repaired during the warranty period within two working days of repair completion. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. Interim status reports shall be submitted weekly on repairs that have not yet been completed. If the Contractor does not perform the construction warranty work within the timeframes specified, the Government will perform the work and backcharge the Contractor.

a. First Priority Code 1 - Safety/Life & Health/Emergency: Perform onsite inspection to evaluate situation and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2 – Property Damage/Severe Inconvenience/Urgent: Perform onsite inspection to evaluate situation and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows (the applicable priority will be determined by the Government in its sole discretion):

Code 1-Air Conditioning Systems

(1) Recreational support.
(2) Air conditioning leak in part of building, if causing damage.
(3) Air conditioning system not cooling properly.

Code 1-Doors

(1) Overhead doors not operational, causing a security, fire, or safety problem.
(2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors

(1) Overhead doors not operational.
(2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical

(1) Power failure (entire area or any building operational after 1600 hours).
(2) Security lights
(3) Smoke detectors
(4) Traffic signal blackout

Code 2-Electrical

(1) Power failure (no power to a room or part of building).
(2) Receptacle and lights, exit lights or emergency lights (in a room or part of building).
(3) Traffic signal inoperable (flashing)

Code 3-Electrical

Street lights.

Code 1-Gas

(1) Leaks and breaks.
(2) No gas to family housing unit or cantonment area.

Code 1-Heat

(1). Area power failure affecting heat.
(2). Heater in unit not working.

Code 2-Kitchen Equipment

(1) Dishwasher not operating properly.
(2) Any other equipment hampering preparation of a meal.

Code 1-Plumbing

(1) Hot water heater failure.
(2) Leaking water supply pipes.
(3) Fire sprinkler systems

Code 2-Plumbing

(1) Flush valves not operating properly.
(2) Fixture drain, supply line to commode, or any water pipe leaking.
(3) Commode leaking at base.

Code 3 -Plumbing

Leaky faucets.

Code 3-Interior

(1) Floors damaged.
(2) Paint chipping or peeling.
(3) Casework.

Code 1-Roof Leaks

Temporary repairs shall be made where major damage to property is occurring.

Code 2-Roof Leaks

Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 1-Water (Exterior)

(1) No water to a building with sanitary facilities.
(2) Broken water main.

Code 2-Water (Exterior)

No water to facility.

Code 2-Water (Hot)

No hot water in portion of building listed.

Code 1 – Sewerage

(1) Sewage line backup.
(2) Broken sanitary or storm sewer main

Code 3-All other work not listed above.

1.2.5 Warranty Tags

At the time of installation, each warranted item shall be tagged with a durable, oil and water resistant tag approved by the Contracting Officer. Each tag shall be attached with a copper wire and shall be sprayed with a silicone waterproof coating. The date of acceptance and the QC signature shall remain blank until project is accepted for beneficial occupancy. The tag shall show the following information.

a. Type of product/material _____.

b. Model number _____.

c. Serial number_____.

d. Contract number_____.

e. Warranty period _____from _____to _____.

f. Contractor Inspector's (QC) signature _____.

g. Construction Contractor _____.

Address_____.

Telephone number_____.

E-mail address _____.

h. Warranty contact_____.

Address_____.

Telephone number_____.

E-mail address _____.

i. Warranty response time priority code_____.

END OF SECTION

SECTION 01704

FORM 1354 CHECKLIST

PART 1 GENERAL

1.1 PROCEDURES

The form which is a part of this specification section shall be completed for any project having revisions to real property. The following page contains the basic instructions applicable to the form.

1.2 SUBMITTAL

This form shall be submitted for approval, and be approved a minimum of 30 days before final inspection of the project. Failure to have this form completed and approved in time for the final inspection will result in delay of the inspection until the checklist is completed.

PARTS 2 AND 3 NOT USED

INSTRUCTIONS FOR DD FORM 1354 CHECKLIST

The following checklist is only a guide to describe various parts of new and modified construction. Alter this form as necessary or create your own document to give complete accounting of the real property added or deleted for this contract. All items added, deleted, replaced, or relocated within the building 1.5 meter (5 foot line), or on site 1.5 meters (5 feet) beyond the building perimeter must be accounted for completely. Only a few of the most common items beyond the 1.5 meter (5 foot) line are included on the checklist under UTILITIES/SURFACE CONSTRUCTION, add additional items as required by the construction accomplished. Attach a continuation sheet and use the checklist format to describe other work related to this particular project. Listed on the last page are additional items with units of measure and descriptive terms.

Costs for each item must include material, tax, installation, overhead and profit, bond and insurance costs. This form should be filled out as each item is installed or each phase of work is completed.

TOTAL FOR ALL ITEMS INCLUDING CONTRACT MODIFICATION COSTS ADDED TOGETHER SHOULD EQUAL THE TOTAL CONTRACT PRICE.

KEY TO ABBREVIATIONS

AC - Acres
BL - Barrels, Capacity
BTU - British Thermal Unit
CY - Cubic Yards
EA - Each
GA - Gallons, Capacity
HD - Head
kV - Kilovolt-Amperes, Capacity (kVA)
kW - Kilowatts, Capacity
SE - Seats
SF - Square Feet
SY - Square Yard
MB - Million British Thermal Units
MI - Miles
LF - Linear Feet
KG - Thousand Gallons Per Day, Capacity
TN - Ton
- Number; How Many

DD FORM 1354 CHECKLIST
Transfer of Real Property

CONTRACT NUMBER:_____

CONTRACT TITLE:_____

LOCATION:_____

1. **DEMOLITION** (Describe each item removed and the cost of removal.)*

2. **RELOCATION** (Describe each item relocated and the cost of relocation.)*

3. **REPLACEMENTS** (Describe each item replaced and replacement cost.)*

*Use a continuation sheet if more space is required. Items should be described by quantity and the correct unit of measure.

4. **NEW CONSTRUCTION OVERVIEW: BUILDING(S)/ADDITION(S) TO A BUILDING** - Use a separate checklist for each building and/or addition.

(1) **Outside Dimensions: Length x Width**

(a) Main Building_____
(b) Offsets_____
(c) Wings_____
(d) Basement_____
(e) Attic_____

(2) **Number of Usable Floors**: _____

(3) **Construction: Exterior Materials Used**

(a) Foundation (such as concrete)_____
(b) Floors (such as wood, concrete)_____
(c) Walls (such as wood siding, metal, CMU)_____
(d) Roof (such as metal, comp., built-up)_____

(4) **Utilities ENTERING Building**: Measure lineal meters (LF) from building entry to next larger size of pipe

(a) Water (size & type of pipe; number of lineal meters (LF)_____
(b) Gas (size & type of pipe; number of lineal meters (LF)_____
(c) Sewer (size & type of pipe; number of lineal meters (LF)_____
(d) Electric (phase, voltage, size & type of wire, connected load in amps_____

(5) **Air Conditioning**:

(a) Type_____
(b) Capacity Kilograms (TONS)_____
(c) SQ METERS (SQ YDS) covered by system_____

(6) **Heating**:

(a) Source_____
(b) Fuel_____

(7) **Hot Water Facilities**:

(a) Capacity Liters (GAL)_____
(b) Temperature Rise_____

BUILDING COST:_____

5. **BUILDING SYSTEMS (INTERIOR)**

A. **FIRE PROTECTION**:
Property Code
(1) (880 50/880-211) CLOSED HEAD AUTO SPRINKLERS - Square Meters (SF) & HD (wet or dry pipe; # of Lineal Meters (LF) of service pipe; type of pipe & # of heads; # of Square Meters (SF) covered by system)
DESCRIPTION:
_____
_____
_____
COST: _____

(2) (880 50/880-212) OPEN HEAD DELUGE SYSTEM - Square Meters (SF) & HD (# of Lineal Meters (LF) of service pipe; type of pipe; # of heads; # of Square Meters (SF) covered)
DESCRIPTION:
_____
_____
_____
COST: _____

(3) (880 10/880-221) AUTO FIRE DETECTION SYSTEM - Square Meters (SF) & EA (# of alarms-horns, bells, etc.; # of smoke detectors; # of heat detectors; # of fire alarm panels; # of radio transmitters/antennae)
DESCRIPTION:
_____
_____
_____
COST: _____

(4) (880 20/880-222) MANUAL FIRE ALARM SYSTEM - EA (# of pull stations; # of alarm horns; # of fire extinguisher cabinets)
DESCRIPTION:
_____
_____
_____
COST: _____

(5) (880 60/880-231) CO2 FIRE SYSTEM (# of bottles & size of bottles in kilograms (lbs.))
DESCRIPTION:

_____
_____
_____
COST: _____

(6) (880 60/880-232) FOAM FIRE SYSTEM - EA (# of tanks - capacity in kilograms (lbs.))
DESCRIPTION:

_____
_____
_____
COST: _____

(7) (880 60/880-233) OTHER FIRE SYSTEM - EA
DESCRIPTION:

_____
_____
_____
COST: _____

(8) (880 60/880-234) HALON 1301 FIRE SYSTEM - EA (# of bottles & size of bottles in kilograms (lbs.))
DESCRIPTION:

_____
_____
_____
COST: _____

B. **SECURITY**:

(1) (880 40/872-841) SECURITY ALARM SYSTEM - EA (name of system installed)
DESCRIPTION:

_____
_____
_____
COST: _____

C. **HEATING/COOLING SYSTEMS**

(1) (826 10/890-126) A/C WINDOW UNITS - kilograms (TN) & Square Meters (SF)-(# of units installed; amount of Square Meters (SF) covered per unit; size & capacity of each unit)
DESCRIPTION:

_____
_____
_____
COST: _____

(2) (826 14/890-125) A/C PLT LESS THAN 4,536 kilograms (5 TN) - kilograms (TN) & square meters (SF)-(# of kilograms (TN); # of square meters (SF) covered)
DESCRIPTION:
_____
_____
COST: _____

(3) (826 13/890-121) A/C PLT 4,536 to 22,680 kilograms (5 TO 25 TN) - kilograms (TN)-(# of kilograms (TN); # of square meters (SF) covered)
DESCRIPTION:
_____
_____
_____
COST: _____

(4) (826 12/826-122) A/C PLT 22,680 to 2,267,962 kilograms (25 TO 100 TN) - kilograms (TN)-(# of kilograms (TN); # of square meters (SF) covered)
DESCRIPTION:
_____
_____
_____
COST: _____

(5) (826 11/826-123) A/C PLT OVER 2,267,962 kilograms (100 TN) - kilograms (TN)-(# of kilograms (TN); # of square meters (SF) covered)
DESCRIPTION:
_____
_____
_____
COST: _____

(6) (821 33/821-115) HEATING PLT 220/1026 W (750/3500 MB) - W (MB)-(# of kW (MBH); type of heating system - Ex: Warm air furnace, central)
DESCRIPTION:
_____
_____
_____
COST: _____

(7) (821 32/821-116) HEATING PLT OVER 1026 W (3500 MB) - W(MB)-(# of kW (MBH); type of heating system)
DESCRIPTION:
_____
_____
COST: _____

(8) (811 60/811-147) ELEC EMERGENCY POWER GENERATOR-KW-(size of engine; rating of generator in kilowatts & voltage)
DESCRIPTION:

_____
_____
_____
COST: _____

(9) (81190 or 82320-gas) STORAGE TANK FOR HEATING or GENERATOR FUEL-Liters (GA); TYPE; FUEL-(Size, type of tank, kind of fuel & # of liters (gallons))
DESCRIPTION:

_____
_____
_____
COST: _____

(10) (89220/890-272) EMCS – EA (Direct Digital Control Sys)

_____
_____
_____
COST: _____

SITE WORK

6. **UTILITIES/SURFACE CONSTRUCTION**:

(1) (812 41/812-223) PRIM DISTR LINE OH-Lineal Meters (LF)-(# Lineal Meters (LF) of wire; size & type of wire; # of poles; voltage)
DESCRIPTION:

_____
_____
_____
COST: _____

(2) (812/81360) TRANSFORMERS-KVA
POWER POLES-Lineal Meters (LF)
(# poles; # transformers - pad or pole mounted; kVA of wire; # Lineal Meters (LF) of wire)
DESCRIPTION:

_____
_____
_____
COST: _____

(3) (812 40/812-224) SEC DISTR LINE OH-Lineal Meters (LF)-(voltage; size & type of wire; # transformers; kVA; # Lineal Meters (LF) of wire; # of service drops; # poles)
DESCRIPTION:

_____
_____
_____
COST: _____

(4) (812 42/812-225) PRIM DISTR LINE UG-Lineal Meters (LF)-(kVA; voltage; type of conduit & size(encased or direct burial); size & kind of wire inside conduit; Lineal Meters (LF) of wire & conduit)
DESCRIPTION:

_____
_____
_____
COST: _____

(5) (812 42/812-226) SEC DISTR LINE UG-Lineal Meters (LF)-(type of conduit & size; type & size of wires in conduit; Lineal Meters (LF) of conduit & wire inside conduit; voltage)
DESCRIPTION:

_____
_____
_____
COST: _____

(6) (812 30/812-926) EXTERIOR LIGHTING-EA-(streets or parking area lights) (# & type of lights; whether pole mounted or not; # Lineal Meters (LF) of connecting wire if pole mounted)
DESCRIPTION:

_____
_____
_____
COST: _____

(7) (824 10/824-464) GAS MAINS-Lineal Meters (LF) (size, type, & # of Lineal Meters (LF) of pipe)
DESCRIPTION:

_____
_____
_____
COST: _____

(8) (831 90/831-169) SEWAGE SEPTIC TANK-thousand liters (KG)-(size, kind of material, & capacity)
DESCRIPTION:

_____
_____
_____
COST: _____

(9) (832 10/832-266) SANITARY SEWER-Lineal Meters (LF)-(sizes & types of pipes - # of Lineal Meters (LF) of each; # of cleanouts; # & size of manholes)
DESCRIPTION:

_____
_____
_____
COST: _____

(10) (842 10/842-245) WATER DISTR MAINS (POTABLE)-Lineal Meters (LF)-(# Lineal Meters (LF) & size, type of pipe)
DESCRIPTION:
_____
_____
_____
COST: _____

(11) (843 11/843-315) FIRE HYDRANTS-EA-(#; size & type)
DESCRIPTION:
_____
_____
_____
COST: _____

(12) (851 90/851-143) CURBS & GUTTERS-Lineal Meters (LF)-(# Lineal Meters (LF); material; width & height)
DESCRIPTION: (Is curb extruded or standard?)_
_____
_____
_____
COST: _____

(13) (851 90/851-145) DRIVEWAY-Square Meters (SY)-Square Meters (SY); material used; thickness)
DESCRIPTION:
_____
_____
_____
COST: _____

(14) (851 10/12/851-147) ROAD-Square Meters (SY) & Lineal Meters (LF)-Square Meters (SY); material used; thickness; Lineal Meters (LF))
DESCRIPTION:
_____
_____
_____
COST: _____

(15) (85210/11 /852-262) VEHICLE PARKING-Square Meters (SY)-Square Meters (SY); material used; thickness; # of bollards; # of wheel stops; # of regular parking spaces; # of handicap spaces)
DESCRIPTION:
_____
_____
_____
COST: _____

(16) (852 20/852-289) SIDEWALKS-Square Meters (SY) & Lineal Meters (LF)-(# Square Meters (SF) & Lineal Meters (LF); dimensions of each section & location; thickness; material used)
DESCRIPTION:

_____
_____
_____
COST: _____

(17) (871 10/871-183) STORM DRAIN DISPOSAL-Lineal Meters (LF)-(# Lineal Meters (LF) of pipe; sizes & types of pipe; # of catch basins & manholes & sizes of each)
DESCRIPTION:

_____
_____
_____
COST: _____

(18) (872 15/872-247) FENCE, SECURITY (ARMS)-Lineal Meters (LF)-(# of Lineal Meters (LF); fence material; # & type of gate(s); # strands of barbed wire on top)
DESCRIPTION:

_____
_____
_____
COST: _____

(19) (87210/12/872-248) FENCE, INTERIOR-Lineal Meters (LF)-(# of Lineal Meters (LF); fence material; # & kind of gate(s)
DESCRIPTION:

_____
_____
_____
COST: _____

(20) (890 70/890-187) UTILITY VAULT(4 or more transformers)- Square Meters (SF) (# Square Meters (SF); dimensions of vault; # of transformers)
DESCRIPTION:

_____
_____
_____
COST: _____

(21) (135 10/135-583) TEL DUCT FACILITY-Lineal Meters (LF)-(# of Lineal Meters (LF); size & type of conduit; type of wire)
DESCRIPTION:

_____
_____
_____
COST: _____

(22) (135 10/135-586) TEL POLE FACILITY-Lineal Meters (LF)-(# Lineal Meters (LF) & type of wire; # of poles)
DESCRIPTION:
_____
_____
_____
COST: _____

7. **INSTALLED EQUIPMENT**: Furnish an Equipment-In-Place List. Any price related to equipment should already be included in this checklist.

8. **SYSTEMS NOT PREVIOUSLY LISTED**: Attach a separate sheet and use the same format to describe the system(s). Example: CATV system, intercom system, or other utilities and surface construction not described on this checklist.

9. **ASBESTOS REMOVAL**: Furnish a description by building of the number of Lineal Meters (LF) of asbestos removed, number of Lineal Meters (LF) of reinsulation, number of Square Meters (SF) of soil encapsulation, and number and size of tanks, etc., where asbestos was removed. Also, identify buildings by their numbers and use.

10. **MAINTENANCE/RENOVATIONS**: List by building number and describe all additions and deletions by quantity and the correct unit of measure. Furnish a cost per building.

UTILITIES/SURFACE CONSTRUCTION - Listed below are some additional items which may or may not apply to your contract. EACH item installed on site should be listed and priced separately even if not included on this checklist.

(1) IRRIGATION SYSTEM(-Lineal Meters (LF) of pipe; size & type of pipe; number and type of heads)
(2) UNDERGROUND/ABOVEGROUND STORAGE TANKS(-Liters (GA), type of tank; material stored)
(3) (833-354) DUMPSTER ENCLOSURE(-Square Meters (SF) & dimensions)
(4) (890-152) UNLOADING PAD(-Square Meters (SY); material)
(5) SIGNAGE-(Dimensions; material)
(6) (12580) CATHODIC PROTECTION(kilometers; Lineal Feet) (MI; LF)
(7) (87270 LIGHTNING PROTECTION-Lineal Feet (LF)
(8) (81290) POLE DUCT RISER(-Lineal Feet (LF, type of material)
(9) RAMPS-Square Meters (SF), material; Cubic Meters (CY) if concrete-use code for sidewalk if concrete)
(10) (89080/890-158) LOAD AND UNLOAD PLATFORM-Square Meters (SF)
(11) (83240/832-255) INDUSTRIAL WASTE MAIN-Lineal Meters (LF)
(12) WHEEL STOPS-(EA; size & material)
(13) (81350) OUTDOOR INTEGRAL DISTR CTR-(kVA)
(14) (45110) OUTDOOR STORAGE AREA-Square Meters (SF)
(15) (73055/730-275) BUS/WAIT SHELTER-Square Meters (SF)
(16) (690-432) FLAGPOLE-(EA; dimensions)
(17) (93210) SITE IMPROVEMENT-(JOB)
(18) (93220) LANDSCAPE PLANTING (Hectare (Acre); EA; Square Meters (SF))
(19) (93230) LANDSCAPE BERMS/MOUNDS-Square Meters (SY)
(20) (93410) CUT AND FILL-Cubic Meters (CY)
(21) (843-315) FIRE HYDRANTS-(EA; Type)
(22) (14970) LOADING AND UNLOADING DOCKS AND RAMPS (not connected to a building)-Square Meters (SF) (23) BICYCLE RACK-(EA)
(24) (85140/812-928) TRAFFIC SIGNALS-(EA)
(25) (87210) FENCING OR WALLS-Lineal Meters (LF)
(26) (15432) RIPRAP-Lineal Meters & Square Meters (LF & SY)
(27) (75061) GRANDSTAND OR BLEACHERS-(EA; SE)
(28) 87150/871-187) RETAINING WALLS-Lineal Meters; Square Meters (LF; SY); material

NOTE: 5 Digit Codes-Army; 6 Digit Codes-Air Force

END OF SECTION

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SECTION 01705

EQUIPMENT-IN-PLACE LIST

PART 1 GENERAL

1.1 SUBMITTALS

Data listed in PART 3 of this section shall be submitted in accordance with section 01330 SUBMITTAL PROCEDURES. Due dates shall be as indicated in applicable paragraphs and all submittals shall be completed before final payment will be made.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PREPARATION AND SUBMITTAL

The final equipment-in-place list shall be completed and returned to the Contracting Officer within 30 calendar days of the final inspection. The Contracting Officer will review all final Equipment-In-Place Lists for accuracy and conformance to the requirements contained in DIVISION 1 GENERAL REQUIREMENTS. The lists shall be returned to the Contractor if corrections are necessary. The Contractor shall make all corrections and shall return the lists to the Contracting Officer within 7 calendar days of receipt.

3.2 EQUIPMENT-IN-PLACE LIST

Contractor shall submit for approval, at the completion of construction, a list of equipment-in-place. This list shall be updated and kept current throughout construction, and shall be jointly inspected for accuracy and completeness by the Contracting Officer's representative and a responsible representative of the Contractor prior to submission of each monthly pay estimate. A sample form showing minimum data required is provided at the end of this section. The EQUIPMENT-IN-PLACE LIST shall be comprised of all equipment falling under one or more of the following classifications:

a. Each piece of equipment listed on the mechanical equipment schedules.

b. Each electrical panel, switchboard, and MCC panel.

c. Each transformer.

d. Each piece of equipment or furniture designed to be movable.

e. Each piece of equipment that contains a manufacturer's serial number on the name plate.

f. All Government furnished, Contractor installed equipment per a. through e. (price data excluded)

EQUIPMENT-IN-PLACE LIST

CONTRACT NO.: _____

Specification Section: _____ Paragraph No. _____

ITEM DESCRIPTION: _____

Item Name: _____

Serial Number: _____

Model Number: _____

Capacity: _____Replacement Cost _____

ITEM LOCATION:

Building Number: _____ Room Number: _____

or Column Location: _____

MANUFACTURER INFORMATION:

Manufacturer Name: _____

Trade Name (if different from item name): _____

Manufacturer's Address: _____

_____

Telephone Number: _____

WARRANTY PERIOD: _____

CHECKED BY: _____

END OF SECTION

DIVISION 2 - SITE WORK

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building.
2. Demolition and removal of selected site elements.
3. Patching and repairs.

1.2 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Contracting Officer's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the Government’s property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Government’s designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Contracting Officer, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.3 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Government’s property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for information only, unless otherwise indicated.

C. Schedule of selective demolition activities indicating the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of stairs.
5. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Government's on-site operations.
6. Locations of temporary partitions and means of egress.

D. Inventory of items to be removed and salvaged.

E. Inventory of items to be removed by Government.

F. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

G. Prepare As-built Contract Drawings as specified in Division 1 General Requirements.

H. Landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Asbestos: See report at the end of this Section.

B. Storage or sale of removed items or materials on-site will not be permitted.

1.7 SCHEDULING

A. Arrange selective demolition schedule so as not to interfere with Government's on-site operations.

1.8 WARRANTY

A. Existing Special Warranty: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled.

D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Contracting Officer.

E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Government and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Government and to governing authorities.

a. Provide not less than 72 hours' notice to Government if shutdown of service is required during changeover.

B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.

1. Government will arrange to shut off indicated utilities when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.
5. Utility Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.2 PREPARATION

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Employ a certified, licensed, exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.
5. Protect walls, ceiling, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
6. Cover and protect furniture, furnishings, and equipment that have not been removed.

D. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.3 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not use water when it may damage exiting construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.4 SELECTIVE DEMOLITION

A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
10. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

C. Break up and remove concrete slabs on grade, unless otherwise shown to remain.

D. Remove resilient floor coverings and adhesive according to recommendations of the Resilient Floor Covering Institute's (RFCI) "Recommended Work Practices for the Removal of Resilient Floor Coverings" and Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

E. Remove no more existing roofing than can be covered in one day by new roofing. See applicable Division 7 Section for new roofing requirements.

F. Remove air-conditioning equipment without releasing refrigerants.

3.5 PATCHING AND REPAIRS

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.

C. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

D. Patch and repair floor and wall surfaces in the new space where demolished walls or partitions extend one finished area into another. Provide a flush and even surface of uniform color and appearance.

1. Closely match texture and finish of existing adjacent surface.
2. Patch with durable seams that area as invisible as possible. Comply With specified tolerances.
3. Where patching smooth painted surfaces, extend final paint coat over entire unbroken surface containing the patch after the surface has received primer and second coat.
4. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
5. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Government's property and legally dispose of them.

3.7 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. See Construction Documents for removal.

3.9 HAZARDOUS MATERIALS

A. See Asbestos and Lead-Based Paint Survey and Drawings.

Attachment follows

Letter Report - Asbestos and Lead-Based Paint Survey

END OF SECTION 02070

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100 N. 27th Street, Suite 550
Billings, Montana 59101
E-mail: NIHINC@ AOL.com

May21, 2002

Mr. Mike Radke
CTA Architects Engineers
1500 Poly Drive, Suite 201
PO Box 1439
Billings, Montana 59103

RE: Letter Report
Asbestos, Lead-Based Paint, and PCB Ballast Inspection
Building 737 - Dormitory
Malmstrom Air Force Base, Montana
Northern Project Number 120-064

Dear Mr. Radke:

This letter report provides the summarized results of the asbestos, lead-based paint, and PCB ballast/fluorescent tube inspection performed by Mark Oliver (MTA-1792) of Northern Industrial Hygiene, Inc. (Northern) on April 29 and April 30, 2002. The inspection was performed to identify potential hazardous materials that may be impacted during a planned renovation in Building Number 737. The interior and exterior of the building were included in the physical inspection. The roof was not to be part of the inspection, however Northern reviewed available information in the original 1974 "as-built" drawings as well as physically inspecting the roof. Based upon information obtained in this manner, Northern assumes the roofing to be an asbestos-containing material.

Building Overview

Building 737 is located at 110 74th Street at Malmstrom Air Force Base near Great Falls, Montana. It is used to house military personnel currently stationed at the base. Original construction began in 1974. It is a three-story slab on grade structure with built-up roofing materials on a flat metal deck. Each story has approximately 8,000 square feet of area plus a first floor mechanical room of approximately 1,175 square feet for a building total of approximately 25,175 square feet. In 1980 the interior was repainted. In 1981 a flooring update occurred that involved replacing carpeting in some areas and carpeting over much of the 12" by 12" floor tile.

In 1983 a renovation took place to replace the domestic piping through-out the building due to a problem with electrolysis. Approximately six years ago another renovation occurred which once again involved replacing worn carpeting. At this time texture was applied to most of the gypsum board and CMU interior walls before repainting occurred. Visual inspection by Northern determined that during one of these renovations the floor tile was removed from the common areas and replaced with carpeting. The black tile mastic is still in place under that carpet. This black mastic was sampled and included with the 12" x 12" floor tile sample.

Interior floor finishes inspected consist of concrete, rubber, ceramic tile, 12"x12" tile or carpet. The stair treads have metal covers with black non-slip inserts and three inches of vinyl sheet flooring on the riser side of the treads. Wall finishes consist of concrete, concrete masonry unit (CMU), ceramic tile, gypsum board and vinyl

wall covering. Interior ceiling finishes include concrete, metal decking, gypsum board and 1'x1' glue-on ceiling tiles. Various colors of 4" vinyl covebase, with brown or white adhesives, finish the lower walls.

Interior painted building components identified and tested for the presence of lead-based paint consist of gypsum board, concrete and CMU walls, gypsum board ceilings, metal doors, metal door frames, metal stair components, metal balcony rails and metal cabinet heaters.

Exterior painted building components identified and tested for the presence of lead-based paint consist of stucco siding, metal doors, metal doorframes and metal pipes.

All dormitory rooms and restrooms have incandescent light fixtures. The mechanical room, stairwells, corridors, laundry rooms, storage rooms and common areas have fluorescent light fixtures.

The building incorporates two heating systems, both of which use hot water supplied via underground piping from the central heating plant. This hot water enters the first floor mechanical room through one feed line and it branches to the separate system components. For the primary heating system the hot water is routed to a heat exchanger, which in turn feeds fin tube cabinet heaters located on perimeter walls. These pipes are routed in along the first floor perimeter walls, in most cases within a gypsum board build out. Next to the windows, vertical chases run up to the second and third floors. No fitting insulation was observed where piping was visible (which was only at the heater units). The secondary heating system is forced air heat. Hot water is routed to an air handler located in the first floor mechanical room. From here heated air is routed through metal ducts to registers located in the drop ceiling. No reheat coils are employed in this system. No air conditioning is present in the building. All observable straight run pipe insulation was fiberglass. Mudded fittings (elbows and pipe valve end caps) were observed in the mechanical room only. Previous testing indicates that this fittings insulation contains asbestos. Domestic water pipes are routed above the drop ceilings. In 1983 the entire domestic system was replaced with new piping. All piping observed through ceiling access panels was either un-insulated or insulated with fiberglass.

A roof hatch is located in a third floor closet. A metal ladder mounted on the wall of the closet accesses this hatch. Northern visually inspected the roof and confirmed that it is finished with build-up asphalt materials. To ensure its structural integrity, Northern did not sample the roofing material, rather is has been assumed to contain asbestos.

Inspection Findings

Asbestos

A total of 21 (19 interior and two exterior) building materials suspected to contain asbestos were identified in the building inspected. Two materials, the original built-up roof and the Transite® (cement asbestos board) soffits, were assumed to be asbestos-containing. Upon further examination four materials, fiberglass straight pipe insulation, fiberglass with plastic cover pipefittings and two different cove bases with white glue, were classified not suspect for the presence of asbestos. Bulk samples of the remaining 13 materials were collected following sample collection requirements outlined under the AHERA legislation. Of the 13 sampled materials, all were non-detect for the presence of asbestos. A summary of the identified suspect materials is presented in Table 1. Table 2 is a summary of confirmed or assumed asbestos-containing materials. Table 3 presents a summary of the laboratory analysis results for bulk samples collected. Table 4 presents the triangulated

locations of the bulk samples taken. Figure 1 depicts locations where samples were collected and Figure 2 depicts locations of confirmed or assumed asbestos-containing materials.

Lead-Based Paint

Northern identified and tested seven painted interior components and four painted exterior components. Identified and tested interior painted building components consisted of gypsum board or CMU walls, gypsum board ceilings, metal doors, metal doorframes, metal stair framing, metal balcony railings and metal cabinet heaters.

Identified and tested exterior painted building components consisted of stucco siding, metal doors, metal doorframes and metal pipes.

Lead at levels above 1 mg/cm^2 was not detected in any of the painted interior or exterior building components.

Table 6 presents a summary of all components identified and tested for the presence of lead-based paint while Table 7 presents a summary of the individual XRF instrument readings

PCB Ballasts and Fluorescent Tubes

Northern identified eight types of fluorescent light fixtures in Building 737. PCB containing ballasts were identified during the physical inspection five of the fixture types. Table 8 presents a summary of the ballast and fluorescent tube inspection while Table 8B presents the total number of fixtures, PCB ballasts and fluorescent tubes present in the building.

Recommendations

Asbestos

Asbestos is present is a limited number of insulated fittings located in the mechanical room. The front and rear roof soffits are Transite (Transite (cement asbestos board)).

If renovation activities will impact these materials, Northern recommends that a certified asbestos abatement contractor abate them. If renovation activities will disturb the assumed asbestos-containing roofing materials, Northern recommends that bulk samples be collected and analyzed prior to commencement of work.

Lead-Based Paint

No lead-based paint in concentrations above 1 mg/cm^2 was detected on the interior or the exterior of the building, therefore, no recommendations are offered.

PCB Ballasts and Fluorescent Tubes

The PCB-containing ballasts should be handled and disposed of as hazardous waste during the renovation project. The fluorescent light tubes should be reused or recycled if they are removed or replaced during the renovation project.

A hazardous material budgetary abatement cost estimate is included in Table 5. This estimate assumes the removal of all confirmed and assumed asbestos-containing materials and all PCB-containing ballasts and fluorescent light tubes. We realize that not all materials may be impacted by the planned renovation. A precise, project specific abatement estimate can be prepared after a thorough review of all renovation documents as they relate to the locations of and the projected impact on known hazardous materials. At that time Northern would also recommend the sampling and testing of the roofing materials, if impact was likely.

We trust this summary report provides sufficient information for planning purposes. We appreciate the opportunity to assist you and look forward to continuing to work with you.
If you have any questions or require additional information, please contact us.

Very truly yours,

NORTHERN INDUSTRIAL HYGIENE, INC.

Kevin Oliver, P.E.

Attachments: Tables 1 through 8
Figure Sets 1 and 2
Laboratory Analysis Results
Inspector Credentials

TABLE 1
SUMMARY OF MATERIALS SUSPECTED TO CONTAIN ASBESTOS
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

Material Number	Material Description
F1.1	Brown and tan mosaic pattern linoleum
F2.1	White/beige vinyl floor tile with black mastic
M12.1	Covebase - 4" tan vinyl with brown mastic
M12.2	Covebase - 4" blue with white mastic, non-suspect
M12.3	Covebase - 5" brown brindled with white mastic, non-suspect
M1.1	Flat built-up roofing material, assumed to be positive
M2.1	Exterior stucco
M3.1	Gypsum wallboard system
M3.2	Gypsum wallboard system (greenboard)
M4.1	Cement asbestos board soffitts, assumed positive
M6.1	12" x 12" Glued-on ceiling tile, orange peel
M6.2	12" x 12" Glude-on ceiling tile, pinhole and fissures
M6.3	12" x 12" Glued-on ceiling tile, large orange peel
S1.1	Wall texture
T2.1	Heating system mudded fittings, positive from earlier testing
T2.2	Heating system mudded endcaps, positive from earlier testing
T2.3	Fiberglass domestic and heating fittings, non-suspect
T3.3	Fiberglass domestic and heating strraight run pipe insultation, non-suspect
T4.1	Furnace expansion joint cloth
T5.1	Tank insulation
T9.1	Patching around pipe going into wall and debris on floor

TABLE 2
SUMMARY OF CONFIRMED ASBESTOS-CONTAINING MATERIALS
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

Material Number	Description	NESHAP Category	Recommended Response Action
M1.1	Flat built-up roofing materials, assumed to be positive	I	Remove if renovation work will disturb
M4.1	Cement asbestos board soffitts, assumed to be positive	II	Remove if renovation work will disturb
T2.1	Heating system mudded fittings	RACM	Remove if renovation work will disturb
T2.2	Heating system pipe endcaps	RACM	Remove if renovation work will disturb

Category I	Nonfriable ACM such as packings, gaskets, resilient floor covering, and asphalt roofing products.
Category II	All nonfriable ACM, excluding Category I materials.
RACM	Friable ACM; Category I material that has become friable; Category I material that will be subjected to sanding, grinding, cutting, or abrading; or Category II, material that has a high probability of becoming friable.

TABLE 3
BULK ASBESTOS SAMPLE ANALYSIS RESULTS
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

Sample Number		Material Description	Lab Results
F1.1	A	Brown and tan mosaic pattern linoleum	ND/ND/ND
F2.1	A	White/beige vinyl floor tile with black mastic	ND/ND/ND
M12.1	A	Covebase - 4" tan vinyl with brown mastic	ND/ND
M2.1	A	Exterior stucco	ND
M2.1	B	Exterior stucco	ND
M2.1	C	Exterior stucco	ND
M3.1	A	Gypsum wallboard system	<1% Chrysotile/ND
M3.2	A	Gypsum wallboard system	<1% Chrysotile/ND
M6.1	A	12" x 12" Glued-on ceiling tile, orange peel	ND
M6.1	B	12" x 12" Glued-on ceiling tile, orange peel	ND
M6.1	C	12" x 12" Glued-on ceiling tile, orange peel	ND
M6.2	A	12" x 12" Glude-on ceiling tile, pinhole and fissures	ND
M6.2	B	12" x 12" Glude-on ceiling tile, pinhole and fissures	ND
M6.2	C	12" x 12" Glude-on ceiling tile, pinhole and fissures	ND
M6.3	A	12" x 12" Glued-on ceiling tile, large orange peel	ND
M6.3	B	12" x 12" Glued-on ceiling tile, large orange peel	ND
M6.3	C	12" x 12" Glued-on ceiling tile, large orange peel	ND
S1.1	A	Wall texture	ND
S1.1	B	Wall texture	ND
S1.1	C	Wall texture	ND
T5.1	A	Tank insulation	ND
T5.1	B	Tank insulation	ND
T5.1	C	Tank insulation	ND
T4.1	A	Furnace expansion joint cloth	ND
T9.1	A	Patching around pipe going into wall and debris on floor	ND

Chrys = Chrysotile Asbestos
Amosite = Amosite Asbestos
NA = Sample Not Analyzed

NS = Material Not Sampled
ND = No Asbestos Detected

TABLE 4
BULK SAMPLE LOCATIONS
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

Sample Number		Room Number	Location of Sample
F1.1	A	Stairs	In main entry go up two stairs, back of stair, south corner
F2.1	A	108	From west edge of door casing, 8" east, on floor
M12.1	A	116	In southeast corner, 3" up wall on wall
M2.1	A	Exterior	On east walkway wall 3' north of building, 3' up wall on wall
M2.1	B	Exterior	From northeast edge of stairwell wall, 4' south, 3' up wall on wall
M2.1	C	Exterior	From west edge of door casing, 3' 6" west, the 2' up wall
M3.1	A	114	From east edge of door casing, 6" east, 4' up wall on wall
M3.2	A	101	From east edge of door casing, 15' west, 4" up wall on wall
M6.1	A	115	From south east corner, 6" north, at wall, on ceiling
M6.1	B	210	From southeast corner, 6' north along wall, 2' west, at wall, on ceiling
M6.1	C	302	From northwest corner, 11' 15" south along wall, at wall, on ceiling
M6.2	A	107	From northwest corner, 4' south along wall, 2' east, on ceiling
M6.1	B	107	From northwest corner, 5' 3" south along wall, 2' east, on ceiling
M6.2	C	107	Form northwest corner, 6' 6" south along wall, 2' on ceiling
M6.3	A	121	From southeast corner, 7' north along wall, 2' west on ceiling
M6.3	B	121	From southeast corner, 8' north along wall, 2' west, on ceiling
M6.3	C	121	From southeast corner, 6' north along wall, 2' west, at wall, on ceiling
S1.1	A	202	From northwest corner, 4' south along wall, 14" up wall on wall
S1.1	B	102	From northwest corner, 6' south along floor,22" up wall on wall
S1.1	C	103	From east edge of door frame, 6" east, 4' up wall on wall
T5.1	A	101	Form northwest corner, 18' east, 1' 6" up, on tank
T5.1	B	101	From northwest corner, 18' east, 3' up, on tank
T5.1	C	101	From northwest corner, 18' east, 4' up, on tank
T9.1	A	101	From southeast corner, 9' north along wall, 8' up wall, on wall
T4.1	A	101	From southeast corner, 16' north along wall, 12' west, 3' up wall, on wall

TABLE 6
IDENTIFIED MATERIALS and XRF SCREENING RESULTS
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

Material Number	Structure	Substrate	Color (at time of survey)	Screening Result*	Condition
1	Walls and Ceilings	Gypsum	White	Neg	Intact
2	Doors	Metal	Brown	Neg	Intact
3	Door Jambs	Metal	Brown	Neg	Intact
4	Wall	CMU	Yellow/Tan	Neg	Intact
5	Stairwell Framing	Metal	White	Neg	Intact
6	Cabinet Heaters	Metal	White	Neg	Intact
7	Balcony Railings	Metal	Brown	Neg	Intact
8	Stucco Siding	CMU	Yellow	Neg	Intact
9	Hot Water Supply Pipe	Metal	Yellow	Neg	Intact
10	Exterior Doors	Metal	Brown	Neg	Intact
11	Exterior Door Frames	Metal	Brown	Neg	Intact

* Pos = Lead-based paint - equal to or greater than 1.0 mg/cm2 measured using XRF screening

* Neg = Nonlead-based paint - less than 1.0 mg/cm2 measured using XRF screening

TABLE 7
SUMMARY OF XRF INSTRUMENT READINGS
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

XRF Test No.	Homog. Mat'l. Number*	Floor	Room	Structure	Feature	Condition	Substrate	Color	PbL**	PbK**	Combined***
1	N/A	N/A	Shutter Cal 1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA
2	N/A	N/A	Calibrate	N/A	N/A	N/A	N/A	N/A	1.05	0.23	1.05
3	N/A	N/A	Calibrate	N/A	N/A	N/A	N/A	N/A	0.96	0.35	0.96
4	1	Second	Room 202	Wall	N/A	Intact	Drywall	White	0.01	0.17	0.01
5	1	Second	Room 230	Wall	N/A	Intact	Drywall	White	0.02	0.12	-0.51
6	1	Second	Room 230	Ceiling	N/A	Intact	Drywall	White	0	0.08	-0.5
7	2	Second	Room 209	Door	N/A	Intact	Metal	Brown	0.08	0.19	0.08
8	3	Second	Room 209	Door	Jamb	Intact	Metal	Brown	0.05	0.29	0.05
9	4	First	Room 117	Wall	N/A	Intact	Concrete	Tan	0	0.03	0
10	1	First	Room 117	Wall	N/A	Intact	Drywall	Tan	0	0.07	0
11	2	First	Room 117	Door	N/A	Intact	Metal	Brown	0.01	0.29	0.01
12	3	First	Room 117	Door	Jamb	Intact	Metal	Brown	0.01	0.03	0.01
13	1	First	Room 131	Ceiling	N/A	Intact	Drywall	White	0.13	0.26	0.13
14	5	First	Room 117	Stairs	Riser	Intact	Metal	White	0.03	0.34	0.03
15	5	First	Room 117	Stairs	Wall Casing	Intact	Metal	White	0.07	0.38	0.07
16	4	First	Room 115	Wall	N/A	Intact	Concrete	Yellow	0.04	0.17	-0.85
17	1	Third	Room 302	Wall	N/A	Intact	Drywall	White	0.03	0.18	0.03
18	2	Third	Room 303	Door	N/A	Intact	Metal	Brown	0.29	0.56	0.29
19	3	Third	Room 303	Door	Casing	Intact	Metal	Brown	0.04	0.44	0.04
20	4	Third	Room 317	Wall	N/A	Intact	Concrete	Yellow	0.01	0.11	0.01
21	8	Exterior	Room 401	Wall	N/A	Intact	Concrete	Yellow	0.07	0.12	0.07
22	8	Exterior	Room 401	Wall	N/A	Intact	Concrete	Yellow	0.15	0.24	0.15
23	8	Exterior	Room 401	Wall	N/A	Intact	Concrete	Yellow	0.01	0.11	-0.65
24	9	Exterior	Room 401	Pipes	Heating Water	Intact	Metal	Yellow	0.04	0.42	0.04
25	10	Exterior	Room 401	Door	N/A	Intact	Metal	Brown	0.01	0.22	0.01
26	11	Exterior	Room 401	Door	Casing	Intact	Metal	Brown	0.02	0.25	0.02
27	6	Second	Room 202	Heater	Cabinet	Intact	Metal	White	0.02	0.3	0.02
28	7	Second	Room 201	Stairs	Rail Cap	Intact	Metal	Brown	0.01	0.21	0.01
29	N/A	N/A	Calibrate	N/A	N/A	N/A	N/A	N/A	0.92	0.13	0.92
30	N/A	N/A	Calibrate	N/A	N/A	N/A	N/A	N/A	1.22	0.46	1.22

Notes: * Refer to Table 6 for descriptions of identified homogeneous materials/areas

** PbL, PbK, and Combined indicates lead concentration in milligrams per square centimeter.

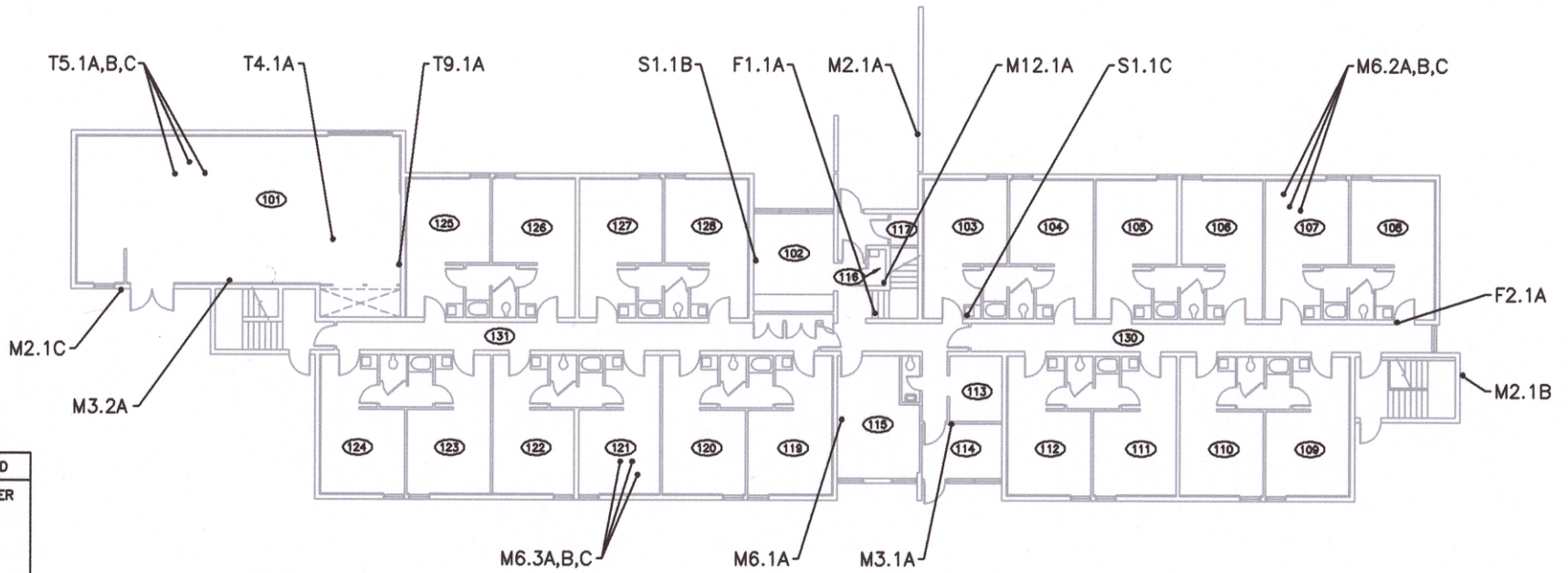
*** Concentrations greater than 1.0 (in bold face) are considered lead-based paint.

TABLE 8
SUMMARY OF FLUORESCENT LIGHT FIXTURES
Dormitory Building Number 737
Malmstrom Air Force Base
Montana

FIXTURE TYPE	FIXTURE DESCRIPTION	PCB'S PRESENT	BALLASTS PER FIXTURE	TUBES PER FIXTURE
01	6" x 2' Recessed metal frame with smoked plastic cover	Yes	1	2
02	2' x 4' Flush mount metal frame with swing down cover	Yes	2	4
03	1' x 4' Flush mount metal frame with swing down cover	Yes	1	2
04	6" x 4' Slimline with decorative light reflector	No	1	2
05	1" x 4' Flush mount with wrap around plastic cover	No	1	1
06	1' x 4' Suspended, open wing	Yes	1	2
07	6" x 4' Side wall mount slimline with frosted lens	No	1	1
08	6" x 4' Side wall mount, frosted wrap around triangle shape	Yes	1	2

TABLE 8A
SYNOPSIS OF FIXTURES AND COMPONENTS

NO. OF FIXTURES	NUMBER OF PCB BALLASTS	NUMBER OF TUBES
82	87	176

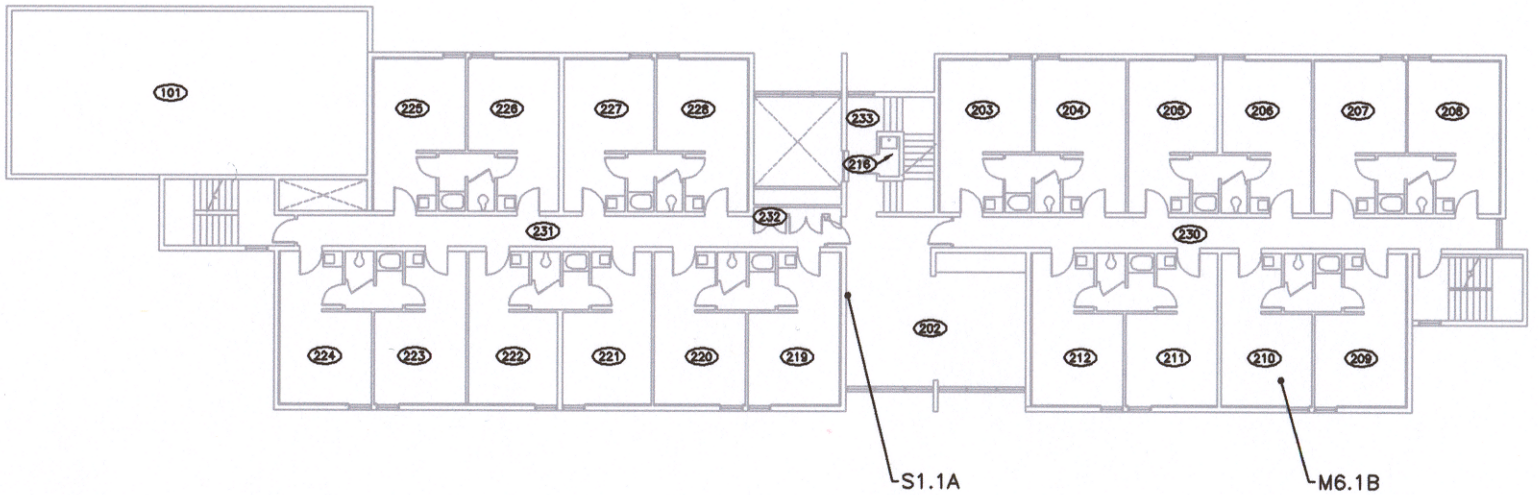


FIRST FLOOR PLAN

N

GRAPHIC LEGEND
(100) ROOM NUMBER
M1.1A — Sample Number, Homogeneous Area Number, Sample Location
FUNCTIONAL AREAS NOT SHOWN
[401] EXTERIOR

NORTHERN INDUSTRIAL HYGIENE, INC.	DATE: 5/21/02 DRAWN BY: MMA CHK BY: MAO CAD FILE: FIRST	PROJECT NAME: ADDRESS: NIH PROJECT NUMBER:	BUILDING 737 MALMSTROM AFB GREAT FALLS, MONTANA 120-064	16 8 0 16 SCALE IN FEET	FIG 1.1 SUSPECT ACBM SAMPLE LOCATIONS



SECOND FLOOR PLAN

N

GRAPHIC LEGEND
(100) ROOM NUMBER
M1.1A — Sample Number, Homogeneous Area Number, Sample Location
FUNCTIONAL AREAS NOT SHOWN
[401] EXTERIOR

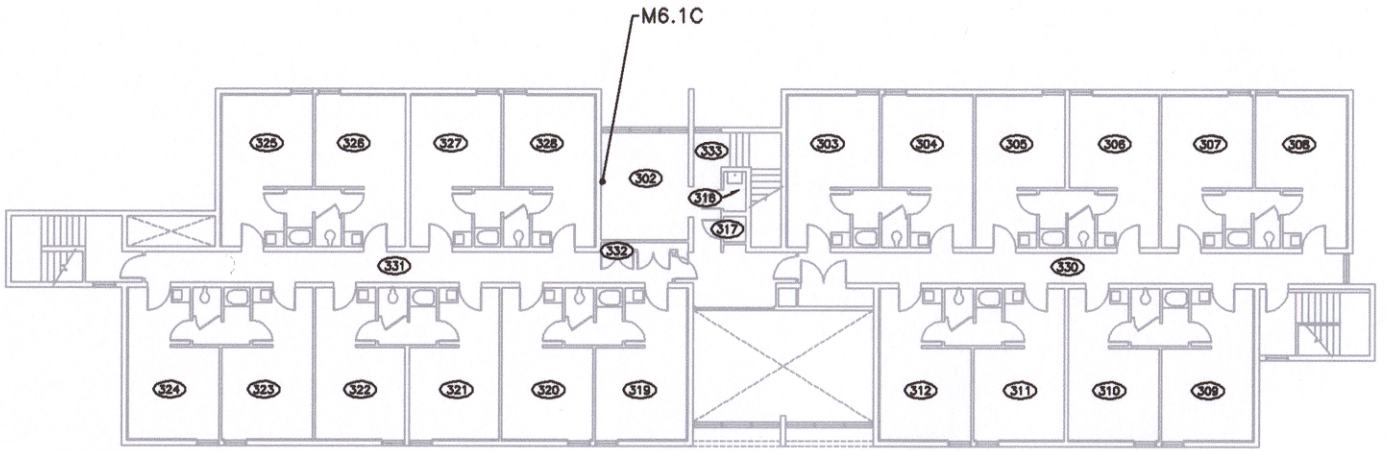
NORTHERN INDUSTRIAL HYGIENE, INC.

DATE: 5/21/02
DRAWN BY: MMA
CHK BY: MAO
CAD FILE: SECOND

PROJECT NAME: BUILDING 737
ADDRESS: MALMSTROM AFB
GREAT FALLS, MONTANA
NIH PROJECT NUMBER: 120-064

16 8 0 16
SCALE IN FEET

FIG 1.2 SUSPECT ACBM SAMPLE LOCATIONS



GRAPHIC LEGEND

(100) ROOM NUMBER

M1.1A
- Sample Number
- Homogeneous Area Number
- Sample Location

FUNCTIONAL AREAS NOT SHOWN

[401] EXTERIOR

[501] ROOF

THIRD FLOOR PLAN

N

NORTHERN INDUSTRIAL HYGIENE, INC.

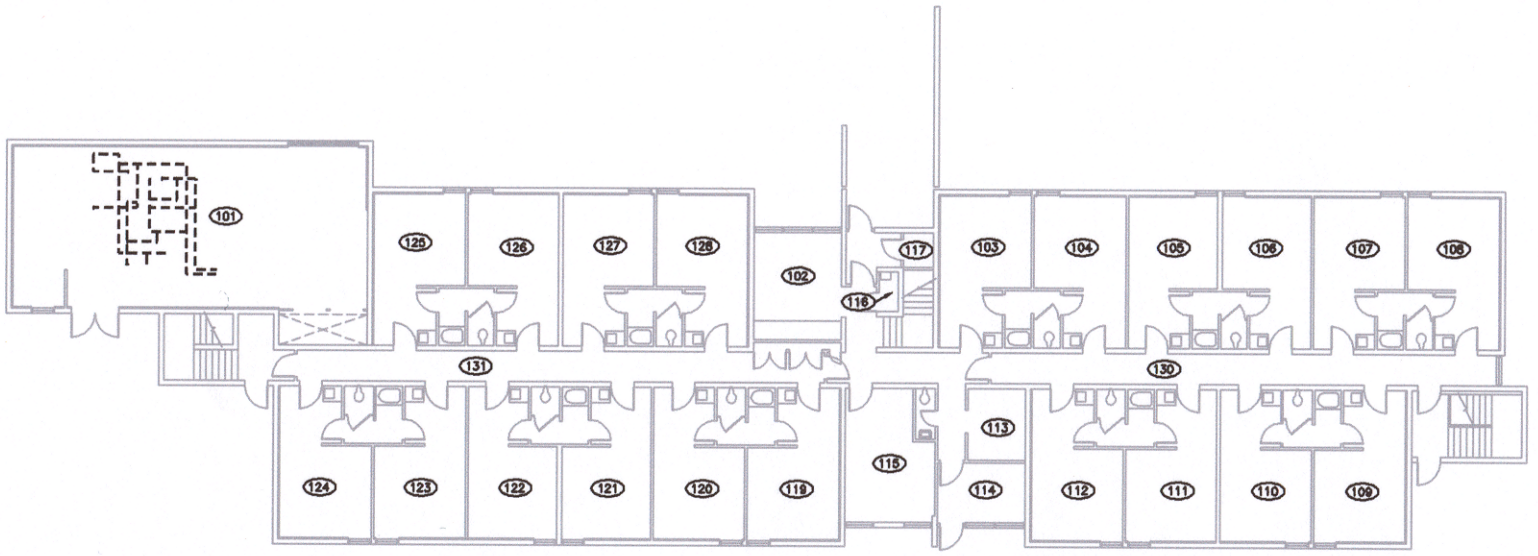
DATE: 5/21/02
DRAWN BY: MMA
CHK BY: MAO
CAD FILE: THIRD

PROJECT NAME: BUILDING 737
ADDRESS: MALMSTROM AFB
GREAT FALLS, MONTANA
NIH PROJECT NUMBER: 120-064

16 8 0 16
SCALE IN FEET

FIG 1.3 SUSPECT ACBM SAMPLE LOCATIONS

CONFIRMED ASBESTOS CONTAINING BUILDING MATERIALS



FIRST FLOOR PLAN

N

GRAPHIC LEGEND
(100) ROOM NUMBER
MUDDED FITTINGS ON FIBERGLASS INSULATED LINES (T2.1)(T2.2)
FUNCTIONAL AREAS NOT SHOWN
[401] EXTERIOR

NORTHERN INDUSTRIAL HYGIENE, INC.

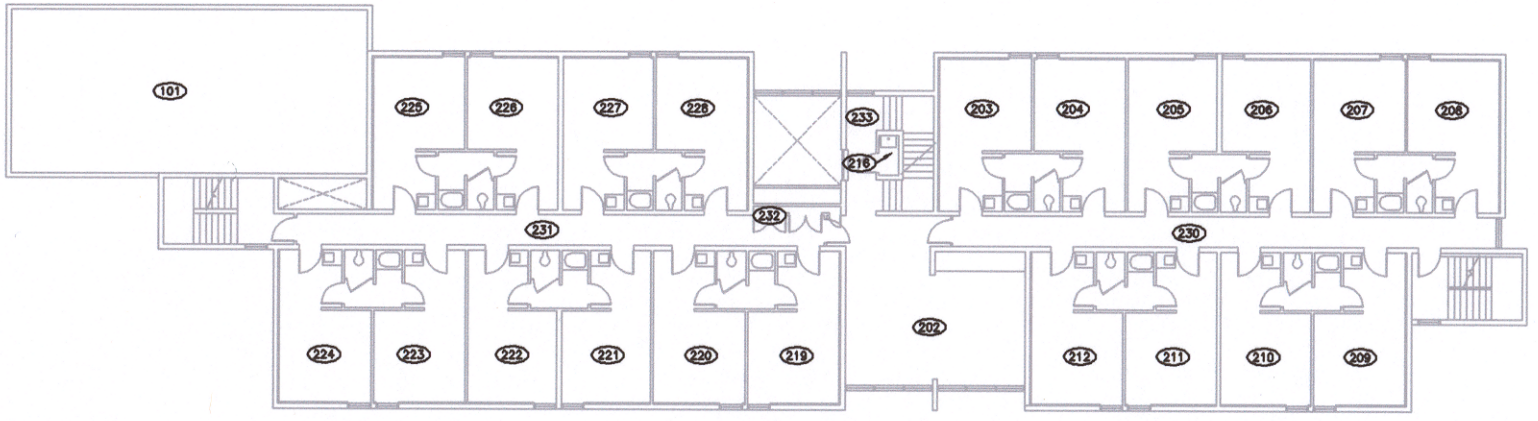
DATE: 5/21/02
DRAWN BY: MMA
CHK BY: MAO
CAD FILE: FIRST

PROJECT NAME: BUILDING 737
ADDRESS: MALMSTROM AFB
GREAT FALLS, MONTANA
NIH PROJECT NUMBER: 120-064

16 8 0 16
SCALE IN FEET

FIG 2.1 HAZARDOUS MATERIAL AREA LOCATIONS

NO CONFIRMED ASBESTOS CONTAINING BUILDING MATERIALS



SECOND FLOOR PLAN

GRAPHIC LEGEND
(100) ROOM NUMBER
FUNCTIONAL AREAS NOT SHOWN
[401] EXTERIOR

NORTHERN INDUSTRIAL HYGIENE, INC.

DATE: 5/21/02
DRAWN BY: MMA
CHK BY: MAO
CAD FILE: SECOND

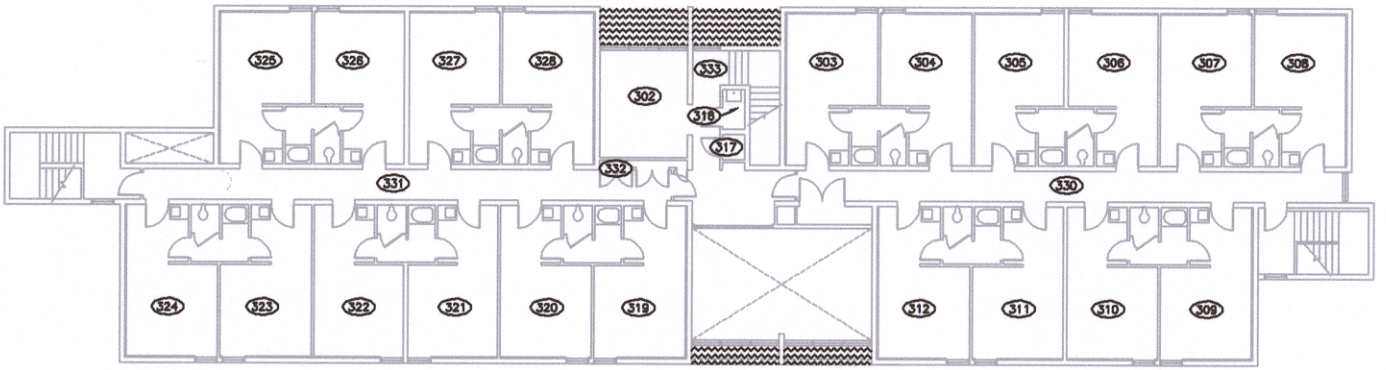
PROJECT NAME: BUILDING 737
ADDRESS: MALMSTROM AFB
GREAT FALLS, MONTANA
NIH PROJECT NUMBER: 120-064

16 8 0 16
SCALE IN FEET

FIG 2.2 HAZARDOUS MATERIAL AREA LOCATIONS

NOTE: FLAT BUILT-UP ROOFING MATERIALS (M1.1) ASSUMED TO BE ASBESTOS CONTAINING.

ASSUMED ASBESTOS CONTAINING BUILDING MATERIALS



THIRD FLOOR PLAN

GRAPHIC LEGEND

(100) ROOM NUMBER

TRANSITE SOFFITS – ASSUMED (M4.1)

FUNCTIONAL AREAS NOT SHOWN

401 EXTERIOR

501 ROOF

NORTHERN INDUSTRIAL HYGIENE, INC.

DATE: 5/21/02
DRAWN BY: MMA
CHK BY: MAO
CAD FILE: THIRD

PROJECT NAME: BUILDING 737
ADDRESS: MALMSTROM AFB
GREAT FALLS, MONTANA
NIH PROJECT NUMBER: 120-064

16 8 0 16
SCALE IN FEET

FIG 2.3 HAZARDOUS MATERIAL AREA LOCATIONS

NORTHERN INDUSTRIAL HYGIENE, INC.

215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

5/10/02

Mark Oliver
Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-

RE: Bulk Asbestos Fiber Analysis; Batch # 02-00317

Dear Mark Oliver,

Thank you for choosing Northern Industrial Hygiene, Inc. as your laboratory. Enclosed you will find test results for the bulk samples submitted to the laboratory. The samples were examined for the presence of identifiable asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with the U.S. EPA Method 600/R-93/166, "Method for determination of asbestos in Bulk Building Materials."

The samples containing more than one separable layer were separated and given an individual result, as required by the National Emission Standard for Hazardous Air Pollutants (NESHAP, 40 CFR – Part 61) protocol that multi-layered samples be analyzed and reported separately. Asbestos concentration in samples is determined by visual estimation and reported by percent on a volume basis.

For samples with asbestos concentrations between 1 and 10 percent based on visual estimation, the EPA recommends a procedure know as point counting. Point counting is a statistically more accurate means of quantification for samples with low concentrations of asbestos. An alternative method also recommended by the EPA is to have the sample analyzed by transmission electron microscopy methods. If you would like us to follow any of the recommendations listed above, please contact us.

This report you receive is highly confidential and will not be released without prior written approval. This report can not be reproduced without written authorization from Northern Industrial Hygiene, Inc. Samples are archived for thirty (30) days following analysis. Please contact us if samples need to be archived longer than the standard holding time.

The information you receive relates only to the items tested. Accuracy of the results is limited by the methodology and expertise of the sample collector. The analyses at Northern Industrial Hygiene, Inc. are cross-checked with other laboratories for quality assurance purposes. This report shall not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Thank you for using Northern Industrial Hygiene, Inc. If you have any questions please don't hesitate to call.

Sincerely,

Crystal Wright
Laboratory Supervisor

Enclosure: Bulk Sample Results

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Client Sample Number: **M2.1A** Lab Sample Number: **02-00317.0001**
Sample Description: **EXTERIOR SIDING MATERIAL-STUCCO**
Sample Location: **FRONT SIDE**
Sample Comments:

Brown paint on off-white coarse material

Asbestos Fibrous Components: Non-Asbestos Fibrous Components: Non-Fibrous Components:
No Asbestos Detected
3% Paint
97% Mineral Filler and Binder

Client Sample Number: **M2.1B** Lab Sample Number: **02-00317.0002**
Sample Description: **EXTERIOR SIDING MATERIAL-STUCCO**
Sample Location: **EAST SIDE**
Sample Comments:

Brown paint on off-white coarse material

Asbestos Fibrous Components: Non-Asbestos Fibrous Components: Non-Fibrous Components:
No Asbestos Detected
10% Paint
90% Mineral Filler and Binder

Client Sample Number: **M2.1C** Lab Sample Number: **02-00317.0003**
Sample Description: **EXTERIOR SIDING MATERIAL-STUCCO**
Sample Location: **SOUTHWEST SIDE**
Sample Comments:

Brown paint on off-white coarse material

Asbestos Fibrous Components: Non-Asbestos Fibrous Components: Non-Fibrous Components:
No Asbestos Detected
10% Paint
90% Mineral Filler and Binder

Client Sample Number: **M3.1A** Lab Sample Number: **02-00317.0004**
Sample Description: **GYPSUM BOARD SYSTEM(GYPSUM, TAPE, JOINT COMPOUND)**
Sample Location: **ROOM 114**
Sample Comments:

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Layer 1 **Paint on off-white powder**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
Chrysotile <1%		35% Paint
		64% Filler and Binder

Layer 2 **Tan papery material with white powdery material**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	30% Cellulose	55% Filler and Binder
	15% Glass Fiber	

Client Sample Number: **M3.2A** Lab Sample Number: **02-00317.0005**
Sample Description: **GYPSUM BOARD SYSTEM(GYPSUM, TAPE, JOINT COMPOUND)**
Sample Location: **ROOM 101**
Sample Comments:

Layer 1 **Paint on off-white powder**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
Chrysotile <1%	15% Glass Fiber	15% Paint
		70% Filler and Binder

Layer 2 **Tan papery material with white powder**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	30% Cellulose	55% Filler and Binder
	15% Glass Fiber	

Client Sample Number: **M6.1A** Lab Sample Number: **02-00317.0006**
Sample Description: **12'X12' GLUE-ON CEILING TILE, ORANGE PEEL**
Sample Location: **ROOM 115**
Sample Comments:

Paint on light gray fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	35% Cellulose	10% Filler and Binder
	42% Mineral Wool	10% Perlite
		3% Paint

(Sample results continued on next page.)

Sampled by: **Mark Oliver** **5/2/02**
Received by: **Tierra Greig** **5/8/02**
Reviewed by: **Crystal Wright** **5/10/02**

Crystal Wright, Laboratory Supervisor

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
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EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Client Sample Number: **M6.1B** Lab Sample Number: **02-00317.0007**
Sample Description: **12'X12' GLUE-ON CEILING TILE, ORANGE PEEL**
Sample Location: **ROOM 210**
Sample Comments:

Paint on light gray fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	42% Mineral Wool	3% Paint
	35% Cellulose	10% Perlite
		10% Filler and Binder

Client Sample Number: **M6.1C** Lab Sample Number: **02-00317.0008**
Sample Description: **12'X12' GLUE-ON CEILING TILE, ORANGE PEEL**
Sample Location: **ROOM 302**
Sample Comments:

Paint on light gray fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	35% Cellulose	10% Filler and Binder
	42% Mineral Wool	10% Perlite
		3% Paint

Client Sample Number: **M6.2A** Lab Sample Number: **02-00317.0009**
Sample Description: **12X12 GLUE-ON CEILING REPLACEMENTS,PINHOLE,FISSURE**
Sample Location: **ROOM 107**
Sample Comments:

White paint on beige fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	35% Cellulose	10% Filler and Binder
	42% Mineral Wool	10% Perlite
		3% Paint

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Client Sample Number: **M6.2B** Lab Sample Number: **02-00317.0010**
Sample Description: **12X12 GLUE-ON CEILING REPLACEMENTS,PINHOLE,FISSURE**
Sample Location: **ROOM 107**
Sample Comments:

White paint on beige fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	35% Cellulose	10% Filler and Binder
	42% Mineral Wool	10% Perlite
		3% Paint

Client Sample Number: **M6.2C** Lab Sample Number: **02-00317.0011**
Sample Description: **12X12 GLUE-ON CEILING REPLACEMENTS,PINHOLE,FISSURE**
Sample Location: **ROOM 107**
Sample Comments:

White paint on beige fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	35% Cellulose	10% Perlite
	42% Mineral Wool	10% Filler and Binder
		3% Paint

Client Sample Number: **M6.3A** Lab Sample Number: **02-00317.0012**
Sample Description: **12X12 GLUE-ON CEILING TILE, LARGE ORANGE PEEL**
Sample Location: **ROOM 121**
Sample Comments:

White paint on beige fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	30% Cellulose	3% Paint
	40% Mineral Wool	27% Filler and Binder

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Client Sample Number: **M6.3B** Lab Sample Number: **02-00317.0013**
Sample Description: **12X12 GLUE-ON CEILING TILE, LARGE ORANGE PEEL**
Sample Location: **ROOM 121**
Sample Comments:

White paint on beige fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	30% Cellulose	3% Paint
	40% Mineral Wool	27% Filler and Binder

Client Sample Number: **M6.3C** Lab Sample Number: **02-00317.0014**
Sample Description: **12X12 GLUE-ON CEILING TILE, LARGE ORANGE PEEL**
Sample Location: **ROOM 121**
Sample Comments:

White paint on beige fibrous compressed material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	30% Cellulose	27% Filler and Binder
	40% Mineral Wool	3% Paint

Client Sample Number: **M12.1A** Lab Sample Number: **02-00317.0015**
Sample Description: **4' TAN VINYL COVEBASE WITH DARK BROWN MASTIC**
Sample Location: **ROOM 116**
Sample Comments:

Layer 1 Tan pliable material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected		100% Vinyl Filler and Binder

Layer 2 Brown brittle mastic

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected		100% Filler and Binder

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Client Sample Number: **S1.1A** Lab Sample Number: **02-00317.0016**
Sample Description: **WALL TEXTURE ORG-PEEL PATTERN GYPSUM BRD/CMU WALLS**
Sample Location: **ROOM 202**
Sample Comments:

Paint on white powder

Asbestos Fibrous Components: **No Asbestos Detected**
Non-Asbestos Fibrous Components:
Non-Fibrous Components: 30% Paint, 70% Filler and Binder

Client Sample Number: **S1.1B** Lab Sample Number: **02-00317.0017**
Sample Description: **WALL TEXTURE ORG-PEEL PATTERN GYPSUM BRD/CMU WALLS**
Sample Location: **ROOM 102**
Sample Comments:

Paint on white powder

Asbestos Fibrous Components: **No Asbestos Detected**
Non-Asbestos Fibrous Components:
Non-Fibrous Components: 35% Paint, 65% Filler and Binder

Client Sample Number: **S1.1C** Lab Sample Number: **02-00317.0018**
Sample Description: **WALL TEXTURE ORG-PEEL PATTERN GYPSUM BRD/CMU WALLS**
Sample Location: **ROOM 103**
Sample Comments:

Paint on white powder

Asbestos Fibrous Components: **No Asbestos Detected**
Non-Asbestos Fibrous Components:
Non-Fibrous Components: 30% Paint, 70% Filler and Binder

Client Sample Number: **F1.1A** Lab Sample Number: **02-00317.0019**
Sample Description: **VYL SHT FLR-BRN&TAN MOASIC PATTERN ON STAIR TREADS**
Sample Location: **STAIRS 1ST**
Sample Comments:

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

NORTHERN INDUSTRIAL HYGIENE, INC.
215 SW 153rd Street Burien, WA 98166
OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Layer 1 **Brown pebbled vinyl**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected		100% Vinyl Filler and Binder

Layer 2 **Gray fibrous material**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	30% Glass Fiber	45% Filler and Binder
	25% Cellulose	

Layer 3 **Gold mastic**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected		100% Filler and Binder

Client Sample Number: **F2.1A** Lab Sample Number: **02-00317.0020**
Sample Description: **12X12 WHT FLR TILE W/ BEIGE STREAKS & BLK MASTIC**
Sample Location: **ROOM 108**
Sample Comments:

Layer 1 **Gold mastic**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected		100% Filler and Binder

Layer 2 **White floor tile with streaks**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected		100% Vinyl Filler and Binder

Layer 3 **Black asphaltic mastic**

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	5% Cellulose	95% Asphalt Filler and Binder

Client Sample Number: **T5.1A** Lab Sample Number: **02-00317.0021**
Sample Description: **WATER TANK INSULATION**
Sample Location: **ROOM 101**
Sample Comments:

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

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NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Gray powdery material with woven layer

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	20% Glass Fiber	60% Filler and Binder
	20% Mineral Wool	

Client Sample Number: **T5.1B** Lab Sample Number: **02-00317.0022**
Sample Description: **WATER TANK INSULATION**
Sample Location: **ROOM 101**
Sample Comments:

Gray fibrous powdery material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	5% Cellulose	30% Mineral Filler and Binder
	15% Glass Fiber	50% Filler and Binder

Client Sample Number: **T5.1C** Lab Sample Number: **02-00317.0023**
Sample Description: **WATER TANK INSULATION**
Sample Location: **ROOM 101**
Sample Comments:

Gray fibrous powdery material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	40% Mineral Wool	45% Filler and Binder
	15% Glass Fiber	

Client Sample Number: **T4.1A** Lab Sample Number: **02-00317.0024**
Sample Description: **EXPANSION JOINT MATERIAL**
Sample Location: **ROOM 101**
Sample Comments:

Black woven fibrous material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	65% Cellulose	35% Filler and Binder

(Sample results continued on next page.)

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

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OFFICE: (206) 988-1746 FAX: (206) 988-1978
EMAIL: nihinclab@aol.com
NVLAP# 200511-0

Bulk Asbestos Analysis Report

Northern Industrial Hygiene, Inc.
100 North 27th Street, Ste 550
Billings, MT 59101-
Project Location: *Malstrom Building 737*

NIH Batch Number: **02-00317**
Client Job Number: **120-064**
Turn Around Time: **3-5 Day**
Samples Analyzed: **25**

Client Sample Number: **T9.1A** Lab Sample Number: **02-00317.0025**
Sample Description: **PATCHING MATERIAL**
Sample Location: **ROOM 101**
Sample Comments:

White hard powdery material

Asbestos Fibrous Components:	Non-Asbestos Fibrous Components:	Non-Fibrous Components:
No Asbestos Detected	15% Cellulose	85% Filler and Binder

Sampled by: Mark Oliver **5/2/02**
Received by: Tierra Greig **5/8/02**
Reviewed by: Crystal Wright **5/10/02**

Crystal Wright, Laboratory Supervisor

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

This certifies that

MARK OLIVER

is accredited as

ASBESTOS INSPECTOR

By the State of Montana

ID MTA1792 *Expiration Date* 02/20/03

INDUSTRIAL SAFETY & CONSULTING, INC.
P.O. BOX 9217, HELENA, MT 59604
(406) 443-3369
Certifies that

Mark Oliver
100 N 27th St, Suite 550, Billings, MT 59101

Has successfully completed the following course approved by the EPA and the Montana Department of Environmental Quality
ASBESTOS
INSPECTOR REFRESHER TRAINING
For the purpose of accreditation required under section 17.74.315 of the Administrative Rules of Montana and Section206 of Title II of the Toxic Substance Control Act (TACA)

Date February 21, 2002 - Expiration date: February 20, 2003
Location: Billings, Montana
Certification # IR02B21-003

Ralph E. DeLong

NITON®

CORPORATION

Certificate of Achievement

Mark Oliver

Northern Industrial Hygiene

has successfully completed the Manufacturer's Training Course for the **NITON Spectrum Analyzer** *and is now certified in radiation safety and monitoring, measurement technology, and machine maintenance of the* **NITON XRF Spectrum Analyzer**.

V1997710-13
Certificate Number

7/10/97 Billings
Course Date & Site

OUTSTANDING QUALITY

Ken Martin
Director of Training

Hal Grodzinski
President & CEO - NITON

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DIVISION 2 - SITE WORK

SECTION 02080 - ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Special Conditions Sections, apply to this Section.

B. The project work areas have been inspected by an independent consultant for the presence of asbestos-containing materials (ACM). The survey and test results are available for review.

1.2 DESCRIPTION OF THE WORK

A. This asbestos abatement project consists of the removal of asbestos-containing pipe fitting insulation, cement asbestos board (Transite®) soffits, and built-up roofing materials from select locations at Building 737, Dormitory, Malmstrom Air Force, MT.

B. Total estimated quantities of the various materials to be abated are listed below. Coordinate all work with the Contracting Officer. Estimated quantities are engineer's estimate of quantity but the contractor is solely responsible for determining exact quantities and the engineer and United States Air Force make no warranty as to the accuracy or completeness of the estimate. For additional information concerning the location and quantities of materials to be removed, refer to the drawings.

All containment areas will require clearance air sampling as outlined in Section 1.2.F of this specification. It is anticipated that only the Boiler Room will require a full containment.

C. The abatement work to be performed in this project is described in this specification. Remove and Dispose as ACM, the following materials:

Location(s)	Material	Estimated Quantity
Boiler Room	Mudded Pipe Fittings	25 Each
Front and Rear Soffits	Cement Asbestos Board (Transite)	200 SF
Roof - Select Areas	Built-up Roofing Materials	250 SF

D. The work shall be executed as follows:

1. The work included in this project is described in these specifications and the accompanying drawings and notes. Contractors must site verify material quantities and site conditions that will affect the bid prices.
2. OSHA Class I asbestos abatement must be accomplished using a negative-pressure enclosure as specified herein utilizing standard removal methods or by using alternative methods; whichever method would be the most efficient.
3. Employ sufficient HEPA filtered local exhaust ventilation machinery to maintain a negative pressure gradient of minimum 0.02 inches water column vs. the outside of the containment, and effect a minimum of four air exchanges per hour. The enclosed area must have critical barriers and containment liners as necessary, waste-water filtration devices and other temporary installations to comply with regulations for proper asbestos removal. Install make-up air vents with HEPA filters in temporary barrier walls as necessary to ensure adequate air movement within containment areas.
4. Each enclosed area (only Class I work will be enclosed) must be equipped with a decontamination unit. Decontamination units for Class I work areas must include clean room, shower and equipment room. Decontamination units for Class II work areas must consist of a minimum clean room and equipment room. Employ bag-out units where feasible with respect to space, bag-outs must be minimum two stage. Equip points of entry/exit and barriers to occupied spaces with proper warning signs. Decontamination units located in exterior or interior locations accessible to the public must be constructed of solid sheeting, have lockable doors and be constructed with materials sufficient to provide off hours site security.
5. All work must be coordinated with the Government and the Contracting Officer, including work hours, site access, scheduling, and general project phasing.
6. Remove the asbestos materials in accordance with standard industry methods; wet removal techniques must be used.
7. Bag or containerize all RACM and Category 2 asbestos waste in impermeable, labeled approved bags or containers. Removed asbestos material must not be allowed to accumulate in the work area, but collected and contained on a continuous basis. Ensure the material is adequately wet at time of containerization. Category 1 materials (roofing materials) may be placed in lined roll-off containers until time of disposal.
8. Abatement Contractor shall coordinate all work, phasing and scheduling with the Contracting Officer. Coordinate exact start dates, the number of mobilizations required and the scope of the work with the Contracting Officer.
9. Training requirements for workers is set forth in “Contractor Accreditation and Experience”, Section 1.5(2), of this document.
10. Abatement requirements for roofing materials and Transite® panels (soffits) are set forth in “Removal of Asbestos on Building Exterior”, Section 3.6(A and B).

E. Air Monitoring - General

1. The asbestos-abatement contractor shall perform, throughout abatement work, monitoring of contractor personnel's exposure, review and testing inside the work area in accordance with OSHA requirements and these specifications. The contractor's accredited supervisor ("competent person") shall personally review conditions inside the work area to ensure compliance with these specifications. In addition, the accredited supervisor shall personally manage air sample collection, analysis and evaluation for personnel samples and work area samples to satisfy OSHA requirements. Additional inspection and testing requirements are specified in other parts of this section.

   The accredited supervisor is responsible for managing all personnel monitoring, inspection and testing required by these specifications, the OSHA regulation 29 CFR 1926.1101, and for continuous monitoring of all sub-systems and procedures affecting the safety of the contractor's employees. Safety of the contractor's employees and providing safe conditions inside the work area for all persons entering is the exclusive responsibility of the contractor. The person performing the personnel and exterior perimeter monitoring of the work area (OSHA "Competent Person") shall be an accredited asbestos contractor/supervisor who shall be trained and shall have field experience in air sampling. Keep a daily log of personnel and area samples taken and analyzed and make such log available to the Government. The log shall contain information on the persons breathing zone sampled, activities being performed, the date of sample collection, the time of sample start and finish, flow rate, sample volume and fibers/cc. The log shall also contain information on area samples showing location of sample, date sample was taken, activities being performed, start and finish times for sample, flow rate, volume and fibers/cc. Take and analyze personnel samples for at least one of the workers in each shift. In addition to the continuous monitoring required, the contractor's accredited supervisor will perform review and testing at the final stages of abatement for each work area or building as specified elsewhere in this section.
2. The Government will employ an independent industrial hygiene consultant (IHC) to perform various services on behalf of the Government. The IHC will perform the necessary monitoring, review, testing and other support services to document that the abatement work proceeds in accordance with these specifications, that areas outside the work areas do not become contaminated, and that the abated areas have been successfully decontaminated. The work of the IHC in no way relieves the abatement contractor from his responsibility to perform his work in accordance with contract documents, to perform continuous review, monitoring, and testing for the safety of his employees, and to perform other such services as specified in this section. The initial cost of the IHC and his services will be borne by the Government.
3. If airborne fiber levels outside the work area documented by the IHC during abatement work exceed the specified respective limits, the contractor shall stop work. Asbestos contractor may request confirmation of above results by analysis of samples with Transmission Electron Microscopy (TEM) with the cost to be borne by the contractor. Request must be submitted to the Government. Confirmation sampling and analysis will be the responsibility of the accredited supervisor with review and approval by the IHC. An

agreement between the two IH's will be reached on the exact details of the confirmation effort and put in writing including such things as number of samples, location, collection, quality control on site, analytical laboratory, interpretation of results and follow-up action. This written agreement shall be cosigned by both parties and delivered to the Government.

F. Air Monitoring - Clearance

1. Clearance air monitoring will be performed in all areas from which asbestos-containing materials were removed from within full containments. Clearance will be performed aggressively in areas where friable asbestos was removed. Samples collected for clearance purposed will be analyzed using Phase Contrast Microscopy (PCM).

   The Government will pay for air monitoring services and analysis of the first round of clearance air samples. In the event that re-testing is required due to failure of the initial samples to meet clearance criteria, the Contractor shall pay all costs associated with the additional testing.

2. The abatement will be determined to be complete, and the area cleared, when the abatement area has been cleaned, a visual inspection has been performed and passed, a coat of penetrating encapsulant has been applied to all areas from which asbestos was removed and the airborne fiber concentration inside the abatement area meets the following criteria: The concentration of each of the five samples collected in the work area, having sample volumes of at least 1,200 liters, is no greater than 0.01 fibers per cubic centimeter. The procedures for sampling, and analyzing air tests are as described in Administrative Rules of Montana 16.47.310.

   Clearance air sampling will begin after the visual inspection has passed, encapsulant has been applied, and the negative air machines have operated for at least 48 air changes.

3. If release criteria are not met, the contractor shall repeat final cleaning and continue the decontamination procedure from that point. Additional review and testing will be at the expense of the contractor until release criteria are met. If results of samples analyzed by PCM are satisfactory the contractor shall remove the critical barriers and shut down and remove HEPA units.

G. Sequencing/Scheduling:

1. The Contractor shall coordinate all scheduling with the Contracting Officer.

1.3 APPLICABLE PUBLICATIONS

This section sets forth governmental regulations and industry standards, which are included and incorporated herein by reference and made a part of the specifications. This section also sets forth those notices and permits, which are known to the Government and which either must be applied for and received, or which must be given to governmental agencies before start of work.

General Applicability of Codes, Regulations, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith. Publications shall be the current edition in effect.

Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Government and Government's representatives harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of himself, his employee, or his subcontractors.

Codes, Standards and Regulations: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

A. Code of Federal Regulations (CFR) Publications:

OSHA

29 CFR 1926.1101 Construction Industry Standard (1994)

29 CFR 1926.500 Guardrails, Handrails, and Covers

29 CFR 1910.134 Respiratory Protection

29 CFR 1910.145 Specifications for Accident Prevention Signs and Tags

EPA

40 CFR 61 Subpart A General Provisions

40 CFR 61 Subpart M National Emission Standard for Hazardous Air Pollutants

40 CFR 763.120, 121 Asbestos Abatement Projects

40 CFR 763 Subpart E AHERA, Asbestos-containing Materials in Schools

B. American National Standard Institute (ANSI) Publications:

Z9.2-1979 Fundamentals Governing the Design and Operations of Local Exhaust Systems

Z88.2-1980 Practices for Respiratory Protection National Institute for Occupational

Safety and Health (NIOSH) Revised Recommended Asbestos Standard

C. Environmental Protection Agency (EPA):

560/5-85-024 Guidance for Controlling Friable Asbestos-Containing Materials in Buildings

D. State Requirements:

16.47.310 Administrative Rules of Montana

1.4 AUTHORITIES OF THE INDUSTRIAL HYGIENE CONSULTANT

A. The purpose of the work of the IHC is to: observe the contractor's work and monitor air adjacent to the work area to maintain his efforts to prevent the spread of contamination beyond the work area. In addition, the consultant's work includes performance of final review and testing to determine whether a space, containment, or a building has been adequately decontaminated. All air monitoring is to be done utilizing PCM, except where the IHC determines that TEM monitoring is necessary. The IHC will perform the following tasks:

1. Task 1: Collect and analyze pre-abatement air samples in areas where abatement work will be performed and clearance air samples will be required.
2. Task 2: Perform monitoring, inspection, and testing as necessary outside the work area during actual abatement work to detect any faults in the work area isolation and any adverse impact of surroundings from work area activities.
3. Task 3: Perform unannounced site visits to spot check overall compliance of work with contract documents. These visits may include inspection, monitoring and testing inside and outside the work area and all aspects of operation except personnel monitoring.
4. Task 4: Provide support to the Government such as evaluation of submittals from the abatement contractor, resolution of unforeseen developments in abatement work, etc.
5. Task 5: Perform, in the presence of the Government’s representative, final review of a decontaminated area at the conclusion of the abatement and clean-up work.
6. Task 6: Collect and analyze clearance air samples in areas, which will be re-occupied following the asbestos abatement.

B. Make available all data, review results and testing results generated by the IHC to the contractor for information and consideration. Contractor shall provide cooperation and support to the IHC for efficient and smooth performance of their work.

C. Monitoring and review results of the IHC will be used by the Government to issue any stop removal orders to the contractor during abatement work and to accept or reject areas as decontaminated. The IHC will, upon request, make available to the contractor the plan for sample collection and analysis for monitoring outside the work areas and the plan of final review for each space prior to executing each plan. Plan will include location of samples,

name and qualification of person taking samples, whether on site analysis and/or lab analysis will be utilized, methodology of analysis, lab information and qualifications of on-site analyst.

D. Stop the abatement work at any time it is determined that conditions are not within the specifications and applicable regulations. The stoppage of work shall continue until conditions have been corrected and corrective steps have been taken to the satisfaction of the IHC. Standby time required to resolve violations shall be at the Contractor's expense.

1.5 CONTRACTOR ACCREDITATION AND EXPERIENCE

Proof of experience of the proposed Asbestos Abatement Contractor is required and will be based upon submission by Contractor of the following:

A. Experience:

Ability and proof of the contractor and his employees to perform asbestos abatement activities by submitting evidence of the successful completion of training courses covering asbestos removal as set forth by the appropriate Federal and State Codes and Regulations pertinent to asbestos abatement. Name and location of at least two asbestos abatement projects involving significant risks of fiber release with the name and telephone number of purchaser of abatement services.

B. Personnel:

1. General Superintendent

General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the Contractor's Representative responsible for compliance with all applicable federal, state and local regulations, particularly those relating to asbestos-containing materials.

Experience and Training: The General Superintendent must have completed a course at an EPA-Approved Training Center or equivalent certificate course in asbestos abatement procedures, and have had a minimum of two (2) years on-the-job training in asbestos abatement procedures and hold a State of Montana card in the proper discipline.

Accreditation: The General Superintendent is to be accredited as a competent person as required by OSHA, NESHAP and State of Montana regulations.

2. Workers Performing Friable and Non-Friable Asbestos Removal

Accreditation: Submit copies of certificates of accreditation as required by OSHA and the State of Montana.

Training for Class I work shall be equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos workers training (40 CFR Part 763, subpart E, appendix C).

Training for Class II work, where critical barriers and/or negative pressure enclosures are not required, consists of an 8-hour course, including material specific hands-on training and all the elements of (k)(9)(viii) in OSHA's Construction in Industry Standard (29 CFR 1926.1101, will be required.

1.6 INSURANCE REQUIREMENTS

A. Insurance, General: the Contractor shall maintain for the duration of the contract, at its cost and expense, insurance as specified in the FAR; and

B. Asbestos Liability Insurance

Contractor shall carry Asbestos Liability Insurance covering damage by reason of any negligent act, error, or omission committed or alleged to have been committed by the Contractor or anyone for whom the Contractor is legally liable, including coverage for liability assumed by contract. Such insurance shall be true occurrence form and shall clearly state on the certificate that asbestos work is included.

1. Each Occurrence	$1,000,000
2. Aggregate	$1,000,000

1.7 REMOVAL AND DISPOSAL GENERAL REQUIREMENTS

A. Description of Work:

The work covered by this section includes the removal and handling of friable materials and non-friable materials which may become friable by the actions of the removal work, and the incidental procedures and equipment required to protect workers and occupants of the area, or both, from contact with airborne asbestos fibers. The work includes the disposal of the removed asbestos-containing materials.
The material removal procedures and work locations are explained in this project manual.

B. Definitions Relative to Asbestos Abatement:

1. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
2. ACGIH: American conference of Governmental Industrial Hygienists.
3. Air Cell: Insulation normally used on pipes and duct work that is comprised of corrugated cardboard which is frequently comprised of asbestos combined with cellulose or refractory binders.

4. Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and a non-contaminated area, typically consisting of two curtained doorways at least 6 feet (2 meters) apart.
5. Air Monitoring: The process of measuring the fiber content of a specific volume of air.
6. Amended Water: Water to which a wetting agent or surfactant has been added.
7. Area Monitoring: Sampling of fiber concentrations within the asbestos removal area, which is representative of the airborne concentrations of asbestos fibers, which may reach the breathing zone.
8. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite grunerite, anthophyllite, amosite and actinolite-tremolite. For purposes of determining respiratory and worker protection, both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
9. Asbestos Fibers: This expression refers to all fibers having an aspect ratio of 3:1 and longer than 5 micrometers.
10. Asbestos-Containing Waste Material: Any material, which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a work area for disposal.
11. Authorized Visitor: The Government, the Government's Representative, testing lab personnel, the Engineer, Industrial Hygiene Consultant, or representative of any Federal, State, and local regulatory or other agency having authority over the project.
12. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.
13. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
14. Bridging Encapsulant: A liquid material, which can be applied to asbestos-containing materials, which controls the possible release of asbestos fibers by creating a membrane over the surface.
15. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded at any time during an 8-hour shift.
16. Certified Industrial Hygienist (CIH): An industrial hygienist certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.
17. Class I Removal: Class I asbestos work means activities involving the removal of TSI and surfacing ACM and PACM.
18. Class II Removal: Class II asbestos work means activities involving the removal of ACM that is not thermal system insulation or surfacing material. This includes, but is not limited to asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
19. Class III Removal: Class III asbestos work means repair and maintenance operations, where ACM including thermal system insulation and surfacing material is likely to be disturbed.
20. Clean Room: An uncontaminated area or room, which is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

21. Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing two overlapping sheets of plastic sheet over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. Two curtained doorways spaced a minimum of 6 feet (2 meters) apart form an airlock.
22. Decontamination Enclosure System: A series of connected rooms with curtained doorways between any two adjacent rooms for the decontamination of workers or of materials and equipment. A decontamination enclosure system always contains at least one airlock.
23. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
24. Disposal Bag: 6 mil thick leak-tight plastic bags used for transporting asbestos waste from work and to disposal site. Each is labeled as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

And shall also be labeled per NESHAP and DOT regulations.

25. Encapsulation: Treatment of asbestos-containing materials, with an encapsulant.
26. Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.
27. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically consisting of a designated area of the work area, a washroom, a holding area and an uncontaminated area.
28. Equipment Room: A contaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.
29. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
30. Friable Asbestos Material: Material that contains more than 1.0% asbestos by weight, and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
31. Glovebag: A sack (typically constructed of 6 mil transparent polyethylene or polyvinylchloride plastic) with two inward projecting long sleeve gloves, which is designed to enclose an object from which an asbestos-containing material is to be removed.
32. HEPA Filter: A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in length.
33. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air (absolute) filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.
34. High-Efficiency Filter: A filter which removes from air 99.97% or more of monodisperse dioctyl phthalate (DOP) particles having a mean particle diameter of 0.3 micrometer.

35. Holding Area: A chamber between the washroom and an uncontaminated area in the equipment decontamination enclosure system. The holding area comprises an airlock.
36. MSHA: Mine Safety and Health Administration.
37. Negative Pressure: Air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).
38. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
39. Negative Pressure Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a negative pressure inside the work area and a constant air flow from adjacent areas into the work area and exhausting that air outside the work area.
40. NIOSH: National Institute for Occupational Safety and Health
41. Non-Friable Asbestos Materials: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not release fibers in excess of the asbestos control limit during any appropriate use, handling, demolition, storage, transportation, processing, or disposal.
42. Personal Monitoring: Sampling of air in the breathing zone of individual workers to determine the concentration of fibers, longer than 5 micrometers, per cubic centimeter of air.
43. PACM: Presumed asbestos-containing material. Any surfacing or thermal system insulation that was installed in buildings no later than 1980 and that has not been tested for asbestos, must be presumed to contain asbestos until tested.
44. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
45. RACM: Regulated asbestos-containing material as defined by NESHAP. Any material that is friable or has become friable.
46. Regulated Area: Means an area established by the employer to demarcate areas where Class I, II and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit.
47. Removal: All herein specified procedures necessary to strip all asbestos-containing materials from the designated areas and to dispose of these materials at an acceptable site.
48. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
49. Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.
50. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

51. Time Weighted Average (TWA): The TWA is an 8-hour time weighted average airborne concentration of fibers, longer than 5 micrometers, per cubic centimeter of air, calculated using formulas found in 29 CFR 1910.1000.
52. TSI: Thermal system insulation.
53. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
54. Washroom: A room between the work area and the holding area in the equipment decontamination enclosure system. The washroom comprises an airlock.
55. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos contaminated waste.
56. Work Area: The area where asbestos related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.1101.
57. Worker Decontamination Enclosure System: A decontamination enclosure system for workers, typically consisting of a clean room, a shower room and an equipment room.

C. Medical Requirements: 29 CFR 1926.1101

1. Medical Examinations: Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1926.1101 requirements within the past year.
2. Medical Records: Maintain complete and accurate records of employees' medical examinations for a period of 30 years after termination of employment and make records of the required medical examination available for inspection and copying to authorized representatives of: The Assistant Secretary of Labor for Occupational Safety and Health Administration (OSHA), and an employee's physician upon the request of the employee or former employee.

D. Permits and Notifications:

1. Secure necessary permits in conjunction with asbestos removal, hauling and disposition, and provide timely notification of such actions as may be required by Federal, State, regional and local authorities.
2. Send Written Notification as required by US EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAP Contact at least 10 days prior to beginning any work on asbestos-containing materials. Send notification to the following address:

Montana Department of Environmental Quality
Asbestos Control Program
Permitting and Compliance Division
PO Box 200901
Helena, MT 59620-0901
(406) 444-2690

E. Safety Compliance:

In addition to detailed requirements of this specification, comply with laws, ordinances, rules and regulations of storing, transporting and disposing of asbestos waste materials. Comply with 40 CFR Part 61. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification and referenced documents vary, the most stringent requirement shall apply.

F. Respirator Program:

Establish a written respirator program as required by 29 CFR 1910.134 and CFR 1926.1101. This program shall be posted in the clean room of the worker decontamination enclosure system.

1.8 SUBMITTALS

A. Make submittals required by the contract documents in a timely manner and at appropriate times in the execution of the work to allow for sufficient and prompt review by the Government and Asbestos Consultant. Revise and resubmit as necessary to establish compliance with the specified requirements.

B. Submit two complete bound sets of the submittals as described in this section. Submit separate sets entitled "Pre-Work Submittals" and "Final Submittals".

1. Submit Pre-Work submittals at the pre-construction meetings. Work may not proceed until the complete Pre-work Submittal package has been reviewed and approved by the Industrial Hygiene Consultant.
2. Submit Final Submittals to the Industrial Hygiene Consultant following completion of the work. Requests for final payment will not be processed until the final submittal package has been reviewed and approved by the Government and the Industrial Hygiene Consultant.

C. Pre-work Submittals

1. Project Schedule: Include information detailing sequencing and scheduling of asbestos work, and schedule coordination with the work of other trades.
2. Work Plan: Provide a detailed work plan, including sketches of intended work zones, layout of containment areas, and HEPA filtration setup. Delineate the portable HEPA

ventilation system and procedures for isolation and close out of the building's HVAC system.

3. Decontamination Procedure: Provide location and layout of decontamination areas, and explanation of intended decontamination sequence.
4. Methods: Provide a description of all asbestos removal methods to be used and sequence of activities. Include information detailing schedule coordination with the Contracting Officer and with other trades.
5. Subcontractors: Provide a listing of subcontractors, and interface of trades involved in the performance of work.
6. Safety Plan: Delineate the methods to be used to assure the safety of workers, building occupants, and visitors to the site.
7. Personnel Protective Equipment: Provide a description of protective clothing and approved respirators to be used.
8. Equipment: Provide manufacturer's specifications of all equipment, including respirators, to be used.
9. Vacuum Equipment: Submit specifications and product date for all vacuum equipment. Include evidence of approval and testing of HEPA exhaust filtration, and wetting and packaging methods for waste collection.
10. Asbestos Disposal Plan: Include explanation of handling, transport, and disposal of asbestos-contaminated waste. Identify any disposal site at which any waste material generated during the project will be disposed and furnish evidence of all necessary government approvals to dispose of the waste.
11. Project Staffing: Provide identity of project site supervisor, project manager, and list of trained workers to be used on project. Include documentation of appropriate training and certification for each employee.
12. Medical Examinations: Provide evidence of medical examinations for workers to be used on this project as required by OSHA. Include most recent written physicians' opinion regarding employees' fitness to work and utilization of mandatory protective equipment.
13. MSDS: Provide Material Safety Data Sheets for all chemicals (i.e., encapsulants, and surfactants) to be used on the project.
14. Cleanup: Provide a description of final cleanup procedures to be used.
15. Emergency Procedures: Provide a description of emergency procedures to be followed in case of injury, fire, temporary utility failures, and breach of barriers. Include evacuation procedures, source of medical assistance (names and phone numbers for Government's Representative, Asbestos Consultant, fire, police, emergency squad, local hospital, and Government), and procedures to be used for access by medical personnel (for example, rescue squad and physician).
16. OSHA Requirements: Submit a notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance, and worker training records are being kept in accordance with OSHA.
17. Laboratory Qualification Information: Submit proof of qualifications of testing laboratory and personnel. Certification that persons analyzing the samples have been judged proficient by successful participation in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program shall be considered sufficient proof of compliance.

18. Certificates of Compliance: Submit certification that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2.
19. Notifications and Policies: Submit copies of regulatory agency abatement permits and notifications, copies of all types of specified bonds and insurance, and notification of bonding and insurance companies indicating extent of coverage.

D. Final Submittals:

1. Certification: Provide written certification that Contractor has fully completed work in strict accordance with the Specifications.
2. Air Monitoring: Submit documentation of all employee personal air monitoring results relative to the OSHA respiratory protection level compliance. Include copies of all air monitoring data and analysis reports conducted at the site.
3. Project Record Documents: Provide record drawings and specifications of abatement work with all contract changes clearly indicated, project photographs, security log, safety log, sign-in sheets, supervisor's daily field reports, and similar final record documentation.
4. Disposal Manifests: Submit copies of all asbestos waste disposal transportation and disposal manifests including signed receipts from the landfill.

E. Contract Revisions: Provide documentation of all Modification Proposals and Change Orders.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Compliance: Equipment, including protective clothing and respirators, used in the execution of this contract and provided to visitors to the site, shall comply with ASTM E 849 and with the applicable Federal, State, and local regulations. Respirators shall conform to the OSHA requirements in 29 CFR 1910.134. Use supplied air type (type "C") units during actual removal operations, except as approved by the Asbestos Consultant prior to the start of work.

B. Work Area Responsibility: It is the Contractor's responsibility to require that each person (worker or visitor) entering the work area wears an approved respirator and protective clothing. There shall be no exceptions to this requirement.

C. Protective Clothing: Provide approved protective clothing to all workers and to all official representatives of the Government, State, or other governmental entity, and the Asbestos Consultant who may inspect or visit the project.

D. Respirators: Respirators will be of a type approved by NIOSH and MSHA for use during asbestos removal operations. See Paragraph 2.2, "Respiratory Protection".

E. Miscellaneous Safety Equipment: Hardhats, protective eyewear, gloves, rubber boots or other footwear shall be provided as required for workers and authorized visitors. Safety shoes may be required for some activities. Protective equipment used in the removal of asbestos-

contaminated items and demolition activities shall be of proper materials to adequately protect the workers.

F. Disposal Bags: Polyethylene bags used for containing removed asbestos-containing materials shall be at least 6 mils thick and sufficiently large for their intended use. These bags should be printed with warning labels per OSHA regulations.

G. Vacuums: All vacuum cleaners must be equipped with HEPA filters.

H. Duct Tape: All tape shall be high quality duct tape. All spray-on adhesives, glue, and other barrier securing material shall be high quality products.

I. Inventory Maintenance: Provide and maintain sufficient inventory of protective clothing, respirators, filter cartridges, plastic sheeting of proper size and thickness, duct tape, glue, adhesives, disposable towels, and air filters for the work required and the numbers of workers, visitors, and inspection personnel entering the work areas.

J. Showers: Provide shower stalls constructed with opaque walls, and sufficient plumbing for these showers, including hot and cold running water and sufficient hose lengths and drain systems or an acceptable alternate such as a portable decontamination trailer with showers. Waste shower water shall be filtered through 5-um filters and disposed of in accordance with all Federal, State, and local regulations.

K. Demolition Equipment: Provide sufficient appropriate equipment for demolition of plaster, brick, and concrete walls, pipe chases and ceiling areas such that the work can be performed without hindering the project schedule.

L. Local Exhaust System & HEPA Filtration: Provide air filtering equipment capable of filtering asbestos fibers to 0.3 um at 99.97 percent efficiency and of sufficient quantity and capacity to cause a complete air change or total air filtration within the work area once every 15 minutes. Air shall flow into the work site through all openings, including the decontamination chamber and waste exit ports, and any areas in the work site where air leakage may occur. Air should exhaust through the local exhaust air filtration units by means of a high quality flexible or solid duct leading outside the building. If air exhaust outside the building is not feasible, the Asbestos Consultant shall determine where the exhaust shall be emitted outside the work area. The air-filtering equipment should be positioned at a maximum distance from the decontamination chamber to maximize filtration of airborne fibers. Local exhaust air filtration units shall be in operation at all times. One additional air filtration unit will be inside the work area as a backup unit.

M. Electrical Equipment: All electrical appliances used in conjunction with the removal will be used with ground fault interruption units. Each electrical appliance will have its own electrical outlet.

N. Fire Extinguishers: Fire extinguishers in sufficient quantity to deal with any small fires shall be kept in containment, minimum one per each homogeneous work area.

O. Encapsulants and Sealants: Encapsulant and sealant shall be commercially available and specifically designed for use as an asbestos sealant.

2.2 RESPIRATORY PROTECTION

Contractor shall select and provide respirators for all workers based on selection procedures outlined under current OSHA regulations. If contractor has properly documented historic personal exposures during abatement activities, respiratory protection may be based on this data. If adequate historic data is not available, all OSHA Class I work shall commence utilizing Type C supplied air respirators. Respiratory protection may be downgraded upon documentation that lower levels of respiratory protection will maintain personal exposures below the Permissible Exposure Limit and the Excursion Limit as set forth under 29 CFR 1926.1101.

A. Air Purifying Respirators

1. Provide one-half-face or full-face type respirators. The Mine Safety and Health Administration (MSHA) and the National Institute must approve all respirators for the use intended for Occupational Safety and Health (NIOSH).
2. Provide, at a minimum, filter cartridges labeled with the NIOSH and MSHA certification for Radionuclides, Radon Daughters, Dust, Fumes, and Mists and color coded in accordance with ANSI Z228.2 (P-100 Cartridges). In addition, a chemical cartridge may be added, if required, for solvents, etc. In this case, provide a combination cartridge labeled with the appropriate color code and MSHA/NIOSH certification. All cartridges shall be manufactured by the same manufacturer as the facepiece.
3. Provide sufficient filters for replacement as necessary by workers.
4. Single-use, disposable, or quarter-face respirators are not permitted.

B. Supplied-Air (Type C) Respirator Systems

1. Provide equipment capable of producing a continuous sufficient supply of Grade D breathing air as described in the Compressed Gas Association Commodity Specifications G-7.1.
2. Provide monitors who will shut down compressor and sound audible alarms if any of the following occur:

    a. Carbon Monoxide (CO) concentrations exceed five parts per million per volume of air in the airline.
    b. Compressor temperature exceeds normal operating range.

3. Provide full facepiece and hose by the same manufacturer. Facepiece and hose must be certified by MSHA/NIOSH as an approved Type C respirator assembly. Operate system in pressure demand mode with a positive pressure facepiece. Maximum hose length is 300 feet.

2.3 SPECIAL CLOTHING

A. Protective Clothing

Provide personnel exposed to airborne concentrations of asbestos fibers with fire retardant disposable protective whole body clothing, head coverings, gloves and foot coverings. One-piece clothing is acceptable and preferred. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone.

Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape. Reusable type protective clothing and footwear shall be left in the contaminated equipment room until the end of the asbestos abatement work at which time such items shall be thoroughly cleaned of all asbestos-contaminated material or disposed as asbestos-contaminated waste.

B. Work Clothing:

Provide cloth work clothes for wear under the disposable protective coveralls and foot coverings.

2.4 WORKER DECONTAMINATION ENCLOSURE SYSTEM

A. Class I Work

Provide a decontamination unit consisting of a serial arrangement of rooms or spaces adjoining the work area or decontamination trailer if approved, for decontamination of workers conducting asbestos removal, and for any authorized visitor entering the work area. The decontamination unit or trailer shall conform to the following specifications:

1. Provide an adequate decontamination unit consisting of a serial arrangement of rooms or spaces adjoining the Work Area or a decontamination trailer. Each airlock shall be clearly identified and separated from the other by plastic sheet crossover doors, designed to minimize fiber and air transfer as people pass between areas. Decontamination chamber doors shall be of sufficient height and width to enable replacement of equipment that may fail and to safely stretcher and carry an injured worker from the site without destruction of the chamber or unnecessary risk to the integrity of the work area. At least two layers of 6 mil black plastic sheeting shall be required for walls and ceilings for on-site constructed decontamination units. Two layers of 6 mil clear plastic may be used for the floors. On-site constructed decontamination units must be able to withstand wind and rain if built

outdoors. Construction must use 2" x 3" or 2" x 4" framing or equivalent and must be large enough to accommodate large individuals adequately.

2. Required decontamination areas comprising the decontamination unit and their usage shall be as follows:

   a. Clean Room: In this room persons remove and leave all street clothes and put on clean disposable coveralls. Approved respiratory protection equipment is also picked up in this area. No asbestos contaminated items are permitted in this room.
   b. Shower room: In this room, personnel shower prior to exiting the containment.
   c. Equipment Room: Work equipment, footwear, and all other contaminated work clothing are left here. This is also a change and transit room for people. All areas between Shower Room and Work Area shall be considered part of the Equipment Room. Plastic floor and wall covering is required. This is a contaminated area.

Class II Work

All Class II work, specifically removal of Transite soffits and built-up roofing materials, will occur outside the building and use of a decontamination unit shall not required.

2.5 EQUIPMENT DECONTAMINATION ENCLOSURE SYSTEM

Install separate equipment and contamination enclosure system where allowed by available space and practical site considerations.

2.6 EYE PROTECTION

Provide goggles to personnel engaged in asbestos operations when the use of a full face respirator is not required.

2.7 WARNING SIGNS AND WARNING LABELS

Post warning signs conforming to the requirements of 29 CFR 1926.1101 and 40 CFR 763.120, 121, at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps. Provide warning labels and affix to all asbestos products contaminated with asbestos. Sign and label formats to conform to 29 CFR 1910.145(d)(4).

Warning Signs:

Provide signs of sufficient size to be clearly legible, displaying the following legend:

DANGER ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

Warning Labels:

Provide labels of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE
HAZARD

2.8 PLASTIC SHEET

Plastic sheet, of 4 mil (0.10 mm) and 6 mil (0.15 mm) thickness in sizes to minimize the frequency of joints for isolation and sealing of designated work areas. Plastic sheet may be either clear or opaque. Black plastic may only be used in the construction of decontamination units.

2.9 TAPE

Tape - capable of sealing joints of adjacent sheets of plastic sheets and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.

2.10 SURFACTANT (WETTING AGENT)

Surfactant (wetting agent) shall consist of 50% polyoxyethylene ether and 50% of polyoxyethylene or polyglycol ester, or equivalent, and shall be mixed with water to provide a concentration of one ounce surfactant to 5 gallons of water.

2.11 IMPERMEABLE CONTAINERS

Impermeable containers shall be 6 mil plastic bags of size to fit within the drum listed hereafter and capable of being sealed and 55 gallon (200 l) capacity metal or fiber drums with tightly fitting lids. The containers shall be labeled in accordance with OSHA Regulation 29 CFR 1926.1101. Containers must be both air and watertight.

2.12 SEALABLE PLASTIC DISPOSAL BAGS

Sealable plastic bags of 6 mil minimum thickness for transportation and disposal of asbestos-contaminated material.

2.13 ENCAPSULANT PRODUCTS

Penetrating and bridging encapsulant and sealant (lock down) products shall be commercially available and specifically designed for use as an asbestos sealant. The Contractor shall submit product data for any materials proposed for use. Approval of "or equal" products will not include substitution of product lines where compatibility for successive applications may be violated.

2.14 REMOVAL GLOVEBAGS

Bags of heavy plastic construction designed to permit isolation of a section of pipe insulation and with integral gloves and fittings for a spray nozzle extending into the bag. Glovebags shall only be used under the direction of a qualified superintendent, and within a containment or partial containment with differential pressure and air filtration.

PART 3 - EXECUTION

3.1 EXECUTION OF REMOVAL

Removal and disposal of all asbestos-containing materials is to be performed in accordance with the following procedures.

3.2 PROJECT SITE CONDITIONS

Means of Egress: Establish and maintain emergency and fire exits from the work area.

A. Use of Existing Facilities

1. Water Supply: The Government will provide access to water either via outdoor faucets or at designated outlets in the building. The Contractor shall connect to the building's system at locations as allowed by the Government after review of the work plan indicating desired locations of connection. Contractor is responsible for installation and maintenance of back flow prevention devices on all water connections. Contractor is responsible for any damage resulting from leaking hoses, connections, or from other water supply system components under the direct control of Contractor.
2. Electricity: The Government will provide access to an electric panel. Contractor will be responsible for making necessary connections to the service, providing appropriate temporary breaker panels, and all extension cords necessary to perform the work. All electrical connections to the building’s electric service must be made by a licensed electrician of at least journeyman level experience. The Contractor must provide emergency power in the event power failure occurs in the facility. Contractor must provide adequate electricity in all locations to allow IHC to operate air pumps for routine and clearance air sampling. Adequate power and lighting must be maintained in all work areas until visual clearance inspections have been performed.
3. Toilets: Coordinate with Government’s representative regarding use of temporary restroom facilities.

4. Waste Storage: Asbestos waste must be either placed in impermeable, labeled double bags, double wrapped and labeled, or the bags must be in labeled metal drums prior to their transport to the transport vehicle. If not removed from the site each day, waste must be stored in a labeled, locked, plastic-lined dumpster in a location approved by the Government's representative.

B. Environmental Conditions to be Maintained: Outside Asbestos Work Area: Air concentrations of asbestos shall be maintained at 8-hour time weighted average below 0.01 fiber (longer than 5 microns) per cubic centimeter of air.

C. Access to Work Area: Access to work area shall be controlled through the use of signs, barricades, or other means as appropriate. Whenever possible, all access shall be through decontamination areas. The following shall have access to work area: EPA and OSHA inspectors, Government's representative, and on-site representative (IHC). These persons shall be the only non-asbestos specialist personnel who shall be permitted access while work is in progress.

3.3 WORK PRACTICES

A. Preparation for Class I Containments:

1. Post warning signs meeting the specifications of OSHA 1926.1101 at any location and approaches to the location of the asbestos removal area. Signs shall be posted at a distance sufficiently far enough away from the work area to permit an employee to read the sign and take the necessary protective measures to avoid exposure. Additional signs may need to be posted following construction of workplace enclosure barriers.
2. Coordinate with the Contracting Officer the shut down and lock out of electric power to all work areas. Contractor is to witness and verify shut down and lockout. Provide temporary power and lighting. Coordinate temporary power hookups with the Government's representative. Insure safe installation (including ground faulting) of temporary power sources and equipment by compliance with all applicable electrical codes, requirements and OSHA requirements for temporary electrical systems. The Government shall pay for all costs for electric service.
3. Seal off all openings between the work area and uncontaminated areas outside of the work area by installing 4-mil polyethylene sheeting and tape or fire-retardant caulk as needed to form critical barriers.
4. Before work is begun, clean all removable items and equipment. Remove these items and store as directed.

B. Isolation of the Work Area - Class I Work Areas Where Glove Bags are Used:

1. Construct isolation and negative pressure containment barriers as follows:

a. Seal all vertical and horizontal surfaces except those of asbestos-containing materials with 1 layers of 4-mil watertight polyethylene plastic sheeting on the walls and 1 layer

of 6-mil watertight polyethylene plastic sheeting on the floor and/or fire-retardant caulk except as provided in b. below.

b. Sole permissible exceptions to total enclosures are: (1) an entrance airlock with showers and a decontamination chamber, (2) a debris removal airlock for cleaning and asbestos waste removal, (3) staircases, and (4) emergency exits. Emergency exits shall be marked by spray-painted arrows and doorway outline, with a knife present to cut the plastic.

c. Wet clean and/or HEPA vacuum all non-removal and non-asbestos items such as boilers, piping, heat exchangers, tanks and other equipment in the Work Area. After cleaning, wrap articles to remain in the room such that they are adequately protected from damage.

d. As all existing ventilation systems in the Work Area are to be sealed throughout the removal operation, an alternate system shall be utilized. Install approved negative air filtration units utilizing appropriate HEPA filters to exhaust air from the Work Area. Negative air filtration units shall be of sufficient number and capacity to ensure that total air volume is exchanged once every 15 minutes. A negative static pressure 0.02 inches of water column shall be maintained as measured by a manometer.

e. A written log shall be maintained for all units utilizing a HEPA filter. This log shall include, but not be limited to, hours of operation, time of filter changes, pressure gauge readings, and current location of the unit.

f. Replacement air shall enter the Work Area through the decontamination facility and the make-up air vents, in order to reduce the possible escape of contaminated air. Install and have operating the entire alternate ventilating system prior to commencement of asbestos abatement.

3.4 REMOVAL OF ASBESTOS IN NEGATIVE PRESSURE CONTAINMENT PROCEDURE

A. This section shall apply to the removal of TSI pipe fitting insulation.

1. Clean and isolate the work area in accordance with Section 3.3 A. Isolation in accordance with Section 3.3B will be required for asbestos removal inside containments.
2. Wet all asbestos-containing material with an amended water solution using equipment capable of providing a fine spray mist, in order to reduce airborne fiber concentrations when the material is disturbed. Saturate the material; however, do not allow excessive water to accumulate in the work area. Keep all removed material wet enough to prevent fiber release until it can be containerized for disposal. Maintain a high humidity in the work area by misting or spraying to assist in fiber settling and reduce airborne concentrations. Wetting procedures are not equally effective on all types of asbestos-containing materials but shall nonetheless be used in all cases.
3. Saturated asbestos-containing material shall be removed in manageable sections. Removed material should be containerized before moving to a new location for continuance of work. Surrounding areas shall be periodically sprayed and maintained in a wet condition until visible material is cleaned up.

4. Apply spray-encapsulant to all exposed surfaces from which ACM has been removed after final clearance visual inspection.

3.5 GLOVEBAG REMOVAL

A. Application: This section applies to the removal of materials that can be accommodated by a glovebag, including straight run and pipe fitting insulation.

B. Preparation: The preparation of the Work Area for glovebag removal shall include the requirements of Paragraph 3.3.A above.

C. Workers: A minimum of two persons are required to perform a glove bag removal project. A third person will be required to control access to the work area, to conduct air monitoring and assist with supplies.

D. Work Area Isolation: The Work Area where the technique is to be utilized shall be isolated in accordance with 3.3.B above.

E. Local Exhaust System: HEPA filter equipped negative air machines shall be placed in operation as close as is feasible throughout the glovebag removal process.

F. Materials & Equipment: All necessary materials, equipment, and supplies shall be brought into the Work Area before any removal begins. The following is a list of recommended equipment and tools for the removal of asbestos by the glovebag technique:

1. The glovebag, which consists of a 6 mil bag fitted with long sleeve gloves, a tool pouch, and a 2-inch opening used for water application.
2. A pump-up sprayer (garden type) with a 2- or 3-gallon capacity.
3. Wetting Agent: Amended water (water with a surfactant) or a removal encapsulant.
4. Six mil polyethylene disposal bags with the proper markings for asbestos waste.
5. A HEPA filtered vacuum with a capillary tube for insertion into the glovebag.
6. Tools such as a small scrub brush, a utility knife for cutting the insulation, a stapler, wire cutters, smoke tubes with aspirator bulb, tin snips, duct tape, and wettable cloths.
7. A roll of 6 mil polyethylene.
8. An encapsulant.

G. Glovebag Removal procedures shall be conducted as follows:

1. Preparation: A visual inspection of the pipe where the work will be performed shall be made to determine if any damaged pipe covering (broken lagging, hanging, etc.) exists. If there is, the pipe shall be wrapped in polyethylene plastic and fully secured

with duct tape. This procedure will prevent high airborne fiber concentrations from occurring during the glovebag work caused by pipe lagging, hanging several feet or even several yards away, which may be jarred loose by the abatement work activities. Debris on the floor and other surfaces that has accumulated and contains asbestos must be cleaned up as necessary. If the pipe is undamaged, one layer of duct tape shall be placed around the pipe at each end of where the glovebag will be attached. This permits a good surface to which to seal the ends of the glovebag and it minimizes the chance of releasing fibers when the tape at the ends of the glovebag is peeled off at the completion of the job. Place one layer of 6 mil plastic underneath the Work Area, extending at least 6 feet in all directions.

2. Installation and Removal: Install the glovebag according to manufacturer's recommendations. Cut covering on the insulation along the top seam to allow wetting of the insulation, and cut cover all around sections to be removed. Remove material in small sections. Lower the material carefully inside the glovebag. Do not permit it to drop.
3. Removal of Glovebag and Disposal: Following ACM removal, ensure that all visible material is inside the bag. Spray all tools in glovebag with amended water while it is still attached. Evacuate bag with portable HEPA vacuum and while the bag is collapsed, squeeze bag below tool pouch, and twist bag. Seal bag with tape or locking ties, separating the waste from the removal area. Vacuum the inside of the top of the glovebag and unsealed portion of the glovebag below. Keep HEPA vacuum connected until the glovebag is removed. Replace HEPA filters as recommended by manufacturer. Cut the glovebag along the top and sides, and then remove it from the pipe. Wet pipe and wash all tools and removal area thoroughly.

H. Immediately remove any asbestos-containing debris which collects on the drop sheet either by using a HEPA vacuum or by spraying with amended water or removal encapsulant, collecting with wet towels, placing in a disposal bag while still wet, and cleaning the surface of the plastic sheet with wet towels.

I. Upon completion of the work, fold the drop sheet and all of its contents toward the center. Place the sheet in a properly labeled 6 mil polyethylene disposal bag. Neck down the bag and collapse it with the HEPA vacuum. Twist the bag shut, fold over and seal with duct tape by wrapping around the bag neck at least three times.

J. Clean all surfaces of the work area by use of a HEPA filter vacuum and/or wet wiping until no visible residue remains.

K. Dispose of glovebag, waste material, disposable clothing, and contaminated equipment in accordance with all applicable regulations and Paragraph 3.8.

L. Upon completion of abatement, conduct final cleanup, encapsulation and clearance procedures as described in Paragraph 3.7.

3.5 ALTERNATIVE PROCEDURES

A. Procedures described in this specification are to be utilized at all times.

B. If specified procedures cannot be utilized, a request must be made in writing to the IHC providing details of the problem encountered and recommended alternatives.

C. Any alternative procedure must be approved in writing by the IHC prior to implementation.

3.6 REMOVAL OF ASBESTOS ON BUILDING EXTERIOR

A. This section shall apply to the removal of built-up roofing.

1. Roofing materials shall be removed in an intact state to the extent feasible.
2. Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards.
3. Cutting machines shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.
4. When removing built-up roofing with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, a HEPA dust collector shall collect all dust resulting from the cutting operation, or shall be HEPA vacuumed by vacuuming along the cut line.
5. Asbestos-containing material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist:

    a. Any ACM that is not intact shall be lowered to the ground a soon as is practicable, bin in any event no later than the end of the work shift. While the material remains on the roof it shall either be kept we, placed in an impermeable waste bag, or wrapped in plastic sheeting.
    b. Intact ACM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.

6. Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.
7. Roof level heating and ventilation air intake sources shall be isolated or the ventilations system shall be shut down.

B. This section shall apply to the removal of Transite® soffits.

1. Cutting, abrading or breaking Transite® panels shall be prohibited unless the Contractor can demonstrate that methods less likely to result in asbestos fiber release cannot be used.

2. Each panel shall be sprayed with amended water prior to removal.
3. Unwrapped or un-bagged panels shall be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.
4. Nails shall be cut with flat, sharp instruments.

3.7 FINAL CLEANUP PROCEDURES

A. Remove and containerize all visible accumulations of asbestos-containing material and asbestos contaminated debris utilizing rubber dust pans and rubber squeegees to move material around. Do not use metal shovels to pick up or move accumulated waste.

B. Remove all containerized waste from the work area.

C. Decontaminate all tools and equipment and remove at appropriate time in cleaning sequence.

D. Inspect the work area for visible residue. If any accumulation of residue is observed, it will be assumed to be asbestos and the cleaning cycle repeated.

E. The work area shall be cleaned until it is visually clean as determined by the assigned IHC. Additional cleaning cycles shall be provided as necessary at no cost to the Government until cleaning is satisfactory.

F. The contractor shall notify the Government's representative (IHC) 24 hours in advance for the performance of the final visual review and testing. The final visual review and testing will be performed by the IHC. Air sample collection will commence no sooner than 24 hours after conclusion of the contractor's final cleaning or sooner upon agreement with the contractor if the work area is dry.

G. Final inspection will include the entire work area, the personnel decontamination facility, all plastic sheeting, seals over ventilation openings, doorways, windows, other openings, and all surfaces from which asbestos-containing material has been removed. Contractor must provide adequate lighting to perform visual inspections. If any debris, residue on surfaces, dust, or other matter is found, repeat final cleaning and continue decontamination. When the work area is visually clean, notify the Government's representative. Visual inspection is not complete until confirmed in writing, by the Government's representative. Visual inspections will be performed in accordance with the "Standard Practice for Visual Inspection of Asbestos Abatement Projects", ASTM Designation E1368-90.

H. After the visual inspection is complete and has been verified by the Governments representative, perform a lock-down encapsulation of all surfaces from which ACM was removed. Apply encapsulant in accordance with the manufacturer's printed instructions for use and apply with an airless spray gun, air pressure and nozzle orifice as recommended by the encapsulant manufacturer. Maintain negative pressure in work area during encapsulant work.

I. Operate HEPA filtered fan unit in space for 48 air changes minimum.

J. When the encapsulant has completely dried, clearance air samples may be collected in accordance with the procedures for PCM specified elsewhere in this section.

K. Failure of general areas to meet the specification requirements for cleanliness will require further area cleaning at the contractor's expense.

3.8 DISPOSAL OF ASBESTOS-CONTAINING MATERIALS

A. Permits and Notifications: Secure necessary permits in conjunction with asbestos removal, hauling and disposition and provide timely notification of such actions, as may be required by Federal, State, regional, and local authorities. Notify the Regional Office of the United States Environmental Protection Agency and provide copies of the notification to the Government/IHC a minimum of 10 working days prior to the commencement of the work. Provide notification in accordance with 40 CFR 61.22(d) (1).

B. Disposal of Asbestos: Collect and dispose of all RACM, Category I and Category II asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing which may produce airborne concentrations of asbestos fibers in sealed impermeable bags or drums. Prior to placing in bags or containers, wet down asbestos wastes to reduce airborne concentrations. Waste asbestos material shall be disposed of in accordance with EPA and Montana Department of Health and Environmental Sciences requirements at a Class II landfill. The "small quantity exclusion" of the regulations shall not apply to disposal of waste asbestos materials. Establish a temporary holding area approved by the Government for properly packaged asbestos waste. This area is only to be used during the regular Asbestos Abatement Contractor's work hours.

END OF SECTION 02080

DIVISION 2 - SITE WORK

SECTION 02091 - FLUORESCENT LIGHT BALLAST AND TUBE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing, General Provisions of the Contract and Division 1 Specification Sections apply to work of this Section.

1.2 DESCRIPTION OF WORK

A General: This section includes all work necessary to remove and recycle or properly dispose of polychlorinated biphenyl (PCB) containing or PCB contaminated fluorescent light ballasts or fixtures and equipment and all work necessary to remove and recycle fluorescent light tubes from Building 737, Dormitory, Malmstrom AFB, Montana.

B. The work under this contract consists of all work specified in these specifications.

1. Scope of Work - Fluorescent Light Ballast Removal:

a. The Scope of Work for the Fluorescent Light Ballast Removal to be conducted includes the removal and disposal by incineration of all PCB-containing fluorescent light ballasts. Disposal of light fixtures after removal of ballasts and light tubes is not required except where leakage from ballasts has contaminated fixtures or tubes.
b. Contractor shall inspect all light fixtures for PCB containing ballasts and segregate PCB containing from non-PCB containing ballasts. Dispose non-PCB containing ballasts as general construction waste.

2 Scope of Work - Fluorescent Light Tube Removal and Recycling:

a. The Scope of Work for the Fluorescent Light Tube Removal includes the removal and on-site recycling or the removal, proper packaging, shipment and off-site recycling of all fluorescent tubes located in the building.

3. General locations of PCB-containing ballasts are presented below. Contractor must verify actual quantities to be removed/disposed.

Material	Locations	Estimated Quantity
Fluorescent Light Tubes	Throughout Building	176 Each
PCB-Containing Ballasts	Throughout Building	87 Each

1.3 REFERENCES

A. American National Standards Institute (ANSI) Publications:

1. Z9.2-79 Fundamentals Governing the Design and Operation of Local Exhaust Systems

B Code of Federal Regulations (CFR):

1. 29 CFR 1910.1001, Occupational Safety and Health Act (OSHA).
2. 29 CFR 1910.20, Subpart C, General Safety and Health Provisions.
3. 29 CFR 1910.134, OSHA Respirator Requirements.
4. 29 CFR 1926.147, OSHA Control of Hazardous Energy
5. 49 CFR 173, Transportation and Labeling Requirements.
6. 40 CFR 761, Toxic Substances Control Act (PCB removal)

1.4 DEFINITIONS

A. Authorized Visitor: The Government, a representative of the Government, or a representative of any regulatory or other agency having jurisdiction over the project.

B. Clean Room: An uncontaminated area or room that is part of the worker decontamination unit, with provisions for storage of workers' street clothes and protective equipment.

C. Contractor: The "Contractor" referenced in this section is the licensed PCB Removal Contractor performing the work under this contract, and any authorized subcontractor. The General Contractor will be referred to as "General Contractor" for clarity in this section.

D. Decontamination Unit: A series of connected rooms or spaces between any two adjacent rooms, for the decontamination of workers, materials, and equipment.

E. Equipment Room: A room between the shower room and the work area in the decontamination unit. Equipment and supplies may be stored here.

F. Removal: All herein specified procedures necessary to remove all PCB-containing materials, and to properly dispose of these materials at an acceptable site.

G. Shower Room: A room between the clean room and the equipment room in the decontamination unit, with hot and cold or warm running water and suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.

1.5 QUALITY ASSURANCE

A Contractor Qualifications: The Contractor shall be a firm of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workers skilled in PCB removal and fluorescent tube recycling and shall have performed this work on previous projects. See "Submittals" paragraph for information that must be submitted and approved.

B. PCB Control Limits: Concentrations of PCB's inside and outside the control areas shall not exceed the background level in the area before the work was started. Any concentrations resulting from spillage of PCB oils and/or contractor abatement practices shall be immediately cleaned at contractor expense until background levels are obtained.

1.6 SUBMITTALS

A. Submit four complete sets of the following after contract award:

1. Contractor Qualification Information: Approval of the following submittals, which shall be submitted after award:

a. Name and location of at least 5 PCB removal projects performed by the Contractor, including name and telephone number of contract representative.
b. Name of and experience record of superintendent and foreman. Include evidence of knowledge of applicable regulations, evidence of participation and successful completion of training course for Hazardous Waste Operations and Emergency Response.
c. Name, location and contact person of proposed disposal and recycling facilities.

B. Submit four complete sets of the following prior to beginning work. Do not commence work until the following has been approved.

1. Plan of Action: Submit a detailed work plan of the procedures proposed for use in complying with the regulations included in this specification. The plan must be approved prior to commencement of work and shall include the following:

a. location and layout of decontamination areas, and explanation of intended decontamination sequence,

b. sketches of intended work zones,
c. description of all ballast and fluorescent tube removal methods to be used,
d. sequencing and scheduling of work,
e. interface of trades involved in the performance of work,
f. methods to be used to assure the safety of workers, building occupants, and visitors to site,
g. disposal plan including location of approved disposal site(s), packaging of removed PCB items, and handling, transport and disposal of PCB waste materials, including evidence of all necessary Government approvals to dispose of the waste,
h. description of protective clothing and manufacturers specifications of all equipment including respirators to be used,
i. a detailed description of the methods to be employed to control pollution,
j. list of trained workers to be used on the project,
k. evidence of medical examinations for workers to be used on this project,
l. Material Safety Data Sheets for all chemicals (i.e. chemical rinse agents, decontamination solutions, etc.) to be used on the project,
m. description of final cleaning procedures to be used,
n. description of emergency procedures to be followed in case of injury, fire, or temporary utilities failure. Include evacuation procedures, source of medical assistance (names and phone numbers for Government, Government's Representative, fire, police, emergency squad, and local hospital), and procedures to be used for access by medical personnel (for example, rescue squad and physician).

2. Policies: Submit copies of all types of specified bonds and insurance, and notification of bonding and insurance companies indicating extent of coverage.
3. Listing of subcontractors: Submit listing of all subcontractors including qualifications and copies of licenses, permits, etc. as applicable.

C. Submit the following upon project completion:

1. Written certification that Contractor has fully completed work in strict accordance with the Plans and Specification.
2. Copies of all waste manifests and disposal documentation.
3. Copies of Certificate of Recycling for all items, which were recycled.

1.7 CONTRACTOR RESPONSIBILITY

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to the protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations, and shall hold

the government harmless for failure to comply with any applicable safety or health regulation on the part of himself, his employees, or his subcontractors.

1. The Contractor shall be responsible in all areas affected by his operation for:

   a. Building security.
   b. Maintaining the existing building and utility systems such as plumbing or electrical installations.
   c. Site maintenance during the hours of operation.

C. Should the failure of any utility occur, the Government shall not be responsible for any loss of time or other expense incurred by Contractor, who shall provide his own temporary utilities at his own expense.

1.8 PROJECT/SITE CONDITIONS

A. Means of Egress: Establish and maintain emergency and fire exits from the work area.

B. Use of Existing Facilities: Contractor is to coordinate access to work areas with General Contractor.

1. Utilities: It will be the responsibility of the Contractor to coordinate utility outages required to perform this work.

   Electrical systems that feed light fixtures shall be shut down and locked out with appropriate safety devices installed. Adhere to all Federal and State regulations of lockout/tag out procedures.

2. Barriers: Provide barriers, covers, safety guards, warning lights, or other protection and warning devices as required by local codes and ordinances, and as necessary to prohibit passage of pedestrians and vehicles into unsafe areas. Safety at the site is the responsibility of the Contractor, and all precautions shall be provided by the Contractor to protect the Government from claims for damages or injury.
3. Temporary Power and Light: The Contractor shall provide extension cords and lamps as necessary for work under the Contractor's Contract, and shall provide connections required to complete the work. A minimum illumination level of fifteen (15) foot-candles shall be maintained in all interior areas in which work is in progress.
4. Temporary Controls: Provide and maintain methods, equipment, and temporary construction, as necessary, to provide controls over the environmental and other project site conditions, and related areas under Contractor's control. Remove physical evidence of temporary control facilities at completion of the work.
5. Facilities for Observation: Every convenience must be given the Government and Government's Representative for safe observation of the work, such as ladders and

scaffolding. Contractor shall provide adequate supplies of protective clothing and respiratory protective equipment for use by the Government's Representative or other authorized site visitors.

C. Maintenance of Existing Equipment:

1. All appurtenances associated with the removal of light fixtures will be well-maintained to ensure worker safety.
2. Adequate safety lighting will be maintained during work to insure safe working conditions and emergency exit/egress of personnel.

D. Environmental Conditions to be Maintained:

1. PCB-containing ballasts and fluorescent tubes shall be handled to avoid breakage and subsequent spillage of PCB oils and fluids or the accidental release of gas from the interior of fluorescent tubes into the work area. Spilled PCB-containing oils and leaking equipment will be cleaned immediately. The Contractor will take all precautions to avoid traffic through spills. All equipment and disposables used to clean spills will be disposed of as PCB-containing materials.
2. Access to Work Area: Access to work areas shall be controlled. The following shall have access to work area:
3. Authorized personnel employed by the contractor.
4. Government's Representative employed to conduct area air monitoring.
5. State and local inspectors.

E. Housekeeping: Essential parts of PCB contamination control and fluorescent tube management are housekeeping and clean-up procedures. Keep all work areas, storage, areas, and equipment areas neat and organized. Provide for collection and proper disposal of all rubbish.

1.9 SEQUENCING/SCHEDULING

A. Scheduling Plan: Submit a detailed sequencing/scheduling plan of the work proposed in complying with this specification. The plan shall include references to other efforts to be completed concurrently, and must show considerations to assure the safety of personnel, building occupants and visitors to the site. The plan must be approved prior to commencement of work. Any considerations for safety including timely removal of spilled hazardous wastes, etc. will be included in any sequencing/scheduling plan.

B. Work Sequence: Coordinate all work with General Contractor.

1.10 PERMITS AND NOTIFICATIONS

A. Permits and Notifications: The Contractor shall secure all necessary permits in conjunction with PCB removal, hauling, and disposition, and provide timely notification of such actions, as may be required by Federal, State, regional, and local authorities.

1.11 PERSONNEL TRAINING REQUIREMENTS:

A. Training: All personnel accomplishing PCB removal shall have received at least 40 hours of training as specified under the Hazardous Waste and Emergency Response regulations (29 CFR 1910.120) and shall have received the following additional training:

1. Special on-site training specific to equipment and procedures unique to this job site shall be performed as required.
2. Training in emergency response and evacuation procedures.
3. Training in cardiopulmonary resuscitation (CPR).
4. Training in First Aid.

PART 2 - PRODUCTS

2.1 PROTECTIVE CLOTHING, EQUIPMENT, AND SUPPLIES

A. Compliance: Equipment, including protective clothing and respirators, used in the execution of this contract and provided to visitors to the site, shall comply with applicable Federal, State, and local regulations. Respirators shall conform to the OSHA requirements in 29 CFR 1910.134.

B. Work Area Responsibility: It is the Contractor's responsibility to require that each person (worker or visitor) entering the work area wears an approved respirator and protective clothing. There shall be no exceptions to this requirement.

C. Protective Clothing: Provide approved protective equipment including but not limited to respirators and protective clothing including head, foot, and full body protection, in sufficient quantities and adequate sizes for all workers and all authorized visitors who may inspect or visit.

D. Respirators: Respirators will be of a type approved by NIOSH and MSHA for use during PCB removal operations.

E. Miscellaneous Safety Equipment: Hardhats, protective eyewear, gloves, rubber boots or other footwear shall be provided as required for workers and authorized visitors. Safety shoes may be required for some activities. Protective equipment used in the removal of

PCB-contaminated items and in the testing of suspect PCB-containing equipment shall be of proper materials to adequately protect the individual conducting the work.

F. Inventory Maintenance: Provide and maintain sufficient inventory of protective clothing, respirators, filter cartridges, plastic sheeting of proper size and thickness, duct tape, glue, adhesives, disposable towels, and air filters for the work required and the numbers of workers, visitors, and inspection personnel entering the work areas.

G. Electrical Equipment: All electrical appliances used in conjunction with the removal will be used with ground fault interruption units. Each electrical appliance will have its own electrical outlet.

H. Fire Extinguishers: Fire extinguishers in sufficient quantity to deal with any small fires shall be kept in the work area, minimum one per each homogeneous work area. I. Drums: Provide an adequate number of removable-top 17C steel drums to package removed light ballasts and other equipment, including light fixtures. Drums used for the disposal of PCB contaminated waste materials including ballasts and electric cooling fluids shall be new and in an undamaged condition, and shall be approved by the Government's Representative.

I. Absorbent: Provide sawdust or other inert, absorbent material to pack around removed ballasts and equipment in the drums.

J. Liners: Provide plastic drum liners of a minimum 6-mil thickness designed for use in the drum size specified.

2.2 DECONTAMINATION UNIT

A. Where applicable and necessary, provide a decontamination unit consisting of a serial arrangement of rooms or spaces adjoining the work area, or a decontamination trailer, for decontamination of workers conducting PCB removal, and for any authorized visitor entering the work area. The decontamination unit or trailer shall conform to the following minimum specifications:

1. Provide an adequate decontamination unit consisting of a serial arrangement of rooms or spaces adjoining the Work Area or in a decontamination trailer. A remote decontamination unit (trailer) may be approved for use during removal of PCB materials. Should a remote decon be used, workers shall use two protective suits, removing the outer suit and properly disposing of it, prior to exiting the work area and proceeding to the decon facility. Two layers of 6 mil clear plastic may be used for the floors. On-site constructed decontamination units must be able to withstand wind and rain if built outdoors. Construction must use 2” x 3” or 2” x 4” framing, or equivalent, and must be large enough to accommodate large individuals adequately.

PART 3 - EXECUTION

3.1 PROCEDURES FOR BALLAST REMOVAL AND DISPOSAL

A. General Procedures: Perform all PCB related work and comply with the general safety and health provisions in conformance with all applicable safety and health regulations. Use general work practices, and testing, removal, and disposal practices as specified in 40 CFR Part 761.

B. Preparation: Isolate the control area for the duration of the work by sealing off area with signs and warning tape. Post warning signs and labels as required, and as directed by the Government's Representative. Cover floor surfaces in the work area with plastic sheeting taped securely in place to protect from damage. Before the work is begun, clean all removable items and equipment. Remove them from the work area and store as directed.

C. Coordination of Work of all Trades: Coordinate the work of all trades to assure that their work is performed in accordance with the applicable regulations and that the PCB control limits are maintained at all times both inside and outside the control area.

D. Ballast Removal: Remove light ballasts from fluorescent fixtures. Ballasts shall be carefully inspected for markings indicating PCB content. Any ballast which is not clearly labeled as Non-PCB containing shall be assumed to contain PCB's and shall be carefully detached from the fixtures and placed in approved 55-gallon drums which are lined with at least one layer of 6-mil poly sheeting for disposal as a PCB material. Do not drop ballasts from the ceiling. Ballasts clearly labeled as NON-PCB shall be segregated for recycling.

E. Cleaning and Collection of Contaminated Oils: If visible leakage of oils from ballasts is present, remove entire fixture and place into approved 55-gallon drums.

F. Site Inspection: While performing the work, the Contractor shall be subject to on site inspection by agency officials. Work shall also be subject to inspection by OSHA and EPA inspectors and/or local building or health officials. If found to be in violation of 29 CFR 1910.1001, the Contractor shall cease all work immediately and until the violation is resolved. Standby time required to resolve the violation shall be at the Contractor's expense. One complete set of equipment (such as respirators and disposable clothing) required for entry to the control area shall be made available within 2 hours of request by the Government's Representative for inspection of the control area. Such requests will only be made during working hours.

G. Housekeeping: Essential parts of PCB contamination control are housekeeping and clean-up procedures. Maintain all surfaces throughout the building free of PCB contaminated electrical fluids, ballast oils, and equipment. Give meticulous attention to restricting the spread of oils and stained debris, keep waste from being distributed over the general area or

to lower floors. Equip personnel engaged in PCB testing, removal, cleaning, and disposal, with necessary respiratory equipment and protective clothing.

H. Emergency Spill Cleanup Procedure: Contact EPA regional office as required depending on the size of the spill. Restrict access to the spill area and establish a minimum three foot buffer zone around the spill area. Stop PCB flow with absorbent material. Remove all visible traces of spill from solid surfaces and soils. Conduct sampling of contaminated area to confirm that background levels of PCB have been re-established. Reclean and re-sample the spill area as required to ensure that the PCB contamination has be eliminated.

I. Sampling: Sampling, if required, of PCB's released during removal of ballasts shall be in accordance with EPA standards. Inspection of the work area for PCB's after final clean-up, and removal of the enclosure of the PCB control area, shall be completed in accordance with paragraph "Final Clean-Up and Removal of Enclosure."

J. Final Clean-up and Removal of Enclosure: The Government or a designated representative will inspect the work area prior to decontamination and removal of control area enclosure. Oil or oil-stained debris through visual observation is not permitted on any surface in or around the work area. Clean work area in accordance with EPA approved methods. If remaining PCB-contaminated materials do not exceed the level recommended by EPA, the Government or a designated representative may authorize removal of the enclosure.

K. Disposal of Waste: Turn in all light ballasts or electrical equipment with PCB’s to the Environmental Flight. Transformers, capacitors, switching gear, etc. often contain PCB’s for cooling purposes. If hermetically sealed equipment, then turn into Environmental Flight assuming that it has a PCB concentration greater than 500 ppm limit.

1. The contractor shall count the number of units for turn in, place units in a DOT shipping container furnished by him, and call Environmental Flight (PH 6438) three days in advance to schedule contractor delivery to building 411 on base. Deliver all containers to building 411.

3.2 PROCEDURES FOR FLUORESCENT TUBE REMOVAL AND RECYCLING

A. General Procedures: All fluorescent light tubes shall be managed in such a way as to prevent incidental breakage and subsequent release of mercury-containing vapor or tube lining. Perform all tube-removal related work and comply with the general safety and health provisions in conformance with all applicable safety and health regulations. Use general work practices, and testing, removal, and disposal practices as specified in 40 CFR Part 761.

B. Fluorescent light tubes shall be carefully removed from fixtures and packaged to prevent breakage during subsequent handling or shipping.

C. Fluorescent tubes must be recycled. The recycling process may be performed either on-site or at a remote location. All recycling processes/facilities shall have been audited and approved by at least 2 independent third-party auditors. Contractor shall provide contact names of auditors.

D. Upon completion of recycling, provide Certificate of Recycling detailing number of tubes recycled, date of recycling, location and name of recycler. Each certificate shall be signed and dated by the contractor removing the tubes and, if recycling is performed by others, the recycling firm.

END OF SECTION 02091

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DIVISION 2 - SITE WORK

SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing.
4. Topsoil stripping.
5. Removing above-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Government's property, cleared materials shall become Contractor's property and shall be removed from the site.

B. Contractor shall deliver all excess satisfactory topsoil material to a designated site on base located within 2 miles of the Project site.

1.5 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

C. Record drawings according to Division 1 Section "01702 As Built Records And Drawings."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Government and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Government's premises where indicated.

C. Notify utility locator service (Malmstrom Zone Personnel) for area where Project is located before site clearing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Government.

3.2 TREE PROTECTION

A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.
2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.

4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Contracting Officer's Representative.

1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

a. Deciduous Trees: Replace with equal size or 6 inch caliper minimum.
b. Evergreen Trees: Replace with equal size or 8 foot tall minimum.

3.3 UTILITIES

A. Government will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Government will arrange to shut off indicated utilities when requested by Contractor.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Government or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Contracting Officer's Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Contracting Officer's Representative's written permission.

D. Excavate for and remove underground utilities indicated to be removed.

E. Removal of underground utilities is included in Division 15 mechanical or Division 16 electrical Sections.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding 8 inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials. Assume stripping to a depth of 6 inches.

1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil and allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Government's property.

END OF SECTION 02230

DIVISION 2 - SITE WORK

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches within building lines.
8. Excavating and backfilling trenches for buried mechanical, fire protection, and electrical utilities and pits for buried utility structures.

1.3 DEFINITIONS

A. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

B. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as directed by Contracting Officer's Representative. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Fill: Soil materials used to raise existing grades.

D. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

E. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

F. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

G. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Retain only those Submittals required for Project.

C. Seismic survey agency report, for record purposes.

1.5 QUALITY ASSURANCE

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for the compliance of the following with requirements indicated:

1. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Government or others unless permitted in writing by Contracting Officer’s Representative and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Contracting Officer’s Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Contracting Officer’s Representative's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase and Base - Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve.

F. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water and fire systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXCAVATION, GENERAL

A. Explosives: Do not use explosives.

B. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations from 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to the following if not indicated on the Drawings:

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
2. Excavate fire department connection trench to approximately 2 feet, 0 inches below grade. Slope pipe as shown on Plans.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
3. Excavate trenches 4 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.7 APPROVAL OF SUBGRADE

A. Notify Contracting Officer's Representative when excavations have reached required subgrade.

B. If Contracting Officer's Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Unforeseen additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Contracting Officer's Representative.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Contracting Officer's Representative.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Contracting Officer's Representative.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.11 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping in compacted lifts not to exceed 8 inches loose measurement. Avoid damage or displacement of utility system.

D. Coordinate backfilling with utilities testing.

E. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

F. Place and compact final backfill of satisfactory soil material to final subgrade.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.13 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.

3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1/2 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
3. Shape subbase and base to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design-bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Contracting Officer's Representative.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Contracting Officer's Representative; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Government's property.

END OF SECTION 02300

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DIVISION 2 – SITE WORK

SECTION 02510 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes piping and specialties for fire-protection water service outside the building to a flange approximately 1'0" inside the building.

1.2 RELATED WORK

A. Drawings and general provision of the Contract, including General and Supplementary conditions and other Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere:

Excavation	Section 02300
Cathodic Protection	Section 13170
Fire Alarm	Section 13851
Fire Sprinklers	Section 13910

C. Examine the above referenced specification parts thoroughly before submitting a proposal for accomplishment of work in this section.

D. Recycling Initiative: The Contractor shall provide recycled products specified in this Section to the extent obtainable IAW the provisions of executive Order 13101, the requirements specified in Section 01000, and the Specification requirements of this Section. If conflicts exist between the products specified in this Section and the recycled product, the Contractor shall provide a recycled product that most nearly matches the salient features of the specified product.

1.3 REGULATORY AGENCIES

A. The term jurisdictional authority used in this section of the specification shall include, as applicable, but not be limited to the following:

1. Malmstrom Air Force Base Assistant Chief of Fire Prevention.
2. Contracting Officer.

B. The installation of all systems of fire protection water distribution shall conform to all requirements of applicable codes and publications herein defined:

1. Uniform Building Code (1997)
2. Uniform Fire Code (1997)
3. NFPA #13 (1999)
4. NFPA #24 (1996)
5. All State and local ordinances
6. Underwriters' Laboratories
7. American Society of Testing Materials
8. American National Standards Institute
9. Occupational Safety and Health Administration

1.4 SUBMITTALS

A. The successful Contractor shall provide submittal data as required under other portions of this specification. Submittals shall conform to the instructions set forth in the General and Special Conditions of these specifications entitled Shop Drawings and Submittals.

B. Submit shop drawings (detailed working drawings), showing dimensions, utilities or other items affecting the fire protection water distribution systems to jurisdictional agencies for review and approval. All items identified in NFPA #24 for proper working drawings shall be complied with. The Contracting Officer will reject all submittals not in compliance. Submit four (4) sets of shop drawings to Contracting Officer for review. These final acceptance sets shall have all agency`s stamps of review and acceptance.

C. Shop drawings shall be prepared in Auto CADD Release 2000 compatible software.

D. Contracting Officer's review will be for general location only. It will be the Contractor's responsibility to check his drawings for interferences and to do shop fabrication from measurements taken at the job site.

E. Work on the project shall not begin until plans have been reviewed by the Contracting Officer.

F. Four (4) sets of full catalog information shall be submitted for approval for all materials provided including:

1. Backflow preventors.
2. Pipe and fittings.
3. Valves.

G. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Submittals not in compliance will be rejected.

H. Coordination Drawings: For piping and specialties including relation to other services in same area. Show piping and specialty sizes and valves, specialty locations, and elevations.

I. Record Drawings: At Project closeout of installed water-service piping according to Division 1 Section "01702 As Built Records And Drawings."

J. Test Reports: As specified in "Field Quality Control" Article in Part 3.

K. Purging and Disinfecting Reports: As specified in "Cleaning" Article in Part 3.

L. Maintenance Data: For specialties to include in the maintenance manuals specified in Division 1. Include data for the following:

1. Backflow preventors.
2. Valves.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Working Pressures: The following are minimum pressure requirements for piping and specialties, unless otherwise indicated:

1. Fire-Protection Water Service: 200 psi.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, and dimensional requirements of water-service piping specialties.

B. Comply with standards of authorities having jurisdiction for fire-protection water-service piping. Include materials, hose threads, installation, and testing.

C. Comply with NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances," for materials, installations, tests, flushing, and valve and hydrant supervision.

D. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.

E. Provide listing/approval stamp, label, or other marking on piping and specialties made to specified standards.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, according to the following:

1. Do not remove end protectors, unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade.

F. Protect flanges, fittings, and specialties from moisture and dirt.

1.8 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Verify that water-service piping may be installed to comply with original design and referenced standards.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate connection to water main with utility company.

B. Coordinate piping materials, sizes, entry locations, and pressure requirements with building fire-protection water piping.

C. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Drilling-Machine, Sleeves, and Corporation Stops:

a. Ford Meter Box Co., Inc.
b. Grinnell Corp.; Mueller Co.; Water Products Div.
c. Lee Brass Co.

2. Tapping Sleeves, Valves and Service Boxes:

a. American Cast Iron Pipe Co.; Waterous Co.
b. East Jordan Iron Works, Inc.
c. Grinnell Corp.; Mueller Co.; Water Products Div.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa)
e. McWane, Inc.; Kennedy Valve Div.
f. United States Pipe & Foundry Co.

3. Gate Valves:

a. American Cast Iron Pipe Co.; Waterous Co.
b. East Jordan Iron Works, Inc.
c. Grinnell Corp.; Mueller Co.; Water Products Div.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa)
e. McWane, Inc.; Kennedy Valve Div.
f. McWane, Inc.; Tyler Pipe; Utilities Div.
g. United States Pipe & Foundry Co.

4. Indicator Posts and Indicator Gate Valves:

a. American Cast Iron Pipe Co.; American Flow Control Div.
b. American Cast Iron Pipe Co.; Waterous Co.
c. Grinnell Corp.; Mueller Co.; Water Products Div.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa)

e. McWane, Inc.; Kennedy Valve Div.
f. Nibco, Inc.

5. Alarm Devices:

a. Grinnell Corp.; Grinnell Supply Sales Co.
b. Pittway Corp.; System Sensor Div.
c. Potter Electric Signal Co.

2.2 PIPES

A. General: Applications of the following pipe materials are indicated in Part 3 "Piping Applications" Article.

B. Ductile-Iron, Push-on-Joint Pipe: AWWA C151, with cement-mortar lining and seal coat according to AWWA C104. Include rubber compression gasket according to AWWA C111.

C. Ductile-Iron, Mechanical-Joint Pipe: AWWA C151, with cement-mortar lining and seal coat according to AWWA C104. Include gland, rubber gasket, and bolts and nuts according to AWWA C111.

2.3 PIPE FITTINGS

A. General: Applications of the following pipe fitting materials are indicated in Part 3 "Piping Applications" Article.

B. Ductile-Iron, Push-on-Joint Fittings: AWWA C110, ductile-iron or cast-iron; or AWWA C153, ductile-iron, compact type. Include cement-mortar lining and seal coat according to AWWA C104 and rubber compression gaskets according to AWWA C111.

C. Ductile-Iron, Mechanical-Joint Fittings: AWWA C110, ductile-iron or cast-iron; or AWWA C153, ductile-iron, compact type. Include cement-mortar lining and seal coat according to AWWA C104 and glands, rubber gaskets, and bolts and nuts according to AWWA C111.

D. Cast-Iron Flanged Fittings: ASME B16.1, Class 125, unless otherwise indicated.

2.4 JOINING MATERIALS

A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.

B. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

C. Ductile-Iron Piping: The following materials apply:

1. Push-on Joints: AWWA C111 rubber gaskets and lubricant.
2. Mechanical Joints: AWWA C111 ductile-iron or gray-iron glands, high-strength steel bolts and nuts, and rubber gaskets.
3. Flanged Joints: AWWA C115 ductile-iron or gray-iron pipe flanges, rubber gaskets, and high-strength steel bolts and nuts.

a. Gaskets: Rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
b. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

2.5 PE ENCASEMENT

A. PE Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

2.6 FIRE PROTECTION VALVES

A. Valve Boxes: Cast-iron box with top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.

B. Indicator Posts: UL 789, FM-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve.

C. Tapping Sleeve and Tapping Valve: Complete assembly, including tapping sleeve, tapping valve, service box and bolts and nuts. Use sleeve and valve compatible with tapping machine.

1. Tapping Sleeve: Cast- or ductile-iron, 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical-joint ends with rubber gaskets or sealing rings in sleeve body. Include sleeve matching size and type of pipe material being tapped and of outlet flange required for branch connection.

2.7 ANCHORAGES

A. Clamps, Straps, and Washers: ASTM A 506, steel.

B Rods: ASTM A 575, steel.

C. Rod Couplings: ASTM A 197 (ASTM A 197M), malleable iron.

D. Bolts: ASTM A 307, steel.

E. Cast-Iron Washers: ASTM A 126, gray iron.

F. Concrete Reaction Backing: Portland cement concrete mix, 3000 psi.

1 Cement: ASTM C 150, Type I.

2 Fine Aggregate: ASTM C 33, sand.
3 Coarse Aggregate: ASTM C 33, crushed gravel.
4 Water: Potable.

2.8 FIRE PROTECTION ALARM DEVICES

A. Description: UL 753, FM approved, of types and sizes to mate and match piping and equipment.

B. Supervisory Switches: DPDT, designed to signal valve in other than full open position.

C. Coordinate tamper switches for post indicator valves with Fire Protection Specification Section #13910.

2.9 IDENTIFICATION

A. Arrange for detectable warning tapes made of solid blue film with metallic core and continuously printed black-letter caption "CAUTION--WATER LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 2 Section "Earthwork" for excavation, trenching, and backfilling.

B. Refer to Division 2 Section "Portland Cement Concrete Paving" for cutting and patching of paving.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications:

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

C. Do not use flanges or keyed couplings for underground piping.

1. Exception: Piping in boxes and structures, but not buried, may be joined with flanges or keyed couplings instead of joints indicated.

D. Fire-Protection Water-Service Piping: Use the following:

1. 4- to 8-Inch NPS: Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed joints.

2. 4- to 8-Inch NPS: Ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings;

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, 4-Inch NPS and Larger: UL/FM, gate valves, non-rising stem, with indicator post.

3.4 JOINT CONSTRUCTION

A. Ductile-Iron Piping, Gasketed Joints: According to AWWA C600.

B. Ductile-Iron Piping, Gasketed Joints for Fire-Service Piping: According to UL 194 and AWWA C600.

C. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

B. Install components with pressure rating equal to or greater than system operating pressure.

C. Install piping free of sags and bends.

D. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

3.6 SERVICE ENTRANCE PIPING

A. Extend fire-service piping and connect to fire-supply source and building water piping systems inside of building wall in locations and pipe sizes indicated.

1. Terminate fire-service piping inside building. Terminate piping with caps, plugs, or flanges as required for piping material. Make connection to fire sprinkler riser.

B. Sleeves and mechanical sleeve seals are specified in Division 15 Section "Basic Mechanical Materials and Methods."

C. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.7 PIPING INSTALLATION

A. Water-Main Connection: Arrange for tap in water main, of size and in location indicated.

B. Make connections with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to manufacturer's written instructions.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Install gate valve onto tapping sleeve. Comply with AWWA C600. Install valve with stem pointing up and with cast-iron valve box.
4. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.

C. Comply with NFPA 24 for fire-protection water-service piping materials and installation.

D. Install ductile-iron piping according to AWWA C600.

1. Encase piping with PE film according to ASTM A 674 or AWWA C105.

E. Provide and install Cathodic protection per specification section 13170.

F. Bury piping with depth of cover over top at least 72 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 72 inches cover over top.

2. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

G. Install piping under streets and other obstructions that cannot be disturbed, by tunneling, jacking, or combination of both.

3.8 ANCHORAGE INSTALLATION

A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Potable-Water Piping: According to AWWA C600.

2. Fire-Service Piping: According to NFPA 24.

B. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

3.9 VALVE INSTALLATION

A. General Application: Use nonrising-stem UL/FM gate valves for installation with indicator posts.

B. UL/FM-Type Gate Valves: Comply with NFPA 24. Install underground valves and valves in pits with stem pointing up and with vertical cast-iron indicator post.

3.10 ALARM DEVICE INSTALLATION

A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with curb boxes do not require supervision.

B. Supervisory Switches: Supervise valves in open position.

1 Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.

C. Connect alarm devices to building fire alarm system. Refer to Division 16 Section "Fire Alarm Systems" for wiring and devices not specified in this Section.

3.11 IDENTIFICATION INSTALLATION

A. Install continuous plastic underground warning tape during back-filling of trench for underground water-service piping. Locate 6 to 8 inches below finished grade, directly over piping.

B. Attach nonmetallic piping label permanently to main electrical meter panel.

3.12 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 200 psi 2 hours.

1. Increase pressure in 50-psi increments and inspect each joint between increments. Hold at test pressure for two hours. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within above limits.

C. Prepare reports for testing activities.

3.13 CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.

2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by that authority, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities, use procedure described in AWWA C651 or as described below:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine. Isolate system or part thereof and allow to stand for 24 hours.
    b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    c. Following allowed standing time, flush system with clean, potable water until chlorine does not remain in water coming from system.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports for purging and disinfecting activities.

END OF SECTION 02510

DIVISION 2 - SITE WORK

SECTION 02751 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Curbs and gutters.
2. Walkways.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates.
2. Admixtures.
3. Curing compounds.
4. Bonding agent or adhesive.
5. Joint fillers.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association’s Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves of a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.

1. Fly Ash: ASTM C 311.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:

1. Class: 4M.
2. Maximum Aggregate Size: 3/4 inch nominal.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

D. Water: ASTM C 94.

2.3 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

E. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

G. Products: Subject to compliance with requirements, provide one of the following:

1. Evaporation Retarder:

a. Cimfilm; Axim Concrete Technologies.
b. Finishing Aid Concentrate; Burke Group, LLC (The).
c. Spray-Film; ChemMasters.
d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
e. Sure Film; Dayton Superior Corporation.
f. Eucobar; Euclid Chemical Co.
g. Vapor Aid; Kaufman Products, Inc.
h. Lambco Skin; Lambert Corporation.
i. E-Con; L&M Construction Chemicals, Inc.
j. Confilm; Master Builders, Inc.
k. Waterhold; Metalcrete Industries.
l. Rich Film; Richmond Screw Anchor Co.
m. SikaFilm; Sika Corporation.
n. Finishing Aid; Symons Corporation.
o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.

2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:

a. AH Curing Compound #2 DR; Anti-Hydro International, Inc.
b. Res-X Cure All Resin; Burke Group, LLC (The).

c. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
d. Day-Chem Rez Cure; Dayton Superior Corporation.
e. Kurez DR; Euclid Chemical Co.
f. Nitocure S; Fosroc.
g. #64 Resin Cure; Lambert Corporation.
h. L&M Cure DR; L&M Construction Chemicals, Inc.
i. 3100-Clear; W. R. Meadows, Inc.
j. Seal N Kure FDR; Metalcrete Industries.
k. Rich Cure; Richmond Screw Anchor Co.
l. Resi-Chem C309; Symons Corporation.
m. Horncure 30; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
n. Uni Res 150; Unitex.
o. Certi-Vex RC; Vexcon Chemicals, Inc.

3. Clear Waterborne Membrane-Forming Curing Compound:

a. AH Curing Compound #2 DR WB; Anti-Hydro International, Inc.
b. Aqua Resin Cure; Burke Group, LLC (The).
c. Safe-Cure Clear; ChemMasters.
d. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
e. Day Chem Rez Cure (J-11-W); Dayton Superior Corporation.
f. Nitocure S; Fosroc.
g. Aqua Kure-Clear; Lambert Corporation.
h. L&M Cure R; L&M Construction Chemicals, Inc.
i. 1100 Clear; W. R. Meadows, Inc.
j. Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
k. Rich Cure E; Richmond Screw Anchor Co.
l. Resi-Chem Clear Cure; Symons Corporation.
m. Horncure 100; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
n. Hydro Cure; Unitex.
o. Certi-Vex Enviocure; Vexcon Chemicals, Inc.

2.5 RELATED MATERIALS

A. The Contractor may use one of the following:

1. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
2. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.
3. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

4. Bonding agents may be used directly from container or as an admixture in cement or sand cement slurry.
5. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Chemical Surface Retarder: Water-soluble, liquid set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Chemical Surface Retarder:

a. True Etch Surface Retarder; Burke Group, LLC (The).
b. Exposee; ChemMasters.
c. Delay S; Conspec Marketing & Manufacturing Co., Inc.
d. Concrete Surface Retarders; Euclid Chemical Co.
e. Expose; Kaufman Products, Inc.
f. Surftard; Metalcrete Industries.
g. Crete-Nox TA; Nox-Crete Products Group, Kinsman Corporation.
h. Lithotex; L. M. Scofield Co.
i. Rugasol-S; Sika Corporation.
j. Certi-Vex Envioset; Vexcon Chemicals, Inc.

2.6 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.

1. Do not use Government's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 4 inches.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: ASTM C 311.

a. 25 percent maximum.
b. 10 percent minimum.

E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:

1. Air Content: 6.0 percent for 3/4-inch maximum aggregate.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

C. Protect adjacent construction from discoloration and spillage during application of release agents, curing compounds, and sealers.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.

1. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 100 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

   a. Radius: 1/4-inch.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Radius: 1/4-inch.

3.4 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

I. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

J. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

K. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

L. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.5 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.6 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.7 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.8 PAVEMENT MARKINGS

A. Products: Pavement-marking paint to be alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N.

1. Color: White.

B. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Contracting Officer's Representative.

C. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

D. Sweep and clean surface to eliminate loose material and dust.

E. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.

7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
8. When total quantity of a given class of concrete is less than 50 cu. yd., Contracting Officer's Representative may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Contracting Officer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Contracting Officer's Representative but will not be used as the sole basis for approval or rejection.

E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Contracting Officer's Representative. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Contracting Officer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 02751

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DIVISION 2 - SITE WORK

SECTION 02813 - LAWN SPRINKLER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping, valves, sprinklers, lawn sprinkler specialties, controls, and wiring.

B. Related Sections include the following:

1. Division 15 Section "Water Supply Piping" for water supply piping.
2. Division 15 Section "Plumbing Specialties" for backflow preventers.
3. Minor Construction, Section 01010.

1.3 DEFINITIONS

A. Lateral Line Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Main Line Piping: Downstream from point of connection to water distribution piping to and including control valves. Piping is under water distribution system pressure.

C. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. NP: Nylon plastic.
3. PE: Polyethylene plastic.
4. PP: Polypropylene plastic.
5. PTFE: Polytetrafluoroethylene plastic.
6. PVC: Polyvinyl chloride plastic.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Water Coverage: 100 percent of turf and planting areas.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:

1. Main Line Piping: 200 psig.
2. Lateral Line Piping: 150 psig.

1.5 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include pressure rating, rated capacity, settings, and electrical data of selected models for the following:

1. Valves. Include aboveground and underground; general-duty, manual and automatic control, and quick-coupler types.
2. Valve boxes.
3. Sprinklers.
4. Specialties. Include emitters, drip tubes, and other devices.
5. Controllers. Include wiring diagrams.

C. Record Drawings according to Part 3 “Record Drawings”.

D. Test Reports: As specified in Part 3 "Testing and Inspection".

E. Maintenance Data: To include in maintenance manuals specified in Division 1. Include data as per Part 3 “Operation and Maintenance”:

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of lawn sprinkler piping components and are based on specific types and models indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

C. Comply with requirements of utility supplying water and authorities having jurisdiction for preventing backflow and back siphonage.

D. Comply with ASTM F 645, "Guide for Selection, Design, and Installation of Thermoplastic Water Pressure Piping Systems."

E. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.

F. Supply written evidence to Government that Contractor has five years experience minimum of similar irrigation work. Government reserves the right to reject unqualified Contractors.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves according to the following:

1. Do not remove end protectors unless necessary for inspection; then, reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

D. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

E. Protect flanges, fittings, and specialties from moisture and dirt.

F. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations.

B. Investigate and determine available water supply water pressure and flow characteristics.

1.9 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff if required with Contracting Officer.

B. Coordinate lawn sprinkler piping with work specified in Division 2 Section "Landscaping."

C. Coordinate lawn sprinkler piping with utility work.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Government.

1. Sprinklers: Furnish six heads of each type installed.
2. Valve Keys: Furnish two tee-handle units of each type of key-operated, control valve installed.
3. Quick-Coupler Hose Swivels: Furnish one of each type of quick coupler installed.
4. Quick-Coupler Operating Keys: Furnish one of each type of quick coupler installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):

1. Brass, Gate Valves for Underground Installation: Legend Valve Co.
2. Plastic, Automatic Control Valves: As per Plans.
3. Control-Valve Boxes: Carson-Brooks Plastics, Inc.
4. Quick Couplers: As per Plan.

5. Sprinklers: As per Plan.
6. Controllers: As per Plan.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" and "Valve Applications" articles for application of pipe and tube materials, joining methods, and valve applications.

2.3 PIPES

A. All main and lateral lines shall be as follows:

1. PVC Pipe: ASTM D 1785, PVC 1120 compound, Class 200.
2. All pipe to be solvent-cemented pipe.
3. All pipe shall be continuously and permanently marked with the following information:

a. Manufacturer's name or trademark, size, schedule, and type of pipe, working pressure at 73 deg F and National Sanitation Foundation Approval (N.S.F.).

B. All sleeves shall be as follows:

1. All sleeves shall be 4 inches minimum or larger. ASTM D 1785, PVC 1120 compound, Schedule 40.
2. All pipe shall be continuously and permanently marked with the following information:

a. Manufacturer's name or trademark, size, schedule, and type of pipe, working pressure at 73 deg F and National Sanitation Foundation Approval (N.S.F.).

2.4 PIPE AND TUBE FITTINGS

A. PVC Socket Fittings, Schedule 40: ASTM D 2466.

B. PVC Socket Fittings, Schedule 80: ASTM D 2467.

C. PVC Threaded Fittings: ASTM D 2464.

D. Transition Fittings: Manufactured assembly or fitting, with pressure rating at least equal to that of system and with ends compatible to piping where fitting is to be installed.

E. All other fittings shall be as described on Plans.

2.5 JOINING MATERIALS

A. Only solvent cement recommended by pipe manufacturer may be used.

2.6 VALVES

A. Heavy-duty cast brass gate valve with non-rising stem, solid wedge disc. and integral seats. Use as isolation and manual drain valves.

B. Automatic Remote Control Valves: As per Plan.

C. Quick-Couplers: One inch factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

1. Include vandal-resistant, locking feature with two matching keys.

D. Control-Valve Boxes: PE, ABS or fiberglass, box and cover, with open bottom, openings for piping, and designed for installing flush with grade. Include size as required for valves and service as per the following.

System Components	Carson-Brooks Valve Box No. or equal
Electric control valves (up to (2) 2-inch, (3) 1-1/2 inch valves or (1) 2 inch with (2) 1-1/2 inch valves.	1320-Jumbo
Automatic remote control valves (up to (1) 1-1/2 inch valves.	910-10 inch round
Isolation valves	910-10 inch round
Mainline drains	910-10 inch round
Air-relief valve	910-10 inch round

2.7 SPRINKLERS

A. Pop-up, Spray Sprinklers: As per Plan.

B. Pop-up, Rotary, Spray Sprinklers: Gear drive, full-circle and adjustable part-circle types as per Plan.

2.8 AUTOMATIC CONTROL SYSTEM

A. Automatic Irrigation Controller: As per Plan.

B. Wiring: UL 493, Type UF, solid-copper-conductor, insulated cable, suitable for direct burial.

1. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves. Provide one extra wire to two locations opposite each other at automatic remote control valve furthest from automatic irrigation controller.

a. Wire color schedule as follows:

COLOR	PURPOSE
YELLOW, RED, ORANGE, GREEN	CONTROL WIRES
WHITE	COMMON WIRES
BLUE	EXTRA WIRES

b. Splicing Materials: Pressure-sensitive, thermoplastic tape; waterproof sealing packets; or other waterproof connectors.

2.9 IDENTIFICATION

A. Refer to Division 2 Section "Earthwork" for plastic underground warning-tape materials.

1. Solid blue film with continuously printed black-letter caption, "CAUTION--WATER LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence and will not interfere or conflict.
2. Verify that the irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Contracting Officer.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FIELD MEASUREMENTS

A. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design.

3.3 PIPING APPLICATIONS

A. Install components having pressure rating greater than system operating pressure.

B. Underground, Pressure Piping: Use the following:

1. 2-Inch NPS and Smaller: Class 200 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

C. Lateral Line Piping: Use the following:

1. 2-Inch NPS (DN50) and Smaller: Class 200 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

D. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80 PVC pipe, PVC threaded fittings, and threaded joints.

E. Risers to Spray Heads: Low-density polyethylene pipe ("funny pipe") with spiral barbed ELL fittings and minimum length of 18 inches.

F. Risers to Rotors and Specialties: Schedule 80 PVC pipe, unitized swing joints as manufactured by Spears or Lasco (12 inch length minimum).

G. Sleeves: Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

3.4 TRENCHING

A. General:

1. Perform all trenching required for the installation of items where trenching is not specifically described in other sections of these Specifications.

2. Make all trenches in accordance with OSHA Requirements with sufficient width to provide free working space at both sides of the trench and around the installed item as required for gluing, joining, backfilling, and compacting while minimizing width of trenches.

B. Depth:

1. Trench as required to provide the elevations shown on the Drawings.
2. All mainline shall have a minimum cover of 18 inches above the pipe. All laterals shall have a minimum cover of 12 inches above the pipe.

C. Correction of Faulty Grades:

1. Where trench excavation is inadvertently carried below proper elevations, backfill with material approved by the Contracting Officer and then compact to provide a firm and unyielding subgrade to the approval of the Contracting Officer at no additional cost to the Government.

D. Trench Bracing:

1. Properly support all trenches in strict accordance with all pertinent rules and regulations.
2. Brace, sheet, and support trench walls in such a manner that they will be safe and that the ground alongside the excavation will not slide or settle, and that all existing improvements of every kind will be fully protected from damage.
3. In the event of damage to such improvements, immediately make all repairs and replacements necessary to the approval of the Contracting Officer at no additional cost to the Government.
4. Arrange all bracing, sheeting and shoring so as to not place stress on any portion of the completed work until the general construction thereof has proceeded far enough to provide sufficient strength.

E. Removal of Trench Bracing:

1. Exercise care in the drawing and removal of sheeting, shoring, bracing, and timbering to prevent collapse or caving of the excavation faces being supported.

F. Grading and Stockpiling Trenched Material:

1. Control the stockpiling of trenched material in a manner to prevent water running into the excavations.
2. Do not obstruct surface drainage but provide means whereby storm and wastewaters are diverted into existing gutters, other surface drains, or temporary drains.

G. Methods:

1. All trench excavation shall be made by open cut. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading, and to prevent slides or cave-ins. All material not required for backfill or not suitable for backfill, shall be removed from the site by the Contractor. Banks of trenches shall be kept as nearly vertical as possible, and shall be properly sheeted and braced as may be necessary to prevent caving.
2. Trench widths in paved streets or in areas where proximity to other structures requires vertical cuts, shall not be wider than is required for proper handling, jointing and bedding of the pipe.
3. The bottom of the trenches shall be accurately graded to line and grade, and provide uniform bearing and support for each section of the pipe on undisturbed soil, at every point along its entire length. Depressions for joints shall be dug after the trench bottom has been graded, and shall be only of such length, depth and width as required for properly making the particular type joint. Care shall be taken not to excavate below the depths indicated.
4. Where rock occurs in trench excavation, the rock shall be removed to a depth of 6 inches below the established grade line, and to a width of 12 inches greater than the outside diameter of the pipe to be installed in the trench.

3.5 BACKFILL

A. Inspection:

1. The trenching shall not be backfilled until inspection has been completed and the pipe installation, including the grade, alignment and jointing has been found to be in compliance with the requirements of the Drawings and Specifications.

B. Around and Over Pipe:

1. Select backfill material consisting of sand, fine gravel or select earth, free of large lumps or rocks larger than 1/2 inch shall be used in backfilling around and over the installed pipe.
2. The selected material shall be obtained from the excavation material removed from the trench and shall be processed by screening, sifting, or selective sorting, so as to produce the type of backfill herein specified. The Contractor will provide an acceptable imported material as required to meet requirements.
3. This backfill material shall be carefully deposited around and over the pipe in layers not more than 6 inch thick, loose measurement, wetted to optimum moisture content and uniformly compacted to at least 85 percent of the maximum density obtainable at optimum moisture content as determined by AASHTO T99

Method A or D (latest revision), until the pipe has a cover depth of at least one (1) foot.

C. Remainder of Trench Backfill:

1. The remaining depth of the trench shall be backfilled with excavation material removed from the trench, which shall be wetted or dried to near optimum moisture content.
2. Inclusion of a limited amount of stones and rocks will be permitted. Stones and rocks shall in no case be larger than fifty (50) pounds, and they shall be placed so that each piece is completely surrounded with material compacted to the density hereinafter specified. The size and amount of rocks used in backfill shall be such that they will not interfere with proper compaction.
3. This material shall be carefully deposited in layers of a thickness suitable to the equipment selected by the Contractor for proper compaction and compacted to at least 85 percent of the maximum density as determined by AASHTO T99 Method A or D (latest revisions). The method of compaction selected by the Contractor shall not cause damage of any nature to the installed pipe.
4. Water puddling of the upper portion of the trench backfilling may be used if the specified density can be obtained and the backfill material is suitable for this type of trench compaction.
5. Install warning tape directly above main line piping, 12 inches below finish grades except below subgrade under pavements and slabs.

3.6 INSTALLATION OF CONTROL WIRES

A. General:

1. Layout the wiring system in strict accordance with the Drawings.

B. Installation:

1. Install all wiring as shown on the Drawings.
2. Run one extra wire to valve at furthest location from controller. Provide extra wire for every five electric valves. Extra wires to be of different color than other wires. Extend extra wires 24 inches inside box and coil for future use.

3.7 INSTALLATION OF PIPING

A. General:

1. Layout the piping system in strict accordance with the Drawings.

2. Where piping is shown on the Drawings to be under paved areas but running parallel and adjacent to planted areas, the intention is to install the piping in the planted areas.

B. Pipe Depth:

1. All mainlines shall be installed with 18 inch minimum cover over the pipe. All laterals shall be installed with 12 inch minimum cover over the pipe.

C. Line Clearance:

1. All lines shall have a minimum clearance of 4 inches from each other, and 6 inches from lines of other trades, except through pipe sleeves.
2. Parallel lines shall not be installed directly over one another.

D. Inspection of Pipe and Fittings:

1. Carefully inspect all pipe and fittings before installation, removing all dirt, scale, and burrs and ream as required; install all pipe with markings up for visual inspection and verification.

E. Plastic Pipe:

1. Plastic pipe shall be installed in a manner so as to provide for expansion and Contraction as recommended by the manufacturer.
2. All plastic joints shall be solvent-weld joints or slip seal gasketed joints. Only the solvent cement recommended by the pipe manufacturer shall be used. All plastic pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer and it shall be the Contractor's responsibility to make arrangements with the pipe manufacturer for any field assistance that may be necessary. The Contractor shall assume full responsibility for the correct installation.
3. All plastic to metal joints shall be made with plastic male adapters.
4. The solvent-weld joints shall be made dry.
5. The solvent-weld joints shall be allowed to set at least 24 hours before pressure is applied to the system on PVC pipe.

3.8 INSTALLATION OF EQUIPMENT

A. General:

1. All fittings, valves, etc. shall be carefully placed in the trenches as shown on the Drawings.

2. All control wires shall be clearly labeled, by station using weatherproof material, both at the controller and at the valve. The inside cover of all automatic valve boxes shall also have the station number clearly painted in white.
3. All sprinklers, having adjustable nozzles, shall be adjusted for proper and adequate distribution of the water over the coverage pattern of the sprinkler.
4. All nozzles on stationary pop-up sprinklers or stationary spray heads shall be tightened after installation. All sprinklers having an adjusting screw, adjusting stem or adjusting friction collars shall be adjusted as required for the proper arc of coverage, radius, diameter and/or gallonage discharge.

B. Lawn Sprinkler Heads:

1. Install lawn sprinkler heads where indicated on the Drawings and in strict accordance with the manufacturer's recommendations. Set all heads plumb and in straight lines, or evenly offset from hard surfaces.
2. Along walks and pavement where finished grade is established, set all heads 1/4 inch below surface of pavement at time of installation and 1-1/2 inches from pavement.
3. Upon completion of maintenance period, reset all lawn sprinkler heads flush with grade and firmly anchor with soil.

C. Controllers:

1. Mount controller as indicated on the Drawings and per manufacturer’s recommended installation.
2. Provide a 5/8 inch x 8 foot copper clad grounding rod and #10 bare copper wire with acorn clamp at controller.
3. The resistance of the ground to controller shall not exceed 5 ohms. In sandy coarse soils that drain rapidly, it may be necessary to bury multiple grounding rods.

3.9 TESTING AND INSPECTION

A. Closing-in Uninspected Work:

1. Do not allow or cause any of the work in this section to be covered up or enclosed until it has been inspected, tested, and approved by the Contracting Officer. The Contractor shall take all safety precautions deemed reasonably prudent, such as barricades, warning signs, security patrols, etc., to prevent injury to workmen or others due to open trenches. Close trenches as soon as possible.

B. Flushing:

1. Before backfilling the mainline, and with all control valves in place, but before lateral pipes are connected, completely flush and test the main line and repair all leaks; flush out each section of lateral pipe before sprinkler heads are attached.

C. Testing:

1. Make all necessary provisions for thoroughly bleeding the line for air and debris.
2. Before testing, fill the line with water for a period of at least 24 hours.
3. After valves have been installed, test all live water lines for leaks at a pressure of 125 psi for a period of four (4) hours, with all couplings exposed and with all pipe sections center-loaded. Make test with Contracting Officer's Representative present.
4. Furnish all necessary testing equipment and personnel.
5. Correct all leaks and retest until accepted by the Contracting Officer's Representative.

D. Final Inspection:

1. Thoroughly clean, adjust, and balance all systems.
2. Demonstrate the entire system to the Contracting Officer, proving that all remote control valves are properly balanced, that all heads are properly adjusted for radius and arc of coverage, and that the installed system is workable, clean, and efficient.

3.10 INSTRUCTIONS

A. Record Drawings:

1. Record accurately on a reproducible print the site plan and all installed work including both pressure and non-pressure lines.
2. Upon completion of each increment of work, transfer all such information and dimensions to the prints. The dimensions shall be recorded in a legible and workmanlike manner. Make all notes on as-built in pencil. (no ball-point pen)
3. Dimension from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavement, etc.). Locations shown on as-built drawings shall be kept day-to-day as the project is being installed. All dimensions noted on drawings shall be 1/8 inch in size (minimum).
4. Show locations and depths of the following items:

    a. Point of connection.
    b. Routing of sprinkler main lines (dimension maximum 100 feet along routing).

c. Sprinkler control valves.
d. Quick coupling valves.
e. Routing of control wires.
f. Gate valves.
g. Other related equipment.

5. No backfill will be permitted until approval of the record drawings by the Contracting Officer. Contact the Contracting Officer for incremental approvals.
6. Maintain as-built drawings on site at all times.
7. Copies of as-built drawings shall accompany all periodic payment requests. PAY REQUESTS SUBMITTED WITHOUT AS-BUILT DRAWINGS WHILE IRRIGATION SYSTEM IS UNDER CONSTRUCTION WILL NOT BE PROCESSED.

B. Controller Charts:

1. As-built drawings must be approved by Contracting Officer before charts are prepared.
2. Provide controller chart showing the area covered by automatic controller, controller chart shall be of the maximum size the controller door will allow.
3. The chart is to be a reduced drawing of the actual as-built system. The chart shall be a photocopy with different colored shading used to show area of coverage for each station. When completed and approved, the chart shall be laminated. The chart shall be mounted in the controller using Velcro or equal type of semi-permanent fastening device.
4. These charts must be completed and approved prior to final acceptance of the irrigation system by the Government.

C. Operation and Maintenance:

1. Prepare and deliver to the Contracting Officer within ten calendar days prior to completion of construction, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in four (4) individually bound copies of the operations and maintenance manual. The manual shall describe the material installed and shall be in sufficient detail to permit operating personnel to understand, operate and maintain all equipment. Spare parts lists and related manufacturer information shall be included for each equipment item installed. Each complete, bound manual shall include the following information:

a. Index sheet stating Contractor's address and telephone number, duration of guarantee period, list of equipment with names and addresses of local manufacturer representatives.
b. Complete operating and maintenance instructions on all equipment.

2. In addition to the above maintenance manuals, provide the maintenance personnel with instructions for equipment operations and show written evidence to the Government at the conclusion of the project that this service has been rendered. Demonstrate winterization procedures to Government personnel.

3.11 SPARE PARTS AND TOOLS

A. Deliverables:

1. All deliverable spare parts, tools and equipment shall be turned over to the Contracting Officer at the conclusion of the project. Before final inspection can occur, evidence that the Contracting Officer has received all specified materials must be shown to the Contracting Officer's Representative.

3.12 GUARANTEE PERIOD

A. Guarantee:

1. The entire irrigation system shall be guaranteed to give satisfactory service for a period of one year from the date of acceptance by the Contracting Officer.
2. Should any trouble develop within the time specified above due to inferior or faulty materials or workmanship, the trouble shall be corrected at no expense to the Government.
3. Any and all damages resulting from faulty materials or workmanship shall be repaired by the Contractor to the satisfaction of the Contracting Officer, at no cost to the Government.

B. Services:

1. Guarantee period services include:

a. Fall winterization and blowout.
b. Spring recharge, start-up and adjustment.
c. Final adjustment at the end of the guarantee period.

END OF SECTION 02813

DIVISION 02 - SITEWORK

SECTION 02815 - IRRIGATION CENTRAL CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes valves, specialties, controls, and wiring.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include pressure rating, rated capacity, settings, and electrical data of selected models for the following:

1. Valves. Include master valve.
2. Valve boxes.
3. Specialties. Include flow sensors and flow meters.
4. Controllers. Include wiring diagrams, controller, power supply, surge protectors, radio modem kit, and antennae.

C. Maintenance Data: To include in maintenance manuals specified in Division 1. Include data for the following:

1. Specialties.
2. Controllers.

1.4 QUALITY ASSURANCE

A. Qualifications: Contractor must make him/herself familiar with all base central irrigation control requirements and provide equipment whether or not mentioned to complete the Project.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of lawn sprinkler piping components and are based on specific types and models indicated. Other manufacturers' products with equal performance characteristics may be considered. Existing system totally compatible with Eicon Central Control.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. Comply with requirements of utility supplying water and authorities having jurisdiction for preventing backflow and back siphonage.

E. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.

F. Irrigation system to be fully compatible with Malmstrom AFB IMCS System, which is the Eicon Central Control System.

G. Supply written evidence to Government that Contractor has experience with similar work. Government reserves the right to reject unqualified Contractors.

1.5 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations.

B. Investigate and determine available water supply water pressure, flow characteristics and power supply.

1.6 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with Contracting Officer.

B. Coordinate irrigation central control work with work specified in Division 2 Section "Lawn Sprinkler Piping."

C. Coordinate irrigation central control work with utility work.

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

A. Pipes and tubes as per Section 02813 “Lawn Sprinkler Piping.”

2.2 PIPE AND TUBE FITTINGS

A. Pipe and tube fittings as per Section 02813 “Lawn Sprinkler Piping.”

2.3 JOINING MATERIALS

A. Joining materials as per Section 02813 “Lawn Sprinkler Piping.”

2.4 VALVES

A. Master Valve: As per Plans.

B. Control-Valve Boxes: PE, ABS or fiberglass, box and cover, with open bottom, openings for piping, and designed for installing flush with grade. Include size as required for valves and service as per the following.

System Components	Carson-Brooks Valve Box No.
Master valves	910-10 inch round
Isolation valves	910-10 inch round
Grounding Rods	910-10 inch round

2.5 SPECIALTIES

A. Flow Sensor: Data Industrial FS100B, 1 inch brass tee type sensor or approved equal.

2.6 CONTROLLERS

A. Automatic Irrigation Controller: As per Plan.

B. Automatic Control Wiring between Satellite Controller and Automatic Valves: As per Section 02813 “Lawn Sprinkler Piping.”

C. Central Control Wiring: As per Plans.

2.7 IDENTIFICATION

A. Solid yellow film with metallic core and continuously printed black-letter caption, "CAUTION--ELECTRICAL LINE BURIED BELOW."

2.8 MISCELLANEOUS

A. Splice Pack: Super serviseal as manufactured by Performed Products, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Install irrigation system in compliance with base irrigation management control system.

3.2 INSPECTION

A. Prior to all work of this Section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence and will not interfere or conflict.

B. Verify that the irrigation central control system may be installed in strict accordance with all pertinent codes and regulations, the original design, the references standards, and the manufacturer’s recommendations.

3.3 DISCREPANCIES

A. In the event of discrepancy, immediately notify the Contracting Officer and the Contracting Officer’s Representative.

B. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.4 FIELD MEASUREMENTS

A. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design.

3.5 TRENCHING

A. Perform all trenching as per Section 02813 “Lawn Sprinkler Piping.”

3.6 BACKFILL

A. Perform all backfilling as per Section 02813 “Lawn Sprinkler Piping.”

3.7 INSTALLATION OF CONTROL WIRES

A. General: Layout the wiring system in strict accordance with the Drawings.

B. Installation: Install all wiring as shown on the Drawings.

3.8 INSTALLATION OF PIPING

A. Install all piping as per Section 02813 “Lawn Sprinkler Piping.”

3.9 INSTALLATION OF EQUIPMENT

A. Controllers:

1. Mount controller and all related equipment as indicated on the Drawings and per manufacturer’s recommended installation.
2. The resistance of the ground to controller shall not exceed 5 ohms. Bury (3) minimum grounding rods not to exceed 5 ohm rating.
3. Do not splice central control wiring. Provide 10 inch round boxes 250 feet on center maximum with a 36 inch loop in each box.
4. In the event a splice must be made to central control wiring make splice with super serviseal.
5. Run separate isolated common wires from master valve to controller assembly.
6. Install all components in strict accordance with manufacturer’s recommendations. Provide all materials required for a complete and fully operational Eicon system or approved equal.

3.10 TESTING AND INSPECTION

A. General:

1. Test and flush all piping as per Section 02813 “Lawn Sprinkler Piping.”

2. Testing Central Control System: Conduct on-site post-installation meeting with Contracting Officer's Representative to thoroughly check the operation of the Eicon equipment that was installed and provide feedback acknowledging that the equipment is installed correctly and ready for a final walk-through. This Eicon check is required to initiate the warranty.

B. Final Inspection:

1. Thoroughly clean, adjust, and balance all systems.

3.11 INSTRUCTIONS

A. Record Drawings:

1. Record accurately on a reproducible print the site plan and all installed work including both pressure and non-pressure lines.
2. Maintain As-Built Drawings on site at all times.

B. Operation and Maintenance:

1. Provide operation and maintenance manuals as per Section 02813 "Lawn Sprinkler Piping."

END OF SECTION 02815

DIVISION 02 - SITEWORK

SECTION 02831 - VINYL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Polyvinyl chloride (PVC) fence.
2. PVC fence accessories.
3. PVC gates, accessories, and hardware.

1.2 RELATED SECTIONS

A. Minor construction, Section 01010.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, gates, and accessories.

C. Shop drawings showing location of fence, gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

D. Samples for initial selection of PVC color in form of manufacturer's color charts or 6-inch lengths of actual fabric wire showing colors available.

E. Samples for verification of PVC color in form of 6-inch lengths of actual fabric wire to be used in color selected.

1. Include similar samples of polymer coating applied on posts, rails, and accessories in color selected.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has at least three years' experience and has completed at least five vinyl fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in-service performance.

B. Single-Source Responsibility: Obtain vinyl fences and gates, including accessories, fittings, and fastenings, from a single source.

C. Fence materials and appearance to match existing fence.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Subject to compliance with requirements, provide vinyl fence products by one of the following or an equal approved by Contracting Officer.

1. Kroy-Imperial, color to be tan.

2.2 MATERIALS AND MANUFACTURING

A. The rigid poly (vinyl chloride) (PVC) plastic compound used to make exterior-profile extrusions meeting the requirements of this specification are categorized by the cell class requirements as defined in Specification D 1784.

B. Virgin PVC compounds used for the products meeting this specification shall meet cell class 12333 as defined in D 1784. Compounds that have higher cell classification because one or more properties are superior to those in this specified compound are acceptable.

C. Rework Material: Clean rework material, generated by the manufacturer's own manufacturing operation, may be used by the same manufacturer's fence profile production facility, provided rework materials meet all the requirements of this specification.

D. Recycle Materials: No recycle materials may be used in production of fence profiles. This includes, but is not limited to, off-specification PVC compound as well as rework, regrind, or scrap material generated outside the manufacturer's fence profile production facility.

E. Coextruded Extrusion Requirements: Only Virgin compound shall be used in the capstock strata or exposed areas of the product, excluding cut ends of the profile lengths.

2.3 WORKMANSHIP

A. The fencing profiles shall be free from visible cracks, holes, foreign inclusions, or other defects. The fencing profiles shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

2.4 CONDITIONING AND TEST CONDITIONS

A. Specimens to be tested at 73.4 deg. F. ± 3.6 deg. F. shall be conditioned in accordance to Methods D 618 in air in a temperature/humidity controlled chamber at 73.4 deg. ± 3.6 deg. F.. for no less than 4 hours.

B. Specimens to be tested at 32 deg. F. ± 3.6 deg. F shall be conditioned in accordance with Methods D 618 in a refrigerated chamber with circulating air flow for no less than 4 hours or in an ice water bath for no less than 1 hour before testing. Samples which must be removed from the freezing temperature conditioning environment to a warmer environment should be tested within 15 seconds after removal to preclude warming of the specimen.

C. Sampling: The selection of sample or samples of fence profiles shall be as agreed upon between purchaser and seller. In the absence of any prior agreement, any sampling plan selected by the testing laboratory shall be deemed adequate.

1. Sample Marking: Samples being tested at a test laboratory not at the manufacturer's location shall be marked with a verifiable and permanent marking which shall identify the manufacturer.

D. Length: With the sample laying on a flat surface, measure length to the nearest 1/6 inch with a steel tape. The average of three samples shall be within ± ¼ inch of the published length with no single sample deviating more than 3/8 inch from the nominal length.

E. Height and Width: Lay three samples on a flat surface and measure each to the nearest 1/6 inch with a steel tape or vernier calipers. The average of the three samples shall be within ± 1/16 inch of the nominal height and width with no single sample deviating more than 3/32 inch from the nominal height and width.

F. Flattening: Flatten three specimens of the fence profiles, each 2 inches long, in a suitable press between parallel plates until the distance between the plates is 40 percent of the width of the profile. In a rectangular profile, the minor axis dimension shall be the dimension which determines the compression distance. The rate of loading shall be uniform and such that the compression is completed within 2 to 5 min. On removal of the load, examine the specimens for evidence of splitting, cracking or breaking. A split or crack longer than 1/32 inch constitutes a failure of the test.

1. Conditioning: The conditioning and test of the flattening test specimens shall be done at 73.4 deg. F. ± 3.6 deg. F.

G. Impact Resistance: Condition ten specimens, each 6 inches long, at either 73.4 deg. F. ± 3.6 deg. F. or 32 deg. F. ± 3.6 deg. F. and test with the apparatus described in D2444, using a "B" tup and a "3" flat plates holder to the values in 7.4. Seven of ten specimens must pass at whichever test conditioning temperature is used. Specimens shall be temperature conditioned per Section 8.2. Shattering, splitting, or cracking greater than 1/32 inch in length shall constitute a failure.

1. Retest: Should more than 3 specimens fail the initial impact test, select and condition ten more samples and test per 4. If 14 ore more samples pass from the combined two samplings, the last shall pass. If 7 or more specimens fail, sampling and testing should be conducted backward through the production run until it can be established that the balance of the production run will pass impact testing. The deficient portion of the production run should be discarded.

H. Warp: Warp should be determined when all sides of the specimen are at the same temperature. Place a full length specimen on a flat surface alongside a straight edge which is at least as long as the specimen. Measure any space between the specimen and the straight edge to the nearest 1/6 inch.

1. Note 5: Testing in accordance with this section is intended to be done as quality control testing to be done at the time of manufacturer to ensure conformance with this standard. Testing performed on profiles after prolonged storage, shipment, or

installation may produce results at variance with the values determined at the time of manufacture.

2.5 RETEST AND REJECTION

A. If the results of any test(s) do not meet the requirements of this specification, the test(s) may be conducted again accordance with an agreement between the purchaser and the seller. There shall be no agreement to lower the minimum requirement of the specification by such means as omitting tests that are a part of the specification, substituting or modifying a test method, or by changing the specification limits. In retesting, the product requirements of this specification shall be met, and the test methods designated in the specification shall be followed. If, upon retest, failure occurs, the quantity of product represented by the test(s) shall be rejected.

2.6 ACCESSORIES TEST

A. Test methods and values for all PVC profile accessories such as caps, plugs, and rail mounting devices may or may not be available from the manufacturer and are subject to agreement between the purchaser and the seller.

2.7 FITTINGS AND ACCESSORIES

A. Material: Comply with ASTM F 626. Mill-finished aluminum or galvanized iron or steel to suit manufacturer's standards.

1. Steel and Iron: Unless specified otherwise, hot-dip galvanize pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A 90.
2. Aluminum: Die cast conforming to ASTM B 26, aluminum-alloy 360 or sand cast conforming to ASTM B 85, aluminum-alloy 365, ZG61A, or Tenzalloy.
3. Supplemental Color Coating: In addition to above metallic coatings, provide a 10-mil minimum polyvinyl chloride (PVC) plastic resin finish applied to exterior surfaces and, except inside cap shapes, to exposed interior surfaces. Color to match PVC fence.

B. Post and Line Caps: Provide PVC weathertight closure cap for each post.

2.8 GATES

A. Fabrication:

1. Fabricate perimeter frames of gates from same material and finish as fence framework. Assemble gate frames according to manufacturer's details.
2. Gate Hardware: Provide galvanized hardware and accessories for each gate according to the following:

a. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6-foot nominal height.
b. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as an integral part of latch.

PART 3 - EXECUTION

3.1 FENCE INSTALLATION

A. General: Install fence to comply with ASTM F 567 and manufacturer's instructions. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

3.2 GATE INSTALLATION

A. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary. Install gates according to manufacturer's instructions, plumb, level, and secure.

END OF SECTION 02831

DIVISION 2 - SITE WORK

SECTION 02875 - SITE AND STREET SHELTERS

PART 1. GENERAL

1.1 SECTION INCLUDES: Prefabricated metal shelter/gazebo/pavilion.

1.2 RELATED SECTIONS

A. Earthwork, Section 02200.

B. Cast-In-Place Concrete, Section 03300.

C. Proposal Option #1, Section 01010.

1.3 REFERENCES

A. American Institute of Steel Construction (AISC).

B. American Iron and Steel Institute (AISI) Specifications for Cold Formed Members.

C. American Society of Testing of Materials (ASTM).

D. American Welding Society (AWS).

E. Steel Structures Painting Council (SSPC-SP2) as outlined in AISC 6.5.

1.4 SYSTEM DESCRIPTION

A. Design Loads: UBC (1997 edition) 50 pounds per square foot snow load, 90 mile per hour wind speed, exposure “C”, seismic zone 4.

B. Design Method: per applicable building code.

C. The pre-engineered package shall be shipped as a pre-cut and pre-fabricated package that shall include the structural frame members, roof material, fasteners, and trim as well as the installation instructions. The structure shall be shipped knocked down for minimum shipping charges. Field labor will be kept to a minimum by pre-manufactured parts. No onsite welding will be allowed. Connection bolts shall be concealed within the tubing where possible.

1.5 SUBMITTALS

A. Submit 6 sets shop drawings and 2 sets structural calculations signed and sealed by a Professional Engineer licensed in the State of Montana.

B. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

C. Structural calculations shall show the following code information: Building Code UBC, 1997 edition, 50 psf snow or live load, 90 mph wind speed, seismic zone 4.

1.6 QUALITY ASSURANCE: Provide evidence of commitment of quality craftsmanship as demonstrated by the following:

A. SUPPLIER QUALIFICATIONS

1. The product shall be designed and produced at a facility owned and directly supervised by the supplier. The product shall be shipped from a single source.
2. The supplier shall have been making steel frame pre-manufactured shelters for a minimum of five years and shall list three similar projects in the territory.
3. Membership in American Institute of Steel Construction.
4. Membership in American Welding Society.
5. Full time on-staff licensed engineer.
6. Full time on-staff quality control manager.
7. Published quality assurance manual.
8. Full time on-staff AWS certified welding inspectors.
9. Continued certification by an independent inspection agency.
10. Maintain quality control program equivalent to U.S. military's Mil I.

B. CERTIFICATIONS

1. Welder certificates and AWS welding inspector certificates.

1.7 DELIVERY AND STORAGE: Unload materials with necessary equipment (no hand unloading), store covered out of weather, and keep out of direct sun. Inspect parts within

48 hours of delivery, compare with manufacturer's bill of material, and report any missing or non-conforming parts to manufacturer within this time.

1.8 WARRANTY: Supply manufacturer's standard five-year warranty.

PART 2. PRODUCTS

2.1 MODEL NUMBER: OCT 28 MR

2.2 ACCEPTABLE MANUFACTURER

A. POLIGON, a Division of W.H. Porter, Inc., Holland, Michigan, (616) 399-1963. Receive pricing from PlaySpace Designs at 800-840-5410.

B. Substitutions must be approved a minimum of ten (10) days prior to bid. All approved manufacturers shall be notified in writing before the bid date and shall not be allowed to bid without written notification.

C. Alternate suppliers must meet the qualifications and provide proof of certifications listed under paragraph 1.6.

2.3 MATERIALS

A. Structural framing: structural steel tube minimum ASTM A500 grade B or cold-formed box sections minimum ASTM A570 grade 55. "I" beams, tapered columns, open channels, or wood products shall not be accepted.

B. Compression ring: structural channel or welded plate minimum ASTM A36.

C. Fasteners: ASTM A325 high strength bolts and A563 high strength nuts, ASTM A36 anchor bolts, self-drilling screws, rivets.

D. Metal roofing: 24-gauge galvalume factory finished with Kynar 500 paint system. Ribs shall be 1-3/16 inch high, 12 inches on center. Panels shall be three feet wide, and angles shall be factory cut. Ribs shall run with the pitch of the roof for proper drainage. Color shall be chosen by Government (Dark Bronze).

E. Metal roofing trim shall match the color of the roof and shall be formed from 26 gauge painted galvalume steel as follows:

PANEL END CAPS shall be pre-bent to a "U" shape to fit over ridge end of roof panels. The inside of the "U" shall match the roof color.
METAL RIDGE CAPS shall be preformed with a single central bend to match the roof pitch. They shall be hemmed on the sides.
ROOF PEAK CAP shall be supplied on all buildings that do not include a cupola.
"J" CHANNEL shall be shaped like a "J" with colored metal on the outside wrapped around 20 gauge galvanized steel core. "J" channel shall be applied all along the eave to strengthen and straighten the eave. Both colored metal and galvanized core shall have 7/16" weep holes 6" on center.
EAVE SPLICE CHANNELS shall be provided to fit behind "J" channel butt joints to create strength at the joint and maintain a straight eave line.
SPECIAL "J" CHANNEL CORNER TRIM shall be provided which fits over the main "J" channel to simplify final detailing of corners.

2.5 FABRICATION

A. All base plates, stiffener plates, U-clips, and end plates shall be factory welded into place and bolt connection holes shall be factory cut.

B. Welded connections shall be made by certified welders in accordance with AWS Specifications and be supervised by an AWS certified welding inspector

C. Factory frame finish: 'E' coated and powder coated per the following procedure: The steel shall be shot blasted to near white condition, then subjected to an 8 stage Zinc Phosphate cleaning process followed by a Cationic Epoxy Electro coat applied with 0.7-1.0 mil thickness A finish coating of TGIC polyester powder coat is applied, 3 – 5 mils in thickness and a clear topcoat of UV resistant Super Durable Polyester TGIC is added for a total film thickness of 8-12 mils. Cured to accomplish heat fusion. All material is inspected to insure 100% coating, intercoat adhesion, proper cure, film thickness and impact resistance. Color shall be chosen by customer

PART 3. EXECUTION

A. The shelter shall be set on prepared footings or concrete slab by others. Foundation will be constructed to local codes, and good construction practices for the specific site conditions. The structure shall be attached to the top of the concrete by use of anchor bolts furnished per manufacturer specifications. Anchor bolts shall be inside the column.

B. Install according to manufacturer's installation instructions and these specifications.

C. When unloading, pad forks and use other precautions to protect powder coat finish. (Do not use chains or buckets to move materials.) Field handle carefully to avoid scratching powder coat finish. Before installing roof deck, clean steel and touch up scratches and chips in powder coat finish using touch up paint from manufacturer.

END OF SECTION 02875

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DIVISION 2 - SITEWORK

SECTION 02920 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Sodding.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated.

C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

D. Qualification Data: For landscape Installer.

E. Material Test Reports: For existing surface soil and imported topsoil.

F. Planting Schedule: Indicating anticipated planting dates for each type of planting.

G. Maintenance Instructions: Recommended procedures to be established by Government for maintenance of lawns and native grass during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and native grass establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding."

1.7 SCHEDULING

A. Planting Restrictions: Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. 30 days from date of substantial completion for sodded lawns.

a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Install irrigation system prior to planting to keep lawn uniformly moist to a depth of 1-1/2 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
2. Water lawn at a minimum rate of 1 inch per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow grass 1-1/2 to 2 inches high.

E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.

F. Contracting Officer has the right to retain 10 percent of proposed lump sum until grass has been established and accepted.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod to be composed of mix of species found to thrive in the region.

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, to meet table Specifications; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

Characteristic	Optimum	Minimum	Maximum
pH	6.5	5.5	8.3
Nitrate (#/ac)	50	1.0	300
Organic Matter (%)	2-3	0.5	5.0
Phosphorus (Olsen, ug/g)	40	2.0	150
Potassium (ug/g)	500	100	1000
Sodium (meq/100g)	<0.5	n/a	2.5
Calcium (meq/100g)	>5.0	0.5	20.0
Sulfate as S (ug/g)	20-100	3	1000
Conductivity (mmhos/cm)	<0.5	n/a	2.5
Lime (qualitative)	Slight	None	Medium

1. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.3 INORGANIC SOIL AMENDMENTS

A. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch

sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows.

2.5 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.6 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition in actual plants: Nitrogen - 4 lbs per 1,000 ft^2, phosphorous - 3 lbs per 1,000 ft^2, and potassium - 2 lbs per 1,000 ft^2.

2.7 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

1. Add fertilizers at the recommended rates.
2. Add organic soil amendments at a rate of 1 cubic yard of compost per 1,000 square feet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding overspray.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Government's property.

1. Add gypsum at a rate of 230 lbs per 1,000 per square feet.
2. Thoroughly blend planting soil mix off-site before spreading.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

3. Spread planting soil mix to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil mix.
    b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least of 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Government's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll

and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.5 SATISFACTORY LAWNS

A. Satisfactory Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

END OF SECTION 02920

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SECTION 02930 - EXTERIOR PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Trees.
2. Shrubs.
3. Ground cover.
4. Plants.

B. Related Sections include the following:

1. Division 2 Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
2. Division 2 Section "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.

1.3 DEFINITIONS

A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

F. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated.

C. Samples for Verification: For each of the following:

1. 5 lb of mineral mulch for each color and texture of stone required, in labeled plastic bags.
2. Edging materials and accessories, of manufacturer's standard size, to verify color selected.

D. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:

1. Manufacturer's certified analysis for standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Qualification Data: For landscape Installer.

F. Material Test Reports: For existing surface soil and imported topsoil.

G. Planting Schedule: Indicating anticipated planting dates for exterior plants.

H. Maintenance Instructions: Recommended procedures to be established by Government for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

1. Selection of exterior plants purchased under allowances will be made by Contracting Officer, who will tag plants at their place of growth before they are prepared for transplanting.

E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

F. Observation: Contracting Officer retains right to observe trees and shrubs for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sunscald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.

B. Handle planting stock by root ball.

C. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots in water for two hours if dried out.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 COORDINATION

A. Planting Restrictions: Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

C. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Contracting Officer.

1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Government, or incidents that are beyond Contractor's control.

1. Warranty Period for Trees and Shrubs: One year from date of Substantial Completion.
2. Warranty Period for Ground Cover and Plants: One year from date of Substantial Completion.
3. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
4. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

1.9 MAINTENANCE

A. Trees and Shrubs: Maintain for the following maintenance period by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.

1. Maintenance Period: Three months from date of Substantial Completion.

B. Ground Cover and Plants: Maintain for the following maintenance period by watering, weeding, fertilizing, and other operations as required to establish healthy, viable plantings:

1. Maintenance Period: Three months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, and disfigurement.

B. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Contracting Officer, with a proportionate increase in size of roots or balls.

C. Label at least one tree and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.2 SHADE AND FLOWERING TREES

A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.

1. Provide balled and burlapped trees.
2. Branching Height: One-third to one-half of tree height.

B. Small Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: Single stem.
2. Provide balled and burlapped trees.

2.3 DECIDUOUS SHRUBS

A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

1. Provide container-grown trees.

2.4 CONIFEROUS EVERGREENS

A. Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.

2.5 GROUND COVER PLANTS

A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

2.6 PLANTS

A. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.

2.7 TOPSOIL

A. Topsoil: ASTM D 5268, to meet attached table Specifications; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

Characteristic	Optimum	Minimum	Maximum
pH	6.5	5.5	8.3
Nitrate (#/ac)	50	1.0	300
Organic Matter (%)	2-3	0.5	5.0
Phosphorus (Olsen, ug/g)	40	2.0	150
Potassium (ug/g)	500	100	1000
Sodium (meq/100g)	<0.5	n/a	2.5
Calcium (meq/100g)	>5.0	0.5	20.0
Sulfate as S (ug/g)	20-100	3	1000
Conductivity (mmhos/cm)	<0.5	n/a	2.5
Lime (qualitative)	Slight	None	Medium

1. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.8 INORGANIC SOIL AMENDMENTS

A. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

2.9 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows.

2.10 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 15-15-15 fertilizer.

2.11 MULCHES

A. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:

1. Type: Rounded riverbed gravel or smooth-faced stone.
2. Size Range: 1-1/2 inches maximum, 3/4 inch minimum.
3. Color: Uniform tan-beige color range, acceptable to Contracting Officer's Representative.

2.12 WEED-CONTROL BARRIERS

A. Nonwoven Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum.

2.13 STAKES AND GUYS

A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.

B. Guy and Tie Wire: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.

C. Guy Cable: 5-strand, 3/16-inch- diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.

D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

E. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

2.14 MISCELLANEOUS PRODUCTS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

B. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4-inch- wide minimum, with stretch factor of 33 percent.

2.15 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following fertilizers in the following quantities:

1. Fertilizer: One pound per 2-3 foot root ball hole.
2. Add organic soil amendments at a rate of one cubic yard of compost per 1,000 square feet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Lay out individual tree and shrub locations and areas for multiple exterior plantings. Stake locations, outline areas, adjust locations when requested, and obtain Contracting Officer's acceptance of layout before planting. Make minor adjustments as required.

C. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.3 PLANTING BED ESTABLISHMENT (FOR GROUND COVERS)

A. Loosen subgrade of planting beds to a minimum depth of 6 inches in any dimension and remove sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Government's property.

1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

2. Spread planting soil mix to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil mix.

B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.4 TREE AND SHRUB EXCAVATION

A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
2. At a minimum over excavate planting hole 2 foot - 0 inch on all sides for trees and 6 inches on all sides for shrubs.

B. Subsoil removed from excavations may be used as backfill.

C. Mix subsoil with suitable topsoil to a 50/50 ratio, adding 5 gallons of gypsum and 10 gallons of compost to that volume of soil.

D. Partially backfill hole with soil mix and compact to allow for correct plant placement. Apply fertilizer at recommended rate.

E. Obstructions: Notify Contracting Officer if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- diameter holes into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

F. Drainage: Notify Contracting Officer's Representative if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

G. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE AND SHRUB PLANTING

A. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.

1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Do not use planting stock if root ball is cracked or broken before or during planting operation.
2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

B. Set container-grown stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.

1. Carefully remove root ball from container without damaging root ball or plant.
2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

C. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping.

3.6 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs as directed by Contracting Officer.

B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.

3.7 GUYING AND STAKING

A. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses. Support trees with two strands of tie wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree. Use the number of stakes as follows:

1. Use 2 stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; 3 stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.

3.8 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants as indicated.

B. Dig holes large enough to allow spreading of roots, and backfill with planting soil.

C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 CLEANUP AND PROTECTION

A. During exterior planting, keep adjacent pavings and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.10 PLANTING BED MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges to a minimum of 3 inches.

1. Material and Seam Treatment: Nonwoven fabric with seams pinned.

B. Mulch backfilled surfaces of planting beds and other areas indicated.

1. Mineral Mulch: Apply 3 inch average thickness of mineral mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.11 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Government's property.

END OF SECTION 02930

DIVISION 3 - CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

B. Cast-in-place concrete includes the following:

1. Foundations and footings.
2. Slabs-on-grade.
3. Foundation walls.
4. Equipment pads and bases.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

C. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Contracting Officer.

D. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar

diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

E. Samples of materials as requested by Contracting Officer, including names, sources, and descriptions, as follows:

1. Normal weight aggregates.
2. Fiber reinforcement.

F. Laboratory test reports for concrete materials and mix design test.

G. Material certificates in lieu of material laboratory test reports when permitted by Contracting Officer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
2. ACI 318, "Building Code Requirements for Reinforced Concrete."
3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

B. Concrete Testing Service: Engage a testing agency acceptable to Architect to perform material evaluation tests and to design concrete mixes.

C. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.

B. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

C. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

1. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615 Grade 60 (ASTM A 615M Grade 400), deformed.

B. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use steel wire bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I-II.

1. Use one brand of cement throughout Project unless otherwise acceptable to Contracting Officer.

B. Fly Ash: ASTM C150, "Standard Specification for Portland Cement".

1. ASTM C311, "Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement".
2. 15 percent minimum / 25 percent maximum.

C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Contracting Officer.

D. Water: Potable.

E. Fiber Reinforcement: Polypropylene fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III, not less than 3/4 inch long.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Gilco Fibers, Cormix Construction Chemicals.
b. Durafiber, Durafiber Corp.
c. Fiberstrand 100, Euclid Chemical Co.
d. Fibermesh, Fibermesh Co., Div. Synthetic Industries, Inc.
e. Forta, Forta Corp.
f. Grace Fibers, W.R. Grace & Co.
g. Polystrand, Metalcrete Industries

F. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Air-Tite, Cormix Construction Chemicals.
b. Air-Mix or Perma-Air, Euclid Chemical Co.
c. Darex AEA or Daravair, W.R. Grace & Co.
d. MB-VR or Micro-Air, Master Builders, Inc.
e. Sealtight AEA, W.R. Meadows, Inc.
f. Sika AER, Sika Corp.

H. Water-Reducing Admixture: ASTM C 494, Type A.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Chemtard, ChemMasters Corp.

b. PSI N, Cormix Construction Chemicals.
c. Eucon WR-75, Euclid Chemical Co.
d. WRDA, W.R. Grace & Co.
e. Pozzolith Normal or Polyheed, Master Builders, Inc.
f. Metco W.R., Metalcrete Industries.
g. Prokrete-N, Prokrete Industries.
h. Plastocrete 161, Sika Corp.

I. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Q-Set, Conspec Marketing & Manufacturing Co.
b. Lubricon NCA, Cormix Construction Chemicals.
c. Accelguard 80, Euclid Chemical Co.
d. Daraset, W.R. Grace & Co.
e. Pozzutec 20, Master Builders, Inc.
f. Accel-Set, Metalcrete Industries.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. PSI-R Plus, Cormix Construction Chemicals.
b. Eucon Retarder 75, Euclid Chemical Co.
c. Daratard-17, W.R. Grace & Co.
d. Pozzolith R, Master Builders, Inc.
e. Protard, Prokrete Industries.
f. Plastiment, Sika Corporation.

2.4 RELATED MATERIALS

A. Vapor Retarder: Provide vapor retarder that is resistant to deterioration when tested according to ASTM E 154, as follows:

1. Polyethylene sheet not less than 8 mils thick.

B. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Aquafilm, Conspec Marketing and Mfg. Co.
b. Eucobar, Euclid Chemical Co.
c. E-Con, L&M Construction Chemicals, Inc.
d. Confilm, Master Builders, Inc.
e. Waterhold, Metalcrete Industries.

2.5 PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

1. Do not use the same testing agency for field quality control testing.
2. Limit use of fly ash to not exceed 25 percent of cement content by weight.

B. Submit written reports to Contracting Officer of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Contracting Officer.

C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:

1. 4000 psi, 28-day compressive strength; 0.45 water-cement ratio.

D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
2. Reinforced foundation systems: Not less than 3 inches and not more than 5 inches.
3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2 - 3 inch slump concrete.
4. Other concrete: Not more than 4 inches.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Contracting Officer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Contracting Officer before using in Work.

F. Fiber Reinforcement: Add at manufacturer's recommended rate but not less than 1.5 lb/cu. yd.

2.6 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F.

C. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content between 4-1/2 percent and 7.0 percent.

D. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

A. Job-Site mixing is not permitted.

B. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMS

A. General: Erect and maintain formwork to support loads that might be applied until concrete structure can support such loads. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, recesses, and the like for easy removal.

C. Chamfer exposed corners and edges as indicated.

D. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings from trades providing such items. Accurately place and securely support items built into forms.

E. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete.

3.2 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations. Repair damages before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Contracting Officer.

D. Do not use masonry blocks, piles of concrete, or similar means to support and position reinforcing for concrete slabs-on-grade.

E. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.3 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Contracting Officer.

B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise.

C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

D. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

E. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.

1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
3. If joint pattern is not shown, provide joints not exceeding 15 ft. in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
4. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.4 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.5 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. Maintain reinforcing in proper position on chairs during concrete placement.

F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

G. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Contracting Officer.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical

manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.

B. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.

1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 17 (floor levelness) measured according to ASTM E 1155 (ASTM E 1155M). Grind smooth any surface defects that would telegraph through applied floor covering system.

C. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.

D. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Contracting Officer before application.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.10 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Curing Methods: Cure concrete by curing compound, by moist curing, or by combining these methods, as specified.

D. Provide moisture curing by the following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Use continuous water-fog spray.

E. Apply curing compound on all exposed concrete as follows:

1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

F. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

G. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

3.11 REMOVING FORMS

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

3.12 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.13 CONCRETE SURFACE REPAIRS

A. Repair methods not specified above may be used, subject to acceptance of Contracting Officer.

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement may include the following, as directed by Contracting Officer.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.

b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below, when 80 deg F and above, and one test for each set of compressive-strength specimens.
d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
3. When total quantity of a given class of concrete is less than 50 cu. yd., Contracting Officer may waive strength testing if adequate evidence of satisfactory strength is provided.
4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to Contracting Officer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Contracting Officer. Testing agency

may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03300

DIVISION 4 - MASONRY

SECTION 04200 - UNIT MASONRY, STRUCTURAL BLOCK (SCAFFOLDING)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Unit masonry (split-face block).
2. Unit masonry infill.

1.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following installed compressive strengths (f'm) at 28 days.

1. For Concrete Unit Masonry: As follows, based on net area:

a. f'm = 1500 psi.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each different masonry unit, accessory, and other manufactured product specified.

C. Samples for initial selection of the following:

1. Concrete masonry unit samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.

D. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
2. Each material and grade indicated for reinforcing bars.
3. Each type and size of joint reinforcement.
4. Each type and size of anchors, ties, and metal accessories.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

B. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

C. Mockup: Prior to installing unit masonry, construct sample wall panels to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mockups on site in the locations indicated or, if not indicated, as directed by Contracting Officer.
2. Build mockups for the following types of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including face and back-up wythes as well as accessories. Include a sealant-filled joint at least 16 inches long in each mockup.

    a. Split face veneer typical exterior wall complete with metal studs, sheathing, veneer ties, flashing, and weep holes.

3. Clean exposed faces of mockups with masonry cleaner indicated.
4. Notify Contracting Officer one week in advance of the dates and times when mockups will be constructed.
5. Protect accepted mockups from the elements with weather-resistant membrane.
6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

    a. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Contracting Officer in writing.

b. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Contracting Officer in writing.
c. When directed, demolish and remove mockups from Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace

unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

    a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
    b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.
    c. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.
    d. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.

2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:

    a. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
    b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
    c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.

3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Concrete Masonry Units.
2. Prefaced Concrete Masonry Units (Split-Face Scored Block Veneers):

   a. Burns & Russell Co. (The).
   b. Trenwyth Industries, Inc.

3. Portland Cement, Mortar Cement, Masonry Cement, and Lime:

   a. Essroc Materials, Inc.
   b. Glen-Gery Corporation.
   c. Lafarge Corporation.
   d. Lehigh Portland Cement Co.
   e. Riverton Corporation (The).

4. Mortar Pigments:

   a. Davis Colors.
   b. Lafarge Corporation.
   c. Solomon Grind-Chem Services, Inc.

5. Joint Reinforcement, Ties, and Anchors:

   a. Dur-O-Wal, Inc.
   b. Heckman Building Products, Inc.
   c. Hohmann & Barnard, Inc.
   d. Masonry Reinforcing Corp. of America.
   e. National Wire Products Industries.
   f. Southern Construction Products.

2.2 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below:

a. 1900 psi.
b. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Normal weight.
3. Aggregates: Do not use aggregates made from pumice, scoria, or tuff.
4. Provide Grade N, Type I, 2,000 psi, moisture-controlled units.
5. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on Drawings:

a. 4 inch nominal: 3-5/8 inch actual (split-face block).
b. 6 inch nominal: 5-5/8 inch actual.
c. 8 inch nominal: 7-5/8 inch actual.

6. Exposed Faces: Color - Use Federal Color #37056 (Dark Brown).
7. All white cement to be used for CMU block.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 476, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated. Match mortar color to CMU block.

B. Masonry Cement: ASTM C 91.

C. Mortar Cement: U.B.C. Standard No. 21-14.

D. Hydrated Lime: ASTM C 207, Type S.

E. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

F. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.

G. Aggregate for Grout: ASTM C 404.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMU, containing integral water repellent by same manufacturer.

J. Water: Potable.

K. Coloring: Mortar coloring shall be added to the mortar used for exposed masonry surfaces to produce a uniform color matching existing. Mortar coloring shall not exceed 3 percent of the weight of cement for carbon black and 10 percent of the weight of cement for all other pigments. Mortar coloring shall be chemically inert, of finely ground lime proof pigment, and furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement.

2.4 REINFORCING STEEL

A. Steel Reinforcing Bars: Material and grade as follows:

1. Billet steel complying with ASTM A 615.
2. Epoxy-coated billet steel complying with ASTM A 615 and ASTM A 775.

a. Grade 60.

B. Deformed Reinforcing Wire: ASTM A 496, with ASTM A 153, Class B-2 zinc coating.

C. Welded-Wire Fabric: ASTM A 185.

2.5 JOINT REINFORCEMENT

A. General: Provide joint reinforcement formed from the following:

1. Galvanized carbon-steel wire, coating class as follows:

a. ASTM A 153, Class B-2, for both interior and exterior walls.

B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:

1. Wire Diameter for Side Rods: 0.1483 inch.
2. Wire Diameter for Cross Rods: 0.1483 inch.

C. For single-wythe masonry, provide type as follows with single pair of side rods:

1. Ladder design with perpendicular cross rods spaced not more than 16 inches o.c.

2.6 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of this Article, unless otherwise indicated.

B. Wire: As follows:

1. Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating for wire ties and anchors in exterior walls.
2. Wire Diameter: 0.1875 inch.

C. Steel Sheet: As follows:

1. Galvanized Steel Sheet: ASTM A 366 (commercial quality) cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153, Class B-2 or B-3, as applicable, for sheet-metal ties and anchors in exterior walls not completely embedded in mortar and grout.

D. Galvanized Steel Sheet Thickness: For steel sheet hot-dip galvanized by continuous process prior to fabrication:

1. 0.0785 inch.

E. Thickness of Steel Sheet Galvanized After Fabrication: Uncoated thickness of steel sheet for hot-dip galvanizing after fabrication:

1. 0.0747 inch.

F. Steel Plates and Bars: ASTM A 36, hot-dip galvanized to comply with ASTM A 153, Class B-1, B-2, or B-3, as applicable to size and form indicated.

2.7 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide 2-piece assemblies allowing vertical or horizontal differential movement between wall and wall framing parallel to plane of wall but resisting tension and compression forces perpendicular to it, for attachment to CMU, and with the following structural performance characteristics:

1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in either tension or compression without deforming over, or developing play in excess of, 0.05 inch.

B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a plate pintel tie section that engages joint reinforcing and a metal anchor section complying with the following requirements:

1. Wire Tie Shape: Triangular.
2. Wire Tie Length: As required to extend 1-1/2 inches into masonry wythe of veneer face.

C. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint, complying with the following requirements:

1. Connector Section: Metal plate tie that engages joint reinforcing.

D. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following or an equal approved by the Contracting Officer's Representative:

1. Screw-Attached, Masonry-Veneer Anchors:

a. D/A 5213; Dur-O-Wal, Inc.

2. Organic-Polymer-Coated, Steel Drill Screws:

a. Dril-Flex; Elco Industries, Inc.
b. Traxx; ITW-Buildex.

2.8 MISCELLANEOUS ANCHORS

A. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Type: Expansion anchors.

2.9 EMBEDDED FLASHING MATERIALS

A. Rubberized Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of a pliable and highly adhesive rubberized asphalt compound, 26

mils thick, bonded completely and integrally to a high-density, cross-laminated polyethylene film, 4 mils thick, to produce an overall thickness of 30 mils.

1. Primer: Flashing manufacturer's standard product or product recommended by flashing manufacturer for bonding flashing sheets to masonry and concrete.

B. Products: Subject to compliance with requirements, provide one of the following or an equal approved by the Contracting Officer's Representative:

1. Rubberized Asphalt Sheet Flashing:

a. Perm-A-Barrier Wall Flashing; Grace: W.R. Grace & Co.
b. Polyguard 300; Polyguard Products, Inc.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from the following material:

1. Polyvinyl chloride.

B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Polyvinyl Chloride: ASTM D 2287, General Purpose Grade, Type PVC-65406.

C. Weep Holes: Provide the following:

1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch outside diameter by 4 inches long.
2. Wicking Material: Material as indicated below, in length required to produce 2-inch exposure on exterior and 18 inches in cavity between wythes:

a. Cotton sash cord.

3. Aluminum Weep Hole/Vent: One-piece, L-shaped units made from sheet aluminum to fit in a vertical mortar joint and consisting of a vertical channel with louvers stamped in web and a flat horizontal; painted to comply with Division 9 Section "Painting," prior to installation, in color approved by Contracting Officer to match that of mortar.
4. Products: Subject to compliance with requirements, provide one of the following weephole/ventilators:

a. Plastic Weep Hole/Vent:

1) Cell Vent; Dur-O-Wal, Inc.

b. Vinyl Weep Hole/Vent:

1) Williams-Goodco Brick Vent; Williams Products, Inc.

2.11 INSULATION

A. Loose-Granular Perlite Insulation: ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or IV (surface treated for water repellency and to limit dust generation).

B. Molded Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by the expansion of polystyrene resin beads or granules in a closed mold to comply with ASTM C578, Type I; in manufacturer's standard lengths and widths; and in thicknesses indicated.

C. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.12 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

2.13 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, in order to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification, for job-mixed mortar; and ASTM C 1142 for ready-mixed mortar, of types indicated below:

1. For reinforced masonry and where indicated, use type indicated below:

a. Mortar shall be Type N in accordance with the proportion specification of ASTM C 270 except Type S cement-lime mortar proportions shall be 1 part cement, ½ part lime and 4 - ½ parts aggregate; Type N cement-lime mortar proportion shall be 1 part cement, 1 part lime and 6 parts aggregate; 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. Evaluation of performance shall be based on ASTM C 780 and ASTM C 1072. Mortar for prefaced concrete masonry unit wainscots shall contain aggregates with 100 percent passing the No. 8 sieve and 95 percent passing the No. 16 sieve. 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.

2.14 SOURCE QUALITY CONTROL

A. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.

B. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.

C. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

E. Wetting of Split-Faced Block: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

3.3 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet, nor 1/2 inch maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.

C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.

E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch. Do not vary from collar-joint thickness indicated by more than minus 1/4 inch or plus 3/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. Stack bond.

D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.

F. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

1. At exterior frames, insert extruded polystyrene board insulation around perimeter of frame in thickness indicated, but not less than 3/4 inch to act as a thermal break between frame and masonry.

H. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.

1. At cavity walls, slope beds toward cavity to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against cavity face of brick.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

D. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.6 HORIZONTAL-JOINT REINFORCEMENT

A. General: Provide continuous horizontal-joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement in mortar joint 1 block course above and below wall openings and extending 12 inches beyond opening.

a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to CMU with masonry-veneer anchors to comply with the following requirements:

1. Locate anchor section relative to course where tie section is embedded to allow maximum vertical differential movement of tie up and down.
2. Space anchors as indicated, but not more than 16 inches o.c. vertically and 18 inches o.c. horizontally. Install additional anchors within 12 inches of openings and at intervals around perimeter not exceeding 8 inches.

3.8 LINTELS

A. Install galvanized steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

C. Paint all exposed angles to match masonry.

3.9 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer before covering with mortar.

C. Install flashing as follows:

1. At composite masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
2. At masonry-veneer walls, extend flashing from exterior face of veneer, through the veneer, up face of sheathing at least 8 inches.
3. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form a pan.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Form weep holes with product specified in Part 2 of this Section.
2. Form weep holes by keeping head joints free and clear of mortar.

3. Space weep holes 24 inches o.c.
4. In cavities, place pea gravel to a height equal to height of first course, but not less than 2 inches, immediately above top of flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
5. Place cavity drainage material immediately above flashing in cavities.

E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.10 INSTALLATION OF REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

1. Do not exceed the following pour heights for fine grout:

a. For minimum widths of grout spaces of 3/4 inch or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches, pour height of 12 inches.
b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2 by 3 inches, pour height of 60 inches.
c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 12 feet.
d. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 24 feet.

2. Do not exceed the following pour heights for coarse grout:

a. For minimum widths of grout spaces of 1-1/2 inches or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches, pour height of 12 inches.
b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 60 inches.

c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 12 feet.
d. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 24 feet.

3. Provide cleanout holes at least 3 inches in least dimension for grout pours over 60 inches in height.

a. Provide cleanout holes at each vertical reinforcing bar.
b. At solid grouted masonry, provide cleanout holes at not more than 32 inches o.c.

3.11 FIELD QUALITY CONTROL

A. The Contractor will employ and pay a qualified independent testing agency to perform the following testing for field quality control. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.

C. Mortar properties will be tested per property specification of ASTM C 270.

D. Mortar composition and properties will be evaluated per ASTM C 780.

E. Grout will be sampled and tested for compressive strength per ASTM C 1019.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Contracting Officer's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.

E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.13 MASONRY WASTE DISPOSAL

A. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.

B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in greatest dimension.
2. Mix masonry waste with at least 2 parts specified fill material for each part masonry waste. Fill material is specified in Division 2 Section "Earthwork."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste and legally dispose of off Government's property.

END OF SECTION 04200

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DIVISION 5 - METALS

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. K-series open-web steel joists.
2. KCS-series open-web steel joists.
3. Joist accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
2. Division 3 Section "Cast-in-Place Concrete" for installing anchors set in concrete.
3. Division 4 Section "Unit Masonry" for installing anchors set in unit masonry.
4. Division 5 Section "Structural Steel" for field quality-control procedures and tests.
5. Division 5 Section "Metal Fabrications" for loose, steel bearing plates and miscellaneous steel framing.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of joist, accessory, and product specified.

C. Shop Drawings showing layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories, splice and connection details, and attachments to other units of Work.

1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.

D. Material certificates signed by joist manufacturer certifying that joists comply with SJI's "Specifications."

E. Welder certificates, for welds performed outside of the joist manufacturing facility, signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engage a firm experienced in manufacturing joists similar to those indicated for this Project and that have a record of successful in-service performance.

1. Manufacturer must be certified by SJI to manufacture joists conforming to SJI standard specifications and load tables.

B. SJI Design Standard: Comply with recommendations of SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders," applicable to types of joists indicated.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with requirements of SJI's "Specifications" for chord and web section material.

B. Steel Bearing Plates: ASTM A 36.

C. Anchor Bolts: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, noncoated.

D. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain, noncoated.

E. Welding Electrodes: Comply with AWS standards.

2.2 PRIMERS

A. Primer: SSPC-Paint 15, Type I, red oxide; Federal Specification TT-P-636, red oxide; or manufacturer's standard shop primer meeting the performance requirements of either of these red-oxide primers.

2.3 STEEL JOISTS

A. Manufacture joists according to SJI's "Specifications," with steel angle top and bottom chord members, of joist types, end arrangements, and top chord arrangements indicated.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

C. Camber K-series steel joists according to SJI's "Specifications."

2.4 JOIST ACCESSORIES

A. Bridging: Fabricate bridging as indicated and according to SJI requirements.

1. Supply additional bridging to ensure stability of structure during construction period.

B. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."

C. Supply ceiling extensions, either extended bottom chord elements or a separate extension unit of sufficient strength to support ceiling construction. Extend ends to within 1/2 inchof finished wall surface, unless otherwise indicated.

D. Supply miscellaneous accessories, including splice plates and bolts required by the joist manufacturer to complete the joist installation.

2.5 SHOP PAINTING

A. Do not shop paint joists to receive fireproofing.

B. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed as follows:

1. Surface Preparation: Either hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.

C. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film thickness of not less than 1 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of joists. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's recommendations, and the requirements of this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and bridging, connections, and anchors to ensure joists are stabilized during construction.

C. Field weld joists to supporting steel framework and steel bearing plates. Coordinate welding sequence and procedure with placing of joists.

1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

3.3 REPAIRS AND PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05210

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DIVISION 5 - METALS

SECTION 05310 - STEEL DECK

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and product certificates. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Comply with SDI Publication No. 29.

C. Comply with AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.

2.2 DECKING

A. Roof Deck: Fabricate panels from galvanized steel sheet, without top-flange stiffening grooves, to comply with the following:

1. Profile Depth: 1 inch.
2. Design Uncoated-Steel Thickness: 28 GA, 0.0179-inch.

B. Floor Deck: Fabricate panels from galvanized steel sheet, without top-flange stiffening grooves, to comply with the following:

1. Profile Depth: 9/16 inch.
2. Design Uncoated-Steel Thickness: As shown on Drawings.

2.3 MISCELLANEOUS

A. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.

PART 3 - EXECUTION

3.1 DECK INSTALLATION

A. Install deck panels and accessories according to SDI Publication No. 29.

B. Place, adjust, align, and bear deck panels on structure. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and mechanically fasten to structure without warp or deflection.

D. Cut, reinforce, and fit deck panels and accessories around openings and projections.

E. Roof Deck Accessories: Install sump pans, sump plates, ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels. Weld to substrate.

F. Weld shear connectors through deck to structure.

G. Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780.

H. Wire brush, clean, and paint scarred areas, welds, and rust spots on both surfaces of painted deck panels.

END OF SECTION 05310

DIVISION 5 - METALS

SECTION 05425 - PRE-ENGINEERED, PRE-FABRICATED LIGHT GAUGE STEEL ROOF TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pre-engineered, pre-fabricated light gauge cold formed steel framing elements. Work includes:

1. Light Gauge Cold formed steel roof trusses.
2. Anchorage, bracing and bridging.

B. Related work:

1. Roofing, fascia, soffit.

1.2 REFERENCES

A. Reference standards:

1. ASTM:

a. ASTM A653/A653M-94 “Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Glavanealed) by the Hot Dip Process.”
b. ASTM A780-93a “Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.”

2. American Welding Society (AWS)

a. AWS D1.1 “Structural Welding Code - Steel.”
b. AWS D1.3 “Structural Welding Code - Sheet Steel.”

1.3 PERFORMANCE REQUIREMENTS

A. AISI “Specifications”: Calculate structural characteristics of cold-formed steel truss members according to AISI’s “Specification for the Design of Cold-Formed Steel Structural Members, 1986 (1990).”

B. Structural Performance: Design, engineer, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.

1. Design Loads: As specified.
2. Deflections: Live load deflection meeting the following (unless otherwise specified):

a. Roof Trusses: Vertical deflection less than or equal to 1/240 of the span.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F.

1.4 SUBMITTALS

A. Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.

B. Submit Shop Drawings showing member, type, location, spacing, size and gage of members, method of attachment to supporting members and all necessary erection details. Indicate supplemental bracing, strapping, splices, bridging, accessories and details required for proper installation.

C. Submit detailed roof truss layouts.

D. Submit truss drawings, sealed and signed by a qualified registered Professional Engineer, verifying truss' ability to meet local code and design requirements. Include:

1. Description of design criteria.
2. Engineering analysis depicting member stresses and truss deflection.
3. Truss member sizes and gauges and connections at truss joints.
4. Truss support reactions.
5. Top chord, Bottom chord and Web bracing requirements.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Fabrication shall be performed by a cold-formed steel truss fabricator with experience designing and fabricating cold-formed steel truss systems equal in material, design, and extent to the systems required for this Project.

1. Cold Formed steel truss system installation shall be performed by an experienced installer approved by the steel truss system fabricator.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.

B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.

C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

1.7 PROJECT CONDITIONS

A. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one joist, truss or other component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS MT

A. Manufacturer: Ultra-Span® certified Truss Manufacturer, or other Ultra-Span representative not listed.

Team Panels International
1600 West Harvard
Englewood, CO 80110
(303) 935-8575
Fax (303) 935-8140
Website: www.teampanels.com
E-mail: sales@teampanels.com
Gregg Miller

Intermountain Truss
790 Nicole Street
Helena, MT 59604
(406) 449-5553
Fax (406) 449-5554
E-mail: reed@bmcwest.com
Bob Reed

Butler Manufacturing Company
1540 Genessee Street
Kansas City, MO 64102
(816) 968-3618
Fax (816) 968-4399
E-mail: ddsternecker@butlermfg.com
David Sternecker, PE

2.2 COMPONENTS

A. System components: Aegis Metal Framing, LLC ULTRA-SPAN® and POSI-STRUT® light gauge steel floor truss and roof truss components.

B. Provide manufacturer's standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete light gauge cold formed steel truss system.

2.3 MATERIALS

A. Materials:

1. All component gauges: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 40,000 psi.
2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.

B. Ultra-Span steel truss components: Provide sizes, shapes and gages as required by Design Engineer.

C. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60 coating.

D. Fastenings:

1. Manufacturer recommended self-drilling, self-tapping screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8-inch thick.
3. Other fasteners as accepted by truss engineer.

2.4 FABRICATION

A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

1. Fabricate truss assemblies in jig templates.
2. Cut truss members by sawing or shearing or plasma cutting.
3. Fasten cold-formed steel truss members by welding or screw fastening, or other methods as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses.

C. Fabrication Tolerances: Fabricate trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual trusses no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine structure, substrates and installation conditions. Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION, GENERAL

A. General:

1. Erection of trusses, including proper handling, safety precautions, temporary bracing and other safeguards or procedures are the responsibility of the Contractor and Contractor's installer.
2. Exercise care and provide erection bracing required to prevent toppling of trusses during erection.

B. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.

C. Provide proper lifting equipment suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.

D. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.

E. Install roof framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.

1. DO NOT cut truss members without prior approval of truss engineer.
2. Fasten cold-formed steel roof framing by welding or screw fastening, as standard with fabricator. Wire tying of roof framing is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to cold-formed roof framing.
c. Manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

d. Install roof framing in one-piece lengths, unless splice connections are indicated.
e. Provide temporary bracing and leave in place until trusses are permanently stabilized.

F. Erection Tolerances: Install trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 ROOF TRUSS INSTALLATION

A. Install, bridge, and brace trusses according to manufacturer's recommendations and requirements of this Section.

B. Space trusses as follows:

1. Truss Spacing: 24 inches.

C. Do not alter, cut, or remove truss members or connections of truss members.

D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.

E. Erect trusses without damaging truss members or connections.

F. Align truss bottom chords with load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

G. Install continuous bridging and permanent truss bracing per truss design requirements.

H. Install necessary roof cross and diagonal bracing per design professional recommendations.

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

END OF SECTION 05425

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DIVISION 5 - METALS

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Loose steel lintels.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Miscellaneous metal trim.

B. Related Sections include the following:

1. Division 5 Section "Structural Steel" for structural-steel framing system components.
2. Division 6 Section "Rough Carpentry" for metal framing anchors and other rough hardware.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For the following:

1. Paint products.

C. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1. Provide templates for anchors and bolts specified for installation under other Sections.

D. Samples for Verification: For each type and finish of extruded nosing and tread.

E. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

F. Welding Certificates: Copies of certificates for welding procedures and personnel.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

F. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

G. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch- wide slotted holes in webs at 2 inches o.c.

1. Width of Channels: 1-5/8 inches.
2. Depth of Channels: As indicated.
3. Metal and Thickness: Galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33, with G90 coating; 0.064-inch nominal thickness.
4. Finish: Hot-dip galvanized after fabrication.

H. Malleable-Iron Castings: ASTM A 47, Grade 32510.

I. Gray-Iron Castings: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.

J. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

K. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

D. Machine Screws: ASME B18.6.3.

E. Lag Bolts: ASME B18.2.1.

F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.

G. Plain Washers: Round, carbon steel, ASME B18.22.1.

H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.4 CONCRETE FILL

A. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Shear and punch metals cleanly and accurately. Remove burrs.

C. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

J. Remove sharp or rough areas on exposed traffic surfaces.

K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.6 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates after fabrication.

2.7 LOOSE STEEL LINTELS

A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.8 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity-wall exterior wythe.

C. Galvanize shelf angles to be installed in exterior walls.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4-inch thick by 8 inches long at 24 inches o.c., unless otherwise indicated.
3. Furnish inserts if units must be installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:

1. Exterior.
2. Interior, where indicated.

2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Paint all exposed steel lintel, etc. to match adjacent material color.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.13 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Polish: No. 4 finish.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 SETTING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove

wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.4 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

A. Install with anchorage system indicated to comply with manufacturer's written instructions.

B. Center nosings on tread widths.

C. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

D. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealants" to provide a watertight installation.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

DIVISION 6 - WOOD AND PLASTICS

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood blocking.
2. Sheathing.
3. Treated lumber at roof.

1.2 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data for the following products:

1. Air-infiltration barriers.
2. Metal framing anchors.
3. Construction adhesives.

C. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee's (ALSC) Board of Review.

D. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Air-infiltration barriers.

2. Metal framing anchors.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

B. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.

C. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by a single producer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. WCLIB - West Coast Lumber Inspection Bureau.
2. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

1. Provide dressed lumber, S4S, unless otherwise indicated.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

A. General: Provide treated lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.3 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

A. General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).

1. Thickness: Provide panels meeting requirements specified but not less than thickness indicated.

2.4 STRUCTURAL-USE PANELS FOR BACKING

A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32-inch thick.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.6 METAL FRAMING ANCHORS

A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.
2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

2.7 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

2.8 GYPSUM SHEATHING

A. Paper-Surfaced Gypsum Wall Sheathing: ASTM C 79/C 79M, with water-resistant material incorporated into the core and with water-repellent paper bonded to core's face, back, and long edges.

1. Type and Thickness: Type X, 5/8-inch thick.
2. Size: 48 inches by 96 inches.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 GYPSUM SHEATHING

A. General: Fasten gypsum sheathing to supports with Type S or W screws. Comply with manufacturer's recommended spacing and referenced fastening schedule. Keep perimeter fasteners 3/8 inch from edges and ends of units. Fit units tightly against each other and around openings.

B. Install 48-by-96-inch or longer sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing.

END OF SECTION 06100

DIVISION 6 - WOOD AND PLASTICS

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood cabinets.
2. Plastic-laminate countertops.

1.2 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated, including finishing materials and processes.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

D. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.

1. Shop-applied transparent finishes.
2. Plastic laminates.

E. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Source Limitations: Engage a single source, qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide AWI certification program labels and certificates indicating that woodwork complies with requirements of grades specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and

coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Wood Cabinets:

a. Dovetail Designs; Billings, MT.
b. Wilson Cabinetry; Billings, MT.
c. Grue Custom Woodworks; Manhattan, MT.
d. Imperial Cabinetry; Billings, MT.
e. Sidney Millwork Company; Sidney, MT.
f. Moderne Cabinet; Great Falls, MT.

2.2 MATERIALS

A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2.
3. Particleboard: ANSI A208.1.
4. Hardwood Plywood and Face Veneers: HPVA HP-1.
5. Veneer-Faced Panel Products (hardwood plywood).

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.

1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:

   a. Formica Corporation.
   b. Laminart.
   c. Nevamar Corp.
   d. Pioneer Plastics Corp.
   e. Westinghouse Electric Corp.; Specialty Products Div.
   f. Wilson, Ralph Plastics Co.
   g. Or Approved Equal by Contracting Officer

D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

2.3 CABINET HARDWARE AND ACCESSORIES

A. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

B. Frameless Concealed Hinges (European Type): B01602.

1. BLUM, Self Closing Module 90 (176 deg angle), nickel plated.

C. Wire Pulls: BHMA A156.9, 4 inch long, 5/16 inches in diameter, B02011.

1. Stanley, Model 4484, BMHA Finish: 613.

D. Adjustable Shelf Standards and Supports: B04071.

1. Knape and Vogt 346, Donnel, nickel plated.

E. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, and rated for the following loads:

1. Box Drawer Slides: 100 lbf.

2.4 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate woodwork to dimensions, profiles, and details indicated.

E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

F. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.6 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. AWI Type of Cabinet Construction: Reveal overlay on face frame.

C. WIC Construction Style: Style B, Face Frame.

D. WIC Construction Type: Type I, multiple self-supporting units rigidly joined together.

E. WIC Door and Drawer Front Style: Reveal overlay.

F. Reveal Dimension: 1/2 inch.

G. Wood Species and Cut for Exposed Surfaces: Red oak, plain sawn or sliced.

1. Grain Direction: Vertically for drawer fronts, doors, and fixed panels. Horizontally for drawer fronts, doors and fixed panels.
2. Matching of Veneer Leaves: Random match.
3. Vertical Matching of Veneer Leaves: End match.
4. Veneer Matching within Panel Face: Center-balance match.

H. Semiexposed Surfaces: Provide surface materials indicated below:

1. Surfaces Other Than Drawer Bodies: 3/8-inch, five-ply, plywood sides box construction.
2. Drawer Sides and Backs: 1/2-inch all wood dovetailed drawer box construction.
3. Drawer Bottoms: Hardwood plywood.

I. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.7 CABINET MATERIALS

A. Exposed Materials:

1. Exposed Wood Species: Light oak. Do not use two adjacent exposed faces that are noticeably dissimilar in color, grain, figure, or natural character markings.
2. Solid Wood: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.
3. Plywood: Hardwood plywood complying with HPVA HP-1 with face veneer of species indicated, selected for compatible color and grain with Grade A faces.

B. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects and kiln dried to 7 percent moisture content. Stained to be compatible with exposed surfaces.
2. Plywood: Hardwood plywood complying with HPVA HP-1 with Grade C faces stained to be compatible with exposed surfaces.

C. Concealed Materials:

1. Solid Wood or Plywood: Any hardwood or softwood species, with no defects affecting strength or utility. Hardwood and softwood lumber kiln dried to 7 and 10 percent moisture content, respectively.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Medium-Density Fiberboard: ANSI A208.2.
4. Hardboard: AHA A135.4, Class 1 Tempered.

2.8 PLASTIC-LAMINATE COUNTERTOPS

A. Grade: Premium.

B. High-Pressure Decorative Laminate Grade: HGS HGP.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by manufacturer's designations.
2. As selected from manufacturer's full range in the following requirements:

a. Solid colors, matte finish.
b. Solid colors with core same color as surface, matte finish.
c. Wood grains, matte finish.
d. Patterns, matte finish.

D. Grain Direction: Parallel to cabinet fronts.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard.

G. Core Material at Sinks: Particleboard made with exterior glue.

H. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.

I. Paper Backing: Provide paper backing on underside of countertop substrate.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8-inch in 96 inches.

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails [or finishing screws] for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8-inch in 96 inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8-inch in 96 inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c.

I. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

J. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

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DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07190 - WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes clear water-repellent coatings for the following vertical and nontraffic horizontal surfaces:

1. Exterior split-faced block veneer.
2. Exterior concrete unit masonry (including fence piers).

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include manufacturer's specifications, surface preparation and application instructions, recommendations for water repellents for each surface to be treated, and protection and cleaning instructions. Include data substantiating that materials are recommended by manufacturer for applications indicated and comply with requirements.

C. Certification by water repellent manufacturer that products supplied comply with local regulations controlling use of VOCs.

D. Material Test Reports: Indicate and interpret test results for compliance of water repellents with requirements indicated.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who employs only persons trained and approved by water repellent manufacturer for application of manufacturer's products.

B. Testing Agency Qualifications: An independent testing agency with experience and capability to conduct testing indicated in "Performance Requirements" Article without delaying the Work, per ASTM E 548.

C. Regulatory Requirements: Comply with applicable rules of pollution-control regulatory agency having jurisdiction in Project locale regarding VOCs and use of hydrocarbon solvents.

1.4 PROJECT CONDITIONS

A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:

1. Ambient temperature is less than 40 deg F.
2. Concrete surfaces and mortar have cured for less than 28 days.
3. Rain or temperatures below 40 deg F are predicted within 24 hours.
4. Application is earlier than 24 hours after surfaces have been wet.
5. Substrate is frozen or surface temperature is less than 40 deg F.
6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

B. Reseal all existing split faced CMU after all recolored CMU is restained.

1.5 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Siloxanes:

a. Prime-A-Pell 200; Chemprobe Corporation.
b. Hydrozo Cleare 7, Hydrozo, Inc.

2.2 WATER REPELLENTS

A. Siloxanes: Penetrating water repellent. Alkylalkoxysiloxanes that are oligomerous with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to repellent manufacturer's written instructions, to ensure surface is sufficiently dry.

B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.

D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.

E. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Contracting Officer to demonstrate the final effect (visual, physical, and chemical) of planned application. Proceed with work only after Contracting Officer approves test application or as otherwise directed.

3.2 APPLICATION

A. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.

B. Provide two coats minimum.

3.3 CLEANING

A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.

END OF SECTION 07190

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Cavity wall insulation.
2. Concealed building insulation.
3. Loose-fill building insulation - acoustical insulation.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each type of insulation product specified.

D. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide insulation products by one of the following:

1. Molded-Polystyrene Board Insulation:

a. AFM Corporation.

b. DiversiFoam Products.
c. Grace: W. R. Grace & Co. (Conn.); Construction Products Division.
d. Manufacturers with a third-party certification program satisfying model building code mandatory requirements for foam plastics.

2. Glass-Fiber Insulation:

a. CertainTeed Corporation.
b. Knauf Fiber Glass GmbH.
c. Owens-Corning Fiberglas Corporation.
d. Schuller International, Inc.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
2. Recovered Material Content:

a. Fiberglass: Glass Cullet 20 percent to 25 percent.
b. Rigid Foam: 9 percent.

B. Molded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed by expansion of polystyrene resin beads or granules in a closed mold to comply with ASTM C 578 for type and with other requirements indicated below:

1. Type I, 0.9-lb/cu. ft. minimum density.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

C. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).

1. Mineral-Fiber Type: Fibers manufactured from glass.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

D. Acoustical Insulation:

1. Mineral Fiber Boards: ASTM C553, Type II, flexible, or Type III, semirigid (4.5 pound nominal density). When full thickness does not occur in cavity.
2. Mineral Fiber Batt or Blankets: ASTM C655, where cavity is filled.

3. Thickness as shown. Fit tight to framing.

E. Glass-Fiber Loose-Fill Insulation: Glass fibers processed to comply with ASTM C 764 for type (method of application) indicated below; maximum flame-spread and smoke-developed indices of 5 and 5, respectively, and as follows:

1. Type 1 for pneumatic application.

F. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarder: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.4 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches in diameter, length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

B. Close off openings in cavities receiving poured-in-place insulation to prevent escape of insulation. Provide bronze or stainless-steel screens (inside) where openings must be maintained for drainage or ventilation.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

E. Place loose-fill insulation into spaces and onto surfaces as shown, either by pouring or by machine blowing to comply with ASTM C 1015. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

F. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu.ft.

3.5 ACOUSTICAL INSULATION

A. Fasten blanket insulation between metal studs and wall furrings with continuous pressure sensitive tape along edges.

B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids.

C. Do not compress insulation below required thickness except where embedded items prevent required thickness.

3.6 INSTALLATION OF CAVITY WALL INSULATION

A. On units of plastic insulation, install small pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, as recommended by manufacturer. Fit sources of

insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Supplement adhesive attachment of insulation by securing boards with 2-piece wall ties designed for this purpose and specified in Division 4 Section "Unit Masonry."

3.7 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

E. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.8 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

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DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07241 - EXTERIOR INSULATION AND FINISH SYSTEMS - CLASS PB

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior insulation and finish system (EIFS) applied over masonry surfaces.

1.3 DEFINITIONS

A. Class PB Exterior Insulation and Finish System (EIFS) is defined by ASTM PS 49 as a "nonload bearing, exterior wall cladding system that consists of an insulation board attached either adhesively, mechanically, or both to the substrate as required by the manufacturer; an integrally reinforced base coat; and a texture protective finish coat."

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide systems that comply with the following performance requirements:

1. Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
2. Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind it, including substrates, supporting wall construction, and interior finish.

B. Physical Properties of Class PB System: Provide EIFS whose physical properties and structural performance comply with the following when tested per methods referenced:

1. Accelerated Weathering Characteristics: Sample of size suitable for test equipment and consisting of 1 inch thick EIFS mounted on 1/2-inch thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, blistering, peeling, or delamination after testing for 2000 hours when viewed under five times magnification per Method I of ASTM G23.
2. Water Penetration: Sample consisting of 1-inch thick EIFS mounted on 2-1/2 inch thick gypsum board; cured for 28 days; and showing no water penetration into the plane of the base coat to expanded polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
3. Water Resistance: Sample consisting of 1 inch thick EIFS mounted on 1/2-inch thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
4. Impact Resistance: Sample consisting of 1 inch thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following impact classification and range:

    a. Standard Impact Resistance: 25-49 inch-lb.

C. Structural Performance of Prefabricated Panels: Provide prefabricated panels capable of withstanding the effects of normal thermal movement, gravity loads, and the following loads and stresses within limits and under conditions indicated:

1. Wind Loads: Uniform pressure (velocity pressure) of 25 lbf/sq. ft., acting inward or outward.
2. Normal thermal movement is defined as that resulting from the following maximum change (range) in ambient temperature. Base design calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

    a. Temperature Change (Range): 100 deg F.

3. Deflection: Limit deflection of framing members to less than L/240 of the member.

1.5 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each component of EIFS specified.

C. Shop Drawings: Show fabrication and installation of system including plans, elevations, sections, details of components, joint locations and configurations within system and between system and construction penetrating it, termination details, and attachments to construction behind system.

D. Samples for Initial Selection: Manufacturer's color charts and small-scale samples consisting of units or sections of units showing the full range of colors, textures, and patterns available for each finish choice indicated.

1. Submit sealant manufacturer's standard bead samples consisting of strips of actual products showing the full range of colors available.

E. Samples for Verification: 24 inch square panels for each finish, color, texture, and pattern specified. Prepare samples using same tools and techniques intended for actual work.

1. Incorporate within each sample a typical control joint filled with sealant of color indicated or selected.

F. Installer Certificates: Signed by system manufacturer certifying that installers comply with specified requirements.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.

H. Product Test Reports: Indicate compliance of proposed EIFS with physical property requirements specified in "Performance Requirements" Article based on comprehensive testing of current products by a qualified testing and inspecting agency.

I. Research/Evaluation Reports: Evidence of EIFS compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed systems similar in material, design, and extent to those indicated for this Project and with a record of successful in-service performance.

B. Manufacturer Qualifications: Engage a firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain materials for system from one source and by a single manufacturer or by manufacturers approved by EIFS manufacturer as compatible with other system components.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturer's labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Stack insulation board flat and off the ground.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install system when ambient outdoor air and substrate temperatures are 40 deg F and falling unless temporary protection and heat are provided to maintain ambient temperatures above 40 deg F during installation of wet materials and until they have dried thoroughly and become weather resistant, but for at least 24 hours after installation.

1.9 COORDINATION AND SCHEDULING

A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, joint sealers, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind EIFS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide Class PB systems by one of the following:

1. Dryvit Systems, Inc.
2. Senergy Div.; of Harris Specialty Chemicals, Inc.
3. Sto Corp.; Sto Finish Systems Div.
4. Thoro System Products.

2.2 MATERIALS

A. Compatibility: Provide substrates, adhesive, board insulation, reinforcing meshes, base- and finish-coat materials, sealants, and accessories that are compatible with one another and approved for use by system manufacturer for Project.

B. Colors, Textures, and Patterns of Finish Coat: Comply with the following requirements:

1. Provide Contracting Officer's selections from system manufacturer's full range of colors, textures, and patterns for type of finish coat indicated.

C. Fasteners for Exterior Cement Board: 1-5/8 inches, No. 8 wafer-head steel drill screws complying with ASTM C 954, with an organic-polymer coating or other corrosion-protective coating having a salt-spray resistance of more than 500 hours per ASTM B 117.

D. Molded-Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by expansion of polystyrene resin beads or granules in a closed mold. Comply with system manufacturer's requirements, ASTM C 578 for Type I, and "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for more stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:

1. Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
2. Provide insulation in boards not more than 24 by 48 inches and in thickness indicated but not more than 4 inches or less than that allowed by ASTM PS 49.

E. Reinforcing Mesh: Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other system materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per EIMA 105.01, complying with ASTM D 578 and the following requirements for minimum weight:

1. Standard Reinforcing Mesh: Not less than 4.0 oz./sq. yd.

F. Base-Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

1. Factory-mixed formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
2. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
3. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
4. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use indicated.
5. Any formulation indicated above as per Manufacturer.

G. Finish-Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

H. Water: Potable.

I. Mechanical Fasteners: System manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:

1. For attachment to masonry and concrete substrates, provide sheathing dowel in the form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.

2.3 ELASTOMERIC SEALANTS

A. Elastomeric Sealant Products: Provide system manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB" and with requirements in Division 7 Section "Joint Sealants" for products corresponding to description indicated below:

1. Low-modulus silicone sealant.

B. Sealant Color: Comply with the following requirements:

1. Match finish-coat color of system.

2.4 MIXING

A. General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of system. Proceed with installation of system only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

C. Prepare and clean substrates to comply with system manufacturer's written requirements to obtain optimum bond between substrate and adhesive for insulation.

1. Apply primer-sealer over substrates where required by system manufacturer for improving adhesion or for protecting substrates from degradation.

3.3 INSTALLATION

A. Comply with ASTM PS 49 and system manufacturer's written instructions for installation of system as applicable to each type of substrate indicated.

B. Adhesively and mechanically attach insulation to comply with ASTM PS 49, system manufacturer's written requirements, and the following:

1. Apply adhesive to insulation by notched-trowel method in a manner that results in adhesive's coating the entire surface of gypsum sheathing once insulation is

adhered to sheathing, unless system manufacturer's written instructions specify using primer-sealer with ribbon-and-dab method. Apply adhesive to a height of not less than 1/4-inch for factory mixed and not less than 3/8-inch for field mixed, measured from the surface of the insulation board before placement.

2. Allow adhered insulation to remain undisturbed for period recommended by system manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
3. Mechanically attach insulation to substrate by method complying with system manufacturer's written requirements. Space fasteners according to system manufacturer's written requirements for attachment to Project substrate(s) for performance indicated. Install top surface of fastener head flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:

    a. Steel Framing: 5/16-inch.
    b. Masonry: 1 inch.

4. Apply insulation boards over dry substrates in courses with long edges oriented horizontally. Begin first course from a level base line and work upward.
5. Apply insulation boards over dry substrates in courses with long edges oriented horizontally. Begin first course from drip screed and work upward. Work from perimeter casing beads toward interior of panels if possible.
6. Stagger vertical joints in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings.

    a. Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.

7. Abut boards tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between insulation boards. If gaps greater than 1/16-inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
8. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
9. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32-inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16-inch.
10. Coordinate flashing installation with installation of insulation to produce a wall system that does not allow water to penetrate behind protective coating.

C. Install trim accessories at locations indicated according to system manufacturer's written instructions.

D. Install expansion joints at locations indicated, where required by system manufacturer.

E. Embed reinforcing mesh of type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM PS 49 and system manufacturer's written requirements. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.

1. Standard reinforcing mesh, unless otherwise indicated.

F. Apply finish coat over dry primer, maintaining a wet edge at all times for uniform appearance, in thickness required by system manufacturer to produce a uniform finish of color and texture matching approved sample.

G. Apply finish coat over dry base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by system manufacturer to produce a uniform finish of color and texture matching approved sample.

3.4 INSTALLATION OF JOINT SEALANTS

A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 7 Section "Joint Sealants" and in "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB."

1. Clean surfaces to receive sealants to comply with indicated requirements and system manufacturer's written instructions.
2. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
3. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
4. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
5. Recess sealant sufficiently from surface of system so an additional sealant application, including backing rod, can be installed without protruding beyond system surface.
6. Apply joint sealants after base coat has cured but before applying finish coat.

3.5 CLEANING AND PROTECTING

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer and system manufacturer that ensure system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 07241

SECTION 07410 - STANDING SEAM METAL ROOFING (SSMR)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

1.1.1. Furnish the administration, facilities, materials, labor, equipment, and quality control (QC) necessary to integrate the work into the total building system so that leakage of the standing seam metal roofing (SSMR) system or the building does not occur. The SSMR system is an assembly of components that include the metal roof panels, supporting structure, metal flashings, shaped metal trim, metal ridge caps, fascia panels, fascia support structure, soffits, soffit support structure, and all related parts necessary to complete the assembly. The SSMR manufacturer is the metal roof panel manufacturer, and shall also manufacture and market the other components of the roofing system. The manufacturer, or his licensed/approved installer, shall complete the work and provide a material and labor warranty for a twenty-year period from the date of final acceptance of the building. The 20-year warranty submitted to the Government (Submittal #4) shall be signed by the SSMR manufacturer and provided to the Contracting Officer prior to final acceptance.

1.1.2. QC procedures, tolerances, testing, and requirements are specified in these Contract Documents. Nonconforming work will be rejected as a violation of these Specifications.

1.1.3. The work to be performed under this section shall include, but is not limited to, the following:

1.1.3.1. Furnish all labor, material, and equipment necessary to selectively remove the aggregate surfaced built-up roof system including the membrane, insulation, flashing systems, underlayment, vapor barrier, wood nailers and blocking, and equipment curbs as necessary to install the supporting structured for the standing seam metal roofing system directly to the existing wood deck of the facility.

1.1.3.2. Furnish all qualified supervision, experienced labor, materials, tools, and equipment required or necessary to complete in an acceptable manner the specified SSMR system in accordance with this Specification with the application in strict accordance with the latest written “Contractor Application Instructions” as supplied by the manufacturer.

1.1.3.3. Furnish materials and labor for surface preparation and corrective work in connection with conditioning and repair of the existing wood roof deck surfaces to receive new insulation or repair where selective roof removal was performed.

1.1.3.4. Furnish materials and labor as specified in other sections of these Specifications which directly relate to this Section.

1.2. QUALITY ASSURANCE (QA)

1.2.1. As specified herein, provide the QA evidence needed to establish confidence that quality control (QC) is being performed adequately.

1.2.2. Except as modified and supplemented herein, follow the published requirements and written recommendations of the SSMR manufacturer and other material manufacturers. Concerning methods of installation, industry practices apply only when this Contract does not address the matter.

1.2.3. The specified QA requirements are minimums. The Contractor shall provide additional QC if, in the opinion of the Contracting Officer, the QC is not effective enough to provide conforming work. This additional QC does not constitute a change to the Contract.

1.2.4. The QC is subject to audit by a Government inspector and the Contractor shall provide all information necessary for the audit.

1.2.4.1. The Government is not obligated to inspect a Contractor's work nor to protect a Contractor from the consequences of malperformance of his/her work force. Government inspection is a general examination of the Contractor's conduct and work, and is solely for the purposes of the Government. Government inspectors does not have the authority to accept any work, whether it be conforming or not. Government inspection is not to be construed as conclusive. Information that may be offered to the Contractor does not change the Contract.

1.2.4.2. Government agents, including inspectors, engineers, and quality assurance evaluators, are not authorized to change the Contract without the written authorization of the Contracting Officer. This lack of authority extends to all situations in which the actions of these agents could be construed as constituting a change.

1.2.5. Provide Quality Control (QC) as follows:

1.2.5.1. Quality Control is the regulatory process by which the Contractor measures actual quality performance, compares it with standards, and acts on the differences. The QC function is the entire collection of activities through which fitness for use is achieved.

1.2.5.2. Contractor inspection is a careful and critical investigation of all work to verify that it conforms to the Contract, and to detect variances and act to correct them in time to prevent reworking and delay. On discovery of variance, the Contractor will immediately institute corrective action and ensure all future work conforms to the requirements of the Contract.

1.2.5.3. The Contractor shall hire or appoint a representative to act as Quality Controller. The quality controller is to have at least five (5) years experience in the supervision and installation of standing seam metal roofing systems, and his/her only function shall be QC.

1.2.5.4. Before the start of roofing work, the Contracting Officer will schedule a preconstruction conference at Malmstrom Air Force Base to review the Contract. The Quality Controller and foreman or superintendent must attend the conference. Technical representative from the SSMR manufacturer and manufacturers of other roofing products shall also attend the preconstruction conference. These representatives shall be knowledgeable in the installation peculiarities and compatibility of their products. Contractor and technical representatives will present oral and documented installation procedures to be used. This conference may include a visit to the work site.

1.2.5.5. Basic QC requirements appear in Part 4 of these Specifications. As a minimum, the Quality Controller shall perform each of the actions listed on a daily basis. Failure to perform these actions constitutes failure to perform and entitles the Government to terminate the Contractor for default.

1.3 SUBMITTALS

1.3.1. Submit requests for all changes in writing. Do not proceed with any changes without written authorization from the Contracting Officer. In addition, all proposed deviations from the Contract shall be noted on the transmittal, AF Form 3000. If these conditions are not met, the Submittal shall be returned to the Contractor for corrective action. The adequacy and accuracy of Submittals and their compliance with Contract Documents are the responsibility of the Contractor.

1.3.2. Approvals of submittals which do not conform to the Contract shall not be construed as a change unless such nonconformance is a change that is specifically so indicated on the submittal and approved by the Contracting Officer.

1.3.3 Approvals of alternate type SSMR components shall not relieve the Contractor from providing the added requirements specified herein unless those requirements are specifically exempted on the submittal approval form and the exempted requirements are approved or recommended in writing by the manufacturer.

1.3.4. Submittals 1 through 6 are included at the end of this Specification and additional submittal forms shall be obtained from the Contracting Officer.

1.3.4.1. Submittal #1, page 07410-24: The SSMR System Manufacturer's Certification. This submittal is a qualification for award of this Contract. It must be submitted as part of the bid, or executed prior to Contract Award, and be accepted by the Contracting Officer.

1.3.4.2. Submittal #2, page 07410-25: System Summary Sheet. This must be signed by both the prospective Contractor and the SSMR manufacturer, and submitted to the Contracting Officer prior to Contract Award. This document is tailored to present project requirements to the system manufacturer who can then ascertain the technical aspects of the project and the acceptability of the design to their 20-year warranty.

1.3.4.3. Submittal #3, page 07410-26: Designation of Roofing Quality Control Controller. The most effective means to evaluate quality installation is by thorough, continuous visual examination at the time of installation, conducted by a person who is knowledgeable in roofing technology and good workmanship practices. The Contractor shall designate a person to be in charge of roofing quality control. The quality controller shall have at least five (5) years experience in the supervision and inspection of SSMR systems and shall not be a principal or officer of the roofing Contractor's company. The Air Force inspector will audit the quality control process on a daily basis. The Contractor must furnish Submittal #3 as required herein, modified as necessary, to identify the person in charge of roofing quality control. This submittal must be approved by the Contracting Officer before the Notice to Proceed (NTP) is issued.

1.3.4.4. Submittal #4, pages 07410-27 thru 30: The Air Force Standing Steam Metal Roofing System 20-Year Labor and Material Warranty. The manufacturer shall provide an executed copy of the 20-year warranty (Attachment #4) upon satisfactory completion of the roofing system. The warranty is to be provided to the Contracting Officer prior to final acceptance of the Project.

1.3.4.5. Submittal #5, page 07410-30: Sample Identification. Use Attachment #4 for this submittal.

1.3.4.6. Submittal #6, page 07410-31: As-Built Roof Summary. The Contractor shall submit this summary upon completion of the project.

1.3.5. Materials Approval: Within ten (10) days after award of Contract, the Contractor shall submit, to the Contracting Officer, certifications from the systems manufacturers/suppliers that the materials to be used conform to specified standards as applicable to produce the SSMR manufacturer's 20-year warranted system.

1.3.6. Within ten (10) days after issuance of Notice to Proceed and before start of work, the Contractor shall submit:

1.3.6.1. Evidence that the approved materials have been ordered.

1.3.6.2. Four (4) copies of:

1.3.6.2.1. Latest editions of the SSMR manufacturer's published general requirements, technical literature, repair instructions, and material safety data sheets (MSDS) for each system to be used in this Contract.

1.3.6.2.2. Shop Drawings for approval prior to starting construction. Shop Drawings shall also be approved by the manufacturer and include the following:

1.3.6.2.2.1. Outline of each roof area and roof area size.

1.3.6.2.2.2. Locations and types of all penetrations, vents, and curbs.

1.3.6.2.2.3. Recommended layout of metal panel sheets.

1.3.6.2.2.4. Recommended flashing system details.

1.3.6.2.2.5. Recommended support structure layout and details.

1.3.6.2.2.6. Recommended support structure-to-roof deck connection details.

1.3.6.2.3. Shop Drawings which address any and all changes in roof details shown on the Contract Drawings.

1.3.6.2.4. Latest editions of all other material manufacturer's product and installation literature.

1.3.7. Panel Lots and Samples:

Factory certified test certificates for each lot of metal roofing panels installed shall be furnished along with two (2) samples, 12" long, on receipt at the job site. For this purpose, a "lot" shall be considered one shift (6 or 8 hours) of production. Production harts will be retained for two (2) years for each lot produced and shall be made available for inspection in the event of panel failure. Internal laboratory test records for specific gravity, tensile strength, elongation, and theology shall be retained for each lot for a two (2) year period and shall be made available for inspection in the event of panel failure.

1.3.8. Submit a daily QC Record, AF Form 1063. Obtain blank forms from 341st Civil Engineer Squadron, Engineering Flight.

1.3.9. Before final acceptance, submit:

1.3.9.1. A plan view Drawing of each roof showing the location and dates of installation for each lot of metal roof panels, as identified by the manufacturer's lot number.

1.3.9.2. 20-Year Warranty Certification (Submittal #4). The Contractor shall be responsible for notifying the manufacturer of the roofing schedule and arranging for a representative to be on site as required by the warranty.

1.3.9.3. As-Built Roof Summary (Submittal #6).

1.3.10. Before start of work, the Contractor shall submit, for approval, samples of all other roof system components to be used in the construction. These components include, but are not limited to: flashing, trim, closures, ridge caps, fasteners, two-piece concealed panel clips, gaskets, sealants, roof vent extensions, and weatherheads.

1.4. ACCEPTANCE OF COMPLETED WORK

1.4.1. Acceptance of completed work will be based on its conformance to this Contract. Nonconforming work may be rejected; the Government is not obligated to accept nonconforming work at a reduced price. The Government will assign the roof areas to the Contractor as they are specifically cleared for Contractor access by the Contracting Officer. The Contractor will be prohibited from starting work in a new area until previous work conforms to Specification requirements. Unacceptable work shall be reaccomplished within tolerances prior to the Contractor continuing work in the assigned area. The Contractor shall start replacement or correction of rejected work within ten (10) calendar days after receipt of the rejection notice; otherwise, the Government may have this work done by others and charge the cost to the Contractor. An inadequate QC program is considered nonconforming work.

1.4.2. A signed final acceptance certificate by the Contracting Officer issued to the Contractor is the only and final acceptance under the Inspection of Construction clause of this Contract.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Deliver panels and other components so that they will not be damaged or deformed. Package roof panels for protection against transportation damage.

1.5.2. Exercise care in unloading, storing, and erecting roof panels to prevent bending, warping, twisting, and surface damage.

1.5.3. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal roof panels so that they will not accumulate water.

Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.6. SYSTEM PERFORMANCE REQUIREMENTS

1.6.1. Metal Roofing Panels:

1.6.1.1. Twelve (12) inch minimum and twenty-four (24) inch maximum panel width from seam to seam.

1.6.1.2. 0.023 inch (24 gauge) minimum bare metal thickness.

1.6.1.3. Two (2) inch minimum rib height; the rib height shall be determined by measuring the vertical distance between the base of the flat portion (the pan) of the panel and the top of the rib (or seam) in the installed panel configuration.

1.6.2. Fasteners: The fasteners listed below shall be the required minimum strength for the connecting condition described. If fastener types other than those listed below are used, they shall be shown by tests to be equal in holding strength (both pull-out and shear strengths) to the listed fasteners. If fasteners do not achieve a minimum holding strength of 750 pounds when connected to steel, the fastener size or the connecting material thickness or strength shall be increased until the minimum holding strengths are achieved.

1.6.2.1. Screws shall not be less than No. 14 diameter if self-tapping type and not less than No. 12 diameter if self-drilling and self-tapping type.

1.6.2.2. If screws strip during installation, they shall be replaced with the next larger size screw of the same type or with a bolt equal in size to the stripped fastener.

1.6.2.3. One-fourth (1/4) inch diameter bolts with appropriate washers and nuts may be used in lieu of the screw fasteners given above.

1.6.3. Hold-Down Clips:

1.6.3.1. Two fasteners shall be used to connect hold-down clips to the structural members below.

1.6.3.2. Hold-down clips shall be capable of allowing for full anticipated thermal movement. The clips shall be positioned at the time of installation with due consideration of the ambient temperature in relation to the temperature range expected during the lift of the roofing system.

1.6.4. Gravity design loads for the roofing panels and for the subpurlins, or panel support system, shall be the sum of the actual dead load and a vertical live load of thirty (30) pounds per square foot.

1.6.5. Maximum deflections under the applied gravity vertical live load shall not exceed those listed below. Deflections shall be based on the member being continuous across two (2) or more supports, unfastened, and free to rotate.

Roofing Panels: 1/180 of the span

Subpurlins, or Panel Support Beams: 1/180 of the span

1.6.6. Resistance to Wind Uplift: The standing seam metal roof system components shall be from a single, tested roof deck construction system listed in the Underwriters' Laboratories, Inc., "Building Materials Directory for Class 90 Wind Uplift." The standing seam metal roof system as installed shall be essentially the same as the UL tested system except as modified by requirements of the roofing system manufacturer to accommodate the specifics of this project. The roof system installed shall be structurally equivalent to the UL Class 90 tested system with regard to its capacity to resist wind uplift. The Contractor may assume that the primary structural supporting members of the building (as indicated on the Contract Drawings) are adequate to withstand the metal roof system need consider those primary supporting members only as required for connection of the standing seam metal roof system to the supporting structural members.

1.6.7. Other Components: Connection devices which are used by the manufacturer as "standard" edge connections at gables, ridges, eaves, etc., must resist wind upload forces. Edge connection devices shall have wind uplift resistance equal to the hold-down clips proposed for use in the roof area adjacent to the edge connector. For devices with movable components, tension pull tests shall be performed in the installed condition of the edge connector that is least resistant to wind uplift. The tests shall be performed only if certified manufacturer test results for prior installed standing seam metal roof systems cannot be obtained.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Refer to U.S. Army Corps of Engineers list below

U.S. ARMY CORPS OF ENGINEERS
LIST OF APPROVED STANDING SEAM METAL ROOF SYSTEMS
(IAW CEGS-07416)

SYSTEM NAME	PANEL SPAN	WIDTH	GAGE NO.	DESIGN LOAD BASED ON DEFORMATION (psf)	DESIGN LOAD BASED ON FAILURE (psf)	MANUFACTURER	DATE OF APPROVAL
MR-24	5' - 1" 2' - 6 1/2"	24"	24-22 24-22	34.6 - 64.4' 53.8 - 127.3'	33.8 - 64.1" 59.0 - 110.1'	Butler Co.	02-13-92
VSR	5' - 1" 2' - 6 1/2"	16"	24 24	36.4 65.9	39.2 66.2	Butler Co.	07-22-92
CRP-16	5' - 1" 2' - 6 1/2"	16"	24 24	42.0 76.8	38.8 66.8	CECO	10-01-92
SEAM-LOC 24	5' - 0" 2' - 6"	24"	24 24	32.1 46.8	32.2 47.6	Metal Sales Manuf. Co.	11-23-92
BattenLok	5' - 0" 2' - 6"	16"	24 24	38.4 43.9 - 58.8'	32.0 43.3 - 70.1"	MBCI	12-14-92
StarShield	5' - 0" 2' - 6"	24"	24 24	48.0 72.0	44.1 56.7	Star Bldg Systems	02-05-93
Shur-Lok	5' - 0" 4' - 0" 2' - 6" 1' - 8"	24" 24" 24" 24"	24 24 24 24	-- -- -- --	42.8 50.3 80.0 84.9	Gulf States Manuf. Co.	06-16-93
VP SSR	5' - 0" 2' - 6" 1' - 8"	24" 24" 24"	24-22 24-22 24-22	44.0 - 68.0' 72.0 - 96.0' 160.0	41.0 - 54.0' 65.0 - 85.0' 126.0	Varco-Pruden Buildings	06-28-93
264FL	5' - 0" 2' - 6"	16" 16:	24 24	51.2 88.0	40.3 69.3	Steelox Roofing Sys	07-01-93
Remarks				*see test results			

Notes: 1. Test load with safety factor of 1.3 applied.
2. Test load with safety factor of 1.65 applied.

U.S. ARMY CORPS OF ENGINEERS
LIST OF APPROVED STANDING SEAM METAL ROOF SYSTEMS
(IAW CEGS-07416)

SYSTEM NAME	PANEL SPAN	WIDTH	GAGE NO.	DESIGN LOAD BASED ON DEFORMATION (psf)	DESIGN LOAD BASED ON FAILURE (psf)	MANUFACTURER	DATE OF APPROVAL
U/R/S-16	5’ - 0” 2’ - 6”	16”	24	55.53 103.15	43.70 81.27	Ultra Roof Inc.	08-04-93
Double-Lok	5’ - 0” 2’ - 6” 5’ - 0” 2’ - 6” 5’ - 0” 2’ - 6”	24” 24” 18” 18” 12” 12”	24 24 24 24 24 24	43.50 64.30 55.10 77.10 69.24 97.24	34.27 50.66 43.41 60.74 65.27 87.64	MBCI	08-12-93
Span-Lok	5’ - 0” 2’ - 6” 5’ - 0” 2’ - 6”	16” 16” 18” 18”	24 24 24 24	58.90 92.20 35.40 75.00	44.90 72.64 27.89 59.09	AEP-SPAN	10-01-93
Loc-Seam	5’ - 0” 2’ - 6”	16” 16”	24 24	41.2 - 43.2’ 63.2 - 120.0’	34.0 - 36.9’ 56.1 - 94.5’	Amer Bldg Co.	10-22-93
KPI RoofLok	5’ - 0” 2’ - 6”	16” 16”	24 24	36.60 100.52	28.83 79.20	KOVACH	10-26-93
Stand’n Seam	5’ - 0” 2’ - 6”	16” 16”	24 24	88.46 121.53	69.70 95.76	FABRAL/Alcan Bldg Product	01-12-94
Remarks				*see test results			

Notes: 1. Test load with safety factor of 1.3 applied.
2. Test load with safety factor of 1.65 applied.

U.S. ARMY CORPS OF ENGINEERS
LIST OF APPROVED STANDING SEAM METAL ROOF SYSTEMS
(IAW CEGS-07416)

SYSTEM NAME	PANEL SPAN	WIDTH	GAGE NO.	DESIGN LOAD BASED ON DEFORMATION (psf)	DESIGN LOAD BASED ON FAILURE (psf)	MANUFACTURER	DATE OF APPROVAL
SA 16 x 2	5' - 0"	16"	24	--	31.1	Carlisle Engineered	03-10-94
	2' - 6"	16:	24	--	63.2	Metals, Inc.	
	5' - 0"	16"	22	--	46.7		
	2' - 6"	16"	22	--	70.4		
AP 12x 1.75	5' - 0"	12"	24	--	61.9		03-10-94
	2' - 6"	12:	24	--	86.6		
	5' - 0"	12"	22	--	76.8		
	2' - 6"	12"	22	--	115.9		
VERSALOK	5' - 0"	24"	24	--	30.4		03-10-94
	2' - 6"	24"	24	--	39.8		
	5' - 0"	24"	22	--	44.4		
	2' - 6"	24"	22	--	58.9		
SSP 200	5' - 0"	36"	24/26	--	59.5		03-10-94
	2' - 6"	36"	24/26	--	84.1		
ZIP RIB	5' - 0"	12"	0.040"	--	66.7	Merchant & Evans, Inc.	03-31-94
(Aluminum)	2' - 6"	12"	0.040"	--	115.2		
SRS-1.5	5' - 0"	18"	22	69.0	55.0	Smith Stellite	04-25-94
	2' - 6"	18"	22	104.0	92.0		
VicLoc 324	5' - 1"	24"	24	44.0 - 62.0'	34.7 - 48.9'	VicWest Steel	07-21-94
	2' - 6 1/2"	24"	24	56.0 - 100.0'	44.1 - 78.8'		
	2' - 6 1/2"	24"	22	98.4 - 110.4'	77.5 - 87.0'		
Remarks				*see test results			

Notes: 1. Test load with safety factor of 1.3 applied.
2. Test load with safety factor of 1.65 applied.

U.S. ARMY CORPS OF ENGINEERS

LIST OF APPROVED STANDING SEAM METAL ROOF SYSTEMS
(IAW CEGS-07416)

SYSTEM NAME	PANEL SPAN	WIDTH	GAGE NO.	DESIGN LOAD BASED ON DEFORMATION (psf)	DESIGN LOAD BASED ON FAILURE (psf)	MANUFACTURER	DATE OF APPROVAL
Ultra Seam US-200S	5’ - 0”	12”	.04” Alum	44.0	34.67	Architectural Metal Products, Inc.	08-03-94
	2’ - 6”	12”	.04” Alum	80.0	63.03		
	5’ - 0”	16”	24	43.3	34.13		
	2’ - 6”	16”	24	69.0	56.19		
Design Span 12”	5’ - 0”	12”	24	47.3	37.28	BHP Steel Products U.S.A., Inc.	11-28-94
	2’ - 6”	12”	24	56.5	44.53		
BR - 24	4’ - 0”	16”	24	50.00	39.40	Berics Corp.	01-05-95
	2 - 6 1/2”	16”	24	64.00	50.40		
Span-Lok	5’ - 0”	16”	22	61.53	48.48	AEP-SPAN	02-06-95
	2’ - 6”	16”	22	123.07	96.90		
	5’ - 0”	18”	22	42.67	33.62		
	2’ - 6”	18”	22	109.07	85.93		
Double-Lok	5’ - 0”	24”	22	45.26	46.06	MBCI	02-08-95
	2’ - 6”	24”	22	81.26	64.03		
	5’ - 0”	18”	22	69.66	54.89		
	2’ - 6”	18”	22	94.06	96.16		
	5’ - 0”	12”	22	81.40	77.36		
	2’ - 6”	12”	22	113.40	117.70		
Zee Lock	4’ - 0”	16”	24	70.00	55.20	Berridge Manuf. Co.	02-14-95
	2’ - 0”	16”	24	88.00	69.70		
Remarks				*see test results			

Notes: 1. Test load with safety factor of 1.3 applied.
2. Test load with safety factor of 1.65 applied.

U.S. ARMY CORPS OF ENGINEERS
LIST OF APPROVED STANDING SEAM METAL ROOF SYSTEMS
(IAW CEGS-07416)

SYSTEM NAME	PANEL SPAN	WIDTH	GAGE NO.	DESIGN LOAD BASED ON DEFORMATION (psf)	DESIGN LOAD BASED ON FAILURE (psf)	MANUFACTURER	DATE OF APPROVAL
Lock-Seam	5’ - 0” 2’ - 6”	16” 16”	24 24	36.00 84.00	31.50 88.00	American Bldg Co.	03-07-95
Stand’n Seam (Aluminum)	5’ - 0” 2’ - 6”	16” 16”	0.032” 0.032”	61.54 84.62	48.48 66.67	FABRAL	06-05-95
MRD110 (Aluminum)	4’ - 0” 2’ - 6”	11” 11”	0.040” 0.040”	56.00 80.00	44.12 63.03	ATAS Alum. Corp.	06-08-95
Remarks				*see test results			

Notes: 1. Test load with safety factor of 1.3 applied.
2. Test load with safety factor of 1.65 applied.

2.2 MATERIALS

2.2.1. Metal Roof Panels:

2.2.1.1. Panels shall be coil-coated and color-finished as specified herein, and shall have configurations designed for mechanically formed seams for securing adjacent sheets. The system for securing the roof covering to structural framing members shall be concealed clip fastening system with nonpenetrating fasteners. The ridge shall not have exposed fasteners. Sealant for the standing seams shall be factory applied. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope. Sheets shall be square-cut, except gable wall sheets or hip sheets may be cut in the shop to correspond to the roof slope. Panels shall be fabricated of zinc-coated steel conforming to ASTM A 446-91, G90 coating designation; aluminum-zinc alloy-coated steel conforming to ASTM A 792-89 with AZ-50 coating designation, Grade 40 or to suit the manufacturer's standards; or aluminum-coated steel conforming to ASTM A 463-88 with T1-40 and Mil Spec MIL-S-4174, Type II. The nominal thickness of the steel sheets prior to forming and coating shall be 24 gauge or thicker.

2.2.1.2. Factory Color Finish: Roof panels shall have a factory color finish on the exposed side. The exterior finish shall consist of either a synthetic resin base coating applied to a cleaned, pretreated, and primed surface, or a dry-film coating bonded by adhesive to a cleaned metal substrate. Color shall be Federal No. 37056. The dry film thickness of the exterior coating shall be not less than 0.8 mil, exclusive of the primer. The interior color finish shall consist of the same coating and dry film thickness as the exterior or backer coat with a dry film thickness of 0.5 mil. The exterior color finish shall meet the test requirements specified below. The manufacturer shall have conducted tests on previously manufactured sheets of the same type and finish as proposed for this project. The term "appearance of base metal" refers to the metal coating on steel base metal.

2.2.1.2.1. Salt Spray Test: A sample of the sheets shall withstand a salt spray test for a minimum of 1,000 hours in accordance with ASTM B 117-90, including a scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of 10, no blistering, as determined by ASTM D 714-87; and a rating of 7, 1/6 inch failure at scribe, as determined by ASTM D 1654-92.

2.2.1.2.2. Formability Test: When subjected to a 180-degree bend over a 3/8 inch diameter mandrel, exterior coating film shall show no evidence of fracturing to the naked eye.

2.2.1.2.3. Accelerated Weathering, Chalking Resistance, and Color Change: A sample of the sheets shall withstand a weathering test a minimum of 2,000 hours in accordance with ASTM G 23-92, using a Type D apparatus, without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with a pen-knife blade or similar instrument shall be considered as an area indicating loss of adhesion. After the 2,000 hour weatherometer test, exterior coating

shall not chalk greater than No. 8 rating in accordance with ASTM D 659 test procedures. After the 2,000 hour weatherometer test, exterior coating color change shall not exceed 2 NBS units in accordance with ASTM D 2244-89,

2.2.1.2.4. Humidity Test. When subjected to a humidity cabinet test in accordance with ASTM D 2247-92 for 1,000 hours, a scored panel shall show no signs of blistering, cracking, creepage, or corrosion.

2.2.1.2.5. Impact Resistance. Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794-92 equal to 1.5 times metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

2.2.1.2.6. Abrasion Resistant Test. When subjected to the falling sand test in accordance with ASTM D 968 E1-81, the coating systems hall withstand a minimum of 30 liters of sand before the appearance of base metal.

2.2.1.2.7. Specular Gloss: Finished surfaces shall have a specular gloss value of 30 to 70 at angle of 60 deg in accordance with ASTM D 523-89.

2.2.2. Accessories. Flashing, trim, molded closure strips, ridge caps, and similar metal accessories shall not be less than the minimum thickness specified for metal roofing panels. Accessories shall be compatible with the roofing panels furnished. Exposed metal accessories shall have a factory color finish to match the panels furnished. Molded closure strips shall be closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the roofing and shall not absorb or retain water.

2.2.3. Fascia Panels: Fascia panels shall be of same material and finish as the metal roof panels. Fascia panels shall also be subject to the same tests and performance requirements as the metal roof panels. The only exception to the above is vertical loading requirements as the fascia panels are installed in a vertical configuration rather than a sloped configuration.

2.2.4. Metal Roof Panel Support Structure: Secondary framing members, purlins, struts, bracing, angles, and secondary structural members shall conform to Specifications as provided by Butler Manufacturing Company for the MR-24 Roof System or approved equal, and as specified below:

2.2.4.1. Roof Purlins: “C” or “Z”-shaped sections fabricated from 16 gauge (0.0598 inch) shop-painted, roll-formed steel. Purlin spacers shall be fabricated from 14 gauge (0.0747 inch) cold-formed galvanized steel sections.

2.2.4.2. Eave Struts: Unequal flange “C”-shaped sections formed to provide adequate backup for roof panels. Fabricate from 16 gauge shop-painted roll-formed steel.

2.2.4.3. Flange and Sag Bracing: 1-5/8 inch x 1-5/8 inch angles fabricated from 16 gauge shop-painted, roll-formed steel.

2.2.4.4. Secondary structural members, except columns and beams, shall be the manufacturer's standard sections fabricated from 14 gauge cold-formed galvanized steel.

2.2.4.5. Unless otherwise shown, subpurlins shall be located above and anchored to the existing wood structural deck with bolts or screws. When additional subpurlins, which cannot be attached to purlins are needed, they shall be anchored to the existing wood structural deck with blind screw-type expandable fasteners. Anchor plates for subpurlin supports shall sit directly on the existing wood deck surface. This will require cutting of holes in existing gravel surface built-up roofing and rigid insulation so that subpurlin support plates are in direct contact with the wood deck. (Note: Contractor must patch roof to match existing surrounding surfaces including insulation.)

2.2.5. Fascia Support Structure:

2.2.5.1. Metal Studs: 3-1/2 inch 20 gauge galvanized steel studs at 16 inch o.c.

2.2.5.2. Furring: 7/8 inch galvanized steel furring channels or manufacturer's approved equal.

2.2.5.3. Expansion Bolts: 1/2 inch diameter x 6 inch long galvanized A36 steel expansion bolts w/washers and nuts.

2.2.6. Miscellaneous Materials:

2.2.6.1. Hold-Down Clips: Two-piece high-strength 304 stainless steel concealed hold-down clips capable of allowing $\pm$ 1.25 inch movement in each direction for thermal expansion and contraction. Each concealed hold-down clip shall be secured by two (2) fasteners to supporting structure.

2.2.6.2. Insulation: Unfaced, preformed, rigid, cellular, polyurethane thermal insulation complying with ASTM C 591-85, Type 2 with aged R-values of 6.2 at 75 deg F. Insulation shall be installed in areas where selective demolition of the existing built-up roof deck was performed.

2.2.6.3. Insulating Compounds and Gaskets: Nonabsorptive and suitable for insulating contact points of incompatible materials.

2.2.6.4. Thermal Spacer: A Polystyrene 3/8 inch minimum, 2-3/8 inch maximum, 4 inch minimum width, 16 inch or 18 inch length sized to fit between panel clips Thermal Spacer shall be installed over the purlin, between each panel clip. The thermal spacer shall be installed with a bend of tube sealant or bead mastic between the thermal spacer and purlin. Installer shall take care that the thermal spacer be slightly compressed and fit between the purlin and roofing panel.

This installation shall be made to reduce any drumming effect from the roofing panel to the purlin.

2.2.6.5. Roof Vent Extensions: Fabricated from 20 gauge zinc-coated sheet steel and finished to match roof panels above roof line.

2.2.6.6. Fasteners: Zinc-coated steel, corrosion-resistant steel, or nylon-capped steel as approved by the manufacturer for applicable uses. Exposed fasteners shall be gasketed or have gasketed washers on the exterior side of the covering to waterproof the penetration. Washer material shall be compatible with the covering, have a minimum diameter of 3/8-inch for structural connections, and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 1/8-inch thick. Nonpenetrating fastener systems using concealed clips shall be the manufacturer's standard for the system provided.

2.2.6.7. Soffits: 24 gauge vented screen fabricated from roll-formed steel or manufacturer's standard soffit for system provided.

2.2.6.8. Ridge Venting: Provide continuous ridge vent for all standing seam metal roofing similar to V-600T High Wind Dome cap as manufactured by Cor-A-Vent, Inc. (1-800-837-8368) Metal Roof Ventilation Systems or approved equal. Ridge vent installation to be coordinated with new standing seam metal roof panel to ensure proper weathertight connection. All screw connections to be stainless steel or as recommended by manufacturer.

2.2.6.9. Snow Guards: Snow guards as manufactured by Alpine Snow Guards, Pipe-style Snow Guards, #4000 with #75 tubing or equal. Contractor to ensure that installation of the snow guards does not interfere with the warranty certification required for the SSMR system.

2.2.6.10. Sealants: Use only urethane sealants. Silicone sealants are not acceptable for use with SSMR.

STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE

1. Scope

1.1 This test method covers the determination of the structural performance of standing seam metal roof systems under uniform static air pressure differences, using a test chamber.

1.2. The proper use of this test method requires a knowledge of principles of pressure and deflection measurement.

1.3. This test method describes the apparatus to be used for applying specific test loads uniformly distributed to a specimen.

1.4. The values states in inch-pound units are to be regarded as the standard. The metric equivalents of inch-pound units may be approximate.

1.5. This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Descriptions of terms specific to this standard.

2.1. Specimen - The entire assembled unit submitted for test as described in Section 6.

2.2. Test Load - The specified difference in static air pressure (positive or negative) for which the specimen is to be tested, expressed in pounds-force per square foot (or pascals).

2.3. Ultimate Load - The difference in static air pressure (positive or negative) at which failure of the specimen occurs, expressed in pounds per square foot (or pascals).

2.4. Permanent Deformation - The permanent displacement from an original position that remains after an applied load has been removed.

2.5. Failure - The inability to carry additional load, permanent separation of the panels or of any of the component parts or connections, or when permanent deformation is sufficient to compromise the weatherability of the roof system.

3. Summary of Method

This test method consists of sealing the test specimen onto the face of a test chamber, supplying air to or exhausting air from the chamber at the rate required to maintain the test-pressure

difference across the specimen, and observing, measuring, and recording the deflections, deformations, and nature of any failures of principal or critical members.

4. Significance and Use

4.1. This test method is a standard procedure for determining structural performance under uniform static air pressure difference. This typically is intended to represent the effects of wind loads on building roof systems.

4.2. The test loads shall be the roof uplift pressures multiplied by the factor of safety. The factor of safety against yielding of the panels shall be 1.3. The factor of safety against all other failure modes shall be 1.65 or 140 psf, whichever is less. The pressure multiplied by 1.65 or 140 psf shall be the maximum pressure required in the test.

5. Apparatus

5.1. The description of the apparatus is general in nature; any equipment capable of performing the test procedure within the allowable tolerances is permitted.

5.2. Major Components

5.2.1. Test Chamber - A test chamber or box with an open top upon which the specimen is installed. At least one static pressure tap shall be provided to measure the chamber pressure and shall be so located that the reading is unaffected by the velocity of the air supply to or from the chamber or any other air movement. The air supply opening into the chamber shall be arranged so the air does not impinge directly onto the test specimen with any significant velocity. A means of access into the chamber may be provided to facilitate adjustments and observations after the specimen has been installed.

5.2.2. The test chamber or the specimen mounting frame, or both, must not deflect under the test load in such a manner that the performance of the specimen will be affected.

5.2.3. Air System - A controllable blower, compressed air supply, an exhaust system, or reversible controllable blower designed to provide the required maximum air pressure difference across the specimen. The system shall provide an essentially constant air pressure difference for the required test period.

5.2.4. Pressure-Measuring Apparatus - A device to measure the test pressure difference within a tolerance of plus or minus 2 percent.

5.2.5. Deflection-Measuring Apparatus - A means of measuring deflections within a tolerance of plus or minus 0.01 inch.

5.2.5.1. Deflections shall be measured at the midpoint between supporting roof members. These measurements shall be taken along the standing seam and at the midpoint of the panels between standing seams. Deflection of edge members that are part of the roof systems hall also be measured at similar locations. Additional measurements may be required by the specified.

5.2.5.2. When deflections are to be measured, the deflection gauges shall be installed so that the deflections of the components can be measured without being influenced by possible movements of, or movements within, the specimen or member supports.

6. Test Specimens

6.1. Specimens shall be of sufficient size to determine the performance of all parts of the system (approximately 10 feet by 20 feet). All parts of the test specimen shall be full size, using the same materials, details, and methods of construction and anchorage as in the manufacturer's established system. Two specimens shall be required to perform the test. There shall be one specimen representing the corner condition and a second specimen representing the construction in the middle portion of the roof.

6.2. Width: Edge seals shall not contain structural attachments that restrict deflection of the test panels other than through the normal gable conditions.

6.3. Length: Spacing of the supports shall be the actual spacing of the panel s pans being evaluated with appropriate panel overhangs, if any, at end supports. The minimum number of spans to be tested is three and the minimum length is 15 feet.

7. Calibration

Calibration of manometers and deflection-measuring devices is required prior to start of the test.

8. Required Information

8.1. In specifying this method the following information shall be supplied by the specifying authority:

8.1.1. The number of incremental loads and the positive and negative test loads at these increments at which deflection measurements are required, if different from paragraphs 9.2 and 9.3.

8.1.2. The duration of incremental and maximum loads, if different for paragraph 9.3.

8.1.3. The number and location of required deflection measurements. See paragraph 5.2.5.1.

9. Procedure

9.1. Fit the specimen upon the chamber opening. Support and secure the specimen b the same number and type of anchors used in installing the manufacturer's established system.

9.1.1. If air leakage through the test specimen is excessive, tape may be used to cover any cracks and joints through which the leakage is occurring. Tape shall not be used when there is a probability that it may significantly restrict differential movement between adjoining members. It is also permissible to cover the entire specimen and mounting panel with a single thickness of polyethylene film no thicker than 6 mils (0.006 in) (0.152 mm). Panels should be tested in such a manner that 100 percent of the exposed panel surface has a uniform static air pressure difference applied giving particular attention to ensuring that this load is applied between or behind all framing support members. The technique of application is important in order that full load is permitted to be transferred to the specimen and that the membrane does not prevent movement or failure of the specimen. Apply the film loosely with extra folds of material at each corner and at all offsets and recesses. When the load is applied, there will be no fillet caused by tightness of plastic film that will have a significant effect on the results.

9.2. Install any required deflection-measuring devices at their specified locations. A minimum of 6 points on the load-deflection curve shall be obtained.

9.3. Apply a nominal pressure equal to at least four times the dead weight of the specimen. Use this nominal pressure as the "reference zero load" and record initial readings after the applied load has been applied for 60 seconds and until dial gauges indicate no further increase in deflection. The next load, unless otherwise specified, shall be a load equal to one-quarter the design wind uplift load and shall be applied for not less than 60 seconds. Thereafter, reduce the pressure difference to no load and then back to "reference zero load." Take readings to determine the permanent deformation or failure. Continue to apply loading in 5 increments reducing loading after each increment back down to no load and then back to "reference zero load" until the design wind uplift load is achieved. After completion of the above portion of the test, reduce the pressure difference to no load and then back to "reference zero load." Multiply the design wind uplift load by the factor of safety. Using one-third increments of this value, increase the load in three steps until this factored load is reached. Follow the same procedure as used to test to design load. Hold the test at final load for a minimum of 60 seconds then reduce the load to zero. If failure occurs prior to the full load, record the load at the time of failure.

10. Report

10.1 The report shall include the following information:

10.1.1. Date of the test and the report.

10.1.2. Identification of the specimen (manufacturer, source of supply, dimensions, model types, materials, and other pertinent information).

10.1.3. Detailed Drawings of the specimen, showing dimensioned section profiles, framing location, panel arrangement, installation and spacing of anchorage, and any other pertinent construction details. Any modifications made on the specimen to obtain the reported values shall be noted on the Drawings.

10.1.4. A tabulation of the number of the test load increments, the pressure differences exerted across the specimen at these increments, the pertinent deflections at these pressure difference, and permanent deformations at locations specified for each specimen tested.

10.1.5. The duration of test loads, including incremental loads.

10.1.6. A record of visual observations of performance.

10.1..7. When the tests are made to check conformity of the specimen to a particular Specification, an identification or description of that Specification.

10.1.8. A statement that the tests were conducted in accordance with this test method, or a full description of any deviations from this test method.

10.1.9. A statement as to whether or not tape or film, or both, were used to seal against air leakage, and whether in the judgment of the test engineer, the tape or film influenced the results of the test.

10.1.10. If several essentially identical specimens of a component are tested, results for all specimens shall be reported, each specimen being properly identified particularly with respect to distinguishing features or differing adjustments. A separate Drawing for each specimen will not be required if all differences between them are noted on the Drawing provide.

10.1.11. The test shall be performed by an independent testing laboratory or at the manufacturer's laboratory if an independent Registered Professional Engineer witnesses the test. In either case, the test report shall be signed and sealed by the engineer who witnessed the test.

PART 3 - EXECUTION

3.1. GENERAL

3.1.1. Installation shall be performed by the manufacturer's authorized installers, in accordance with the approved erection instructions and Drawings and requirements specified herein, or in accordance with submitted Shop Drawings as approved by the Contracting Officer. The roof

system supplier shall furnish a representative, at the job site, who is experienced in the erection of the roof system being installed, for the entire installation of the roof system. The representative shall be either an employee of the manufacturer with at least three (3) years experience in installing the proposed roofing system or an employee of an independent installer that is certified by the roofing system manufacturer to have three (3) years experience installing the roofing system being proposed. Qualifications of the job site representative shall be submitted for review and approval by the Contracting Officer.

3.1.2. Dissimilar materials which are not compatible shall be insulated from each other by means of gaskets and insulating compounds. Premolded closure strips shall be installed wherever covering sheets terminate in an open-end configuration, exclusive of flashings. The closure strip installation shall provide a watertight and weathertight closure. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign materials. Stained, discolored, improperly drilled or damaged sheets shall be removed from the project site.

3.1.3. Comply with the manufacturer's instructions and recommendations for installation, as applicable to projection conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal and structural movement.

3.1.3.1. Field cutting of roof panels by torch is not permitted.

3.1.3.2. Install panels with concealed fasteners and clips.

3.1.3.3. Install components required for a complete roofing system including trim, copings, fascia panels, corner units, ridge closures, clips, thermal block, seam covers, flashings, exterior gutters, sealants, gaskets, fillers, closure strips, soffit panels and vents, vent extensions, and similar items.

3.2. INSTALLATION

3.2.1. Metal Roof Panels: Fasten roof panels to supports with concealed hold-down clips in accordance with the manufacturer's instructions.

3.2.1.1. Install clips at each support with self-tapping fasteners.

3.2.1.2. Roofing panels shall be applied with the longitudinal configurations in the direction of the roof slope. Side laps shall have factory applied sealant. Joints at accessories shall be sealed as recommended by the manufacturer.

3.2.1.3. Complete seaming of panel joints by operation of a potable power-driven seaming machine of the type recommended by the panel manufacturer to provide a weathertight joint.

3.2.2. Metal Fascia Panels: Install in same manner as roofing panels. Factory fabricated internal and external corner units with mitered joints shall be provided where fascia changes direction of run. Provide and install closure strips, shaped trim pieces, and flashings where fascia panels meet roofing panels, as recommended by the manufacturer.

3.2.3. Soffits: Install as shown on the Contract Drawings or as recommended by the manufacturer.

3.2.4. Roof/Fasica Panel Support Structure: Install as shown on the Contract Drawings or as recommended by the manufacturer.

3.3 INSTALLATION TOLERANCES

Shim and align panel units within installed tolerances of 1/4 inch in 20 foot - 0 inch on level/plumb/slope and location/line as indicated on the Contract Drawings or as approved on submitted Shop Drawings, and within 1/8 inch offset of adjoining faces and of alignment of matching profiles.

3.4. CLEANING AND PROTECTION

3.4.1. Damaged Units: Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.

3.4.2. Cleaning: Remove temporary protective coverings and strippable films (if any) as soon as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by the panel manufacturer, and maintain in a clean condition during the construction period.

PART 4 - QUALITY CONTROL PROCEDURES

4.1. QUALITY CONTROL RECORD: Complete AF Form 1063 daily as follows:

4.1.1. Top Section:
Insert date and record number
Insert weather description and temperature
Indicate crew start/stop times
Indicate your start/stop times
Indicate total roof area
Indicate roof area completed previous to date

4.1.2. Products Section: This section is divided into major categories. Each category may include several materials:

4.1.2.1. Examine each material within the category and check proper box.

4.1.2.2. Check the "not applicable" box for work materials not included.

4.1.2.3. Assure that all materials in a category comply with the Contract to result in a check in the "complies" box. To determine compliance, compare the material with the project Specifications, Drawings, and also with the approved manufacturer's literature submitted. Since materials other than those covered by the components listed may be used, enter their compliance in the "all other materials" category.

4.1.3. Execution Section:

4.1.3.1. The work item numbers in this section of the record correspond to the work items in these basic QC requirements. The work items are Specification items considered to be a major concern. These items are in the basic QC requirements for convenience and tabulation.

4.1.3.2. Performance of the "actions" below the work item will result in an entry in the proper box on the QC record. Specification items not in the basic QC requirements must also be considered, and their acceptability grouped and documented in the "other" box.

4.1.4. Variance Section:

4.1.4.1. An entry in any "varies" box under the "products" or "execution" sections requires an explanation of the variance in this section. The explanation should be limited to a description of the variance only; reasons for variances are not necessary.

4.1.4.2. Indicate action taken to resolve each variance to result in complying work. If a variance is not resolved on the same day it occurs, the number of that day's record must be entered in the space provided on records for all succeeding days, until the variance is resolved.

4.1.5. Closing Section: Sign the record at the end of the workday and submit it to the Government inspector.

4.2 WORK ITEMS

4.2.1. Work Item 1: Do not expose materials to moisture in any form before, during, or after delivery to the site.

Action: Inspect materials upon delivery for intact manufacturer's shipping containers. Verify the vehicle delivering materials provided adequate cover for protection of materials. Inspect

materials for evidence of contact with moisture before acceptance. Inspect job site storage; ascertain enclosed storage to protect materials from moisture from any source. Observe material handling from storage areas to roof. Delivery to job site requires the same attention as delivery to the storage area. Mark conspicuously all materials exposed to any form of moisture and have them permanently removed from the project site.

4.2.2. Work Item 2: Execute the work so that each area of the installation is completed on the same work day it is begun. Included are all flashings, metal trim shapes, closure strips, and all other related parts to complete assembly.

Action: Determine the area of work planned and ascertain that enough materials are at hand to complete it. Inspect work at day's end and verify completion to "tie-in" point.

4.2.3. Work Item 3: Install temporary water cutoffs and tie-ins at the end of each work day. Remove cutoffs and tie-ins on resuming work day so that all vertical faces of insulation are exposed.

Action: None.

4.2.4. Work Item 4: Except for expedient temporary work, do not proceed with roofing work during inclement weather or when the ambient temperature is below 45 deg F or projected to fall below 45 deg F at any time during each work day.

Action: During bad weather, ascertain that work being done is only temporary and protects the facility and previously completed roofing system. Assure that all temporary work is removed before installation of permanent components when work is resumed.

4.2.5. Work Item 5: Do not apply roofing system components if moisture in any form can be seen or felt on the substrate to which the components will be secured. Substrate shall be free of debris, sharp objects, films, or other contaminants.

Action: Ascertain no moisture is on deck, vapor barrier, or any other existing surfaces before applying subsequent materials. If there are objects present which present a physical danger to the new roof system, they are to be swept off or smoothed out. Water shall be broomed or pumped off and the surface allowed to dry before commencement of work. Other contaminants which may be present and not addressed here shall be prevented from coming into physical contact with new roof system.

4.2.6. Work Item 6: N/A

4.2.7. Work Item 7: N/A

4.2.8. Work Item 8: N/A

4.2.9. Work Item 9: If traffic of any kind over the partially or fully completed roofing is unavoidable, provide and use adequate plank or plywood protection for the roofing.

Action: Inspect activities and methods used to transport materials over the completed or partially completed roofing system. Check adequacy of planks of plywood to protect system.

4.2.10. Work Item 10: Do not load or permit any part of a structure to be loaded with a weight that will adversely affect its safety.

Action: Assure that runways (such as wood planks or plywood) are used to distribute the load of materials and equipment hauling over the deck so as not to cause deflection of the deck. Check for broken welds on bends in metal decking because of materials or equipment handling.

4.2.11. Work Item 11: Removal of existing materials must result in clean, dry substrate, except for residual stains, providing a surface suitable to apply and secure new materials.

Action: Inspect substrate for excessive roughness, cracks, holes, deleterious coatings, or deteriorated condition. Assure that decking or other substrate determined to be defective is repaired, replaced, or brought to the attention of the Contracting Officer. Assure that deck joints are sealed to prevent the passage of moisture.

4.2.12. Work Item 12: N/A

4.2.13. Work Item 13: N/A

4.2.14. Work Item 14: Clean seaming area using techniques required by the roofing manufacturer's Specification.

Action: This is the most critical factor and should be monitored very carefully. Accurate seaming depends on proper cleaning on both mating surfaces. If incorrectly cleaned, flanges are to be taken apart and reinstalled.

4.2.15. Work Item 15: Probe seams for defects.

Action: Check all outside edges of the seam along its entire length. The completed seams hall be visually free of any voids, fishmouths, wrinkles, and shall be configured perfectly vertical.

4.2.16. Work Item 16: N/A

4.2.17: Work Item 17: N/A

END OF SECTION 07410

ATTACHMENTS FOLLOW

SYSTEM SUMMARY SHEET
Submittal #1

This is to notify you that we shall apply for your full 20-year labor and materials warranty for the following Project:

Solicitation No. _____ Name of Building:
_____

Address of Building:
_____

Type and Use of Building:
_____

( ) New Building ( ) Recover ( ) Tear Off

No. of Squares _____ Mfg Spec #_____ Feet of Flashing _____ Mfg Spec #_____

Description of Project:
_____

Roof Slope _____ Does roof have adequate drainage? ( ) Yes ( ) No

Deck: ( ) Steel Gauge_____ Joist Spacing _____ Width of Rib _____
( ) Wood Type_____ Thickness _____ Joist Spacing _____
( ) Lightweight Concrete Type _____ Min. Thickness
_____
( ) Concrete Type _____ ( ) Structural Wood Fiber Trade Name
_____
( ) Gypsum Type _____ ( ) Other (Specify)
_____

Vapor Retarder: ( ) No ( ) Yes ( ) Old ( ) New
Type_____

New Insulation: ( ) Fiberboard ( ) Perlite
( ) Isocyanurate ( ) Other _____

( ) EPS ( ) Urethane
( ) Cellular Glass ( ) Fiberglass

Attachment: ( ) Mechanical Fastener
( ) Type _____

Insulation Mfg _____ No. of Layers _____ Thickness _____

Recover Info: Number of Existing Roofs? _____ Existing Surface? _____
Loose Gravel to be removed? Y/N Wet Insulation? Y/N
Waterlogged areas to be removed? ( ) Yes ( ) No
Roof vents to be used? ( ) Yes ( ) No Spacing _____

This job will be completed in accordance with the contract specifications or the latest issue of the SSMR manufacturer's "commercial roofing specifications" manual, whichever is most stringent, and we will use only approved products.

We plan to start this job on _____. We plan to complete this job on _____.

Name of Roofing Contractor/Subcontractor
_____

Phone No. _____ Address
_____

Signature of Company Official _____ Title
_____

We acknowledge your notification that the U.S. Government 20-Year SSMR Warranty will be required on the roof described above and will sign and issue this warranty/guarantee to the Government upon your successful completion of this project. There will be a charge to you of $_____.

Manufacturer_____
____

Authorized Representative_____
Date_____

SYSTEM SUMMARY SHEET
Submittal #2

This is to notify you that we shall apply for your full 20-year labor and materials warranty for the following Project:

Solicitation No. _____ Name of Building:
_____

Address of Building:
_____

Type and Use of Building:
_____

( ) New Building ( ) Recover ( ) Tear Off

No. of Squares _____ Mfg Spec #_____ Feet of Flashing _____ Mfg Spec #_____

Description of Project:
_____

Roof Slope _____ Does roof have adequate drainage? ( ) Yes ( ) No

Deck: ( ) Steel Gauge_____ Joist Spacing _____ Width of Rib _____
( ) Wood Type_____ Thickness _____ Joist Spacing _____
( ) Lightweight Concrete Type _____ Min. Thickness
_____
( ) Concrete Type _____ ( ) Structural Wood Fiber Trade Name
_____
( ) Gypsum Type _____ ( ) Other (Specify)
_____

Vapor Retarder: ( ) No ( ) Yes ( ) Old ( ) New
Type_____

New Insulation: ( ) Fiberboard ( ) Perlite
( ) Isocyanurate ( ) Other _____

( ) EPS ( ) Urethane
( ) Cellular Glass ( ) Fiberglass

Attachment: ( ) Mechanical Fastener
( ) Type _____

Insulation Mfg _____ No. of Layers _____ Thickness _____

Recover Info: Number of Existing Roofs? _____ Existing Surface? _____
Loose Gravel to be removed? Y/N Wet Insulation? Y/N
Waterlogged areas to be removed? ( ) Yes ( ) No
Roof vents to be used? ( ) Yes ( ) No Spacing _____

This job will be completed in accordance with the contract specifications or the latest issue of the SSMR manufacturer's "commercial roofing specifications" manual, whichever is most stringent, and we will use only approved products.

We plan to start this job on _____. We plan to complete this job on _____.

Name of Roofing Contractor/Subcontractor
_____

Phone No. _____ Address
_____

Signature of Company Official _____ Title
_____

We acknowledge your notification that the U.S. Government 20-Year SSMR Warranty will be required on the roof described above and will sign and issue this warranty/guarantee to the Government upon your successful completion of this project. There will be a charge to you of $_____.

Manufacturer_____
____

Authorized Representative_____
Date_____

APPOINTMENT OF QUALITY CONTROLLER
Submittal #3

_____ (name) is appointed as quality controller on Project No. _____ with the authority to regulate the quality of the work so that it conforms to the contract. The quality controller is authorized to order discontinuance of any operation causing nonconforming work.

The quality controller is experienced in the supervision and inspection of SSMR construction similar to that required in this contract. The quality controller understands all requirements of these specifications.

Name of Firm _____

Address _____

Telephone _____

Authorized Representative's Signature _____

Printed or Typed Name _____

Date _____

I acknowledge receipt of this letter.

Quality Controller's Signature _____

Printed or Typed Name _____

Date _____

STANDING SEAM METAL ROOF (SSMR)
20-YEAR LABOR AND MATERIAL WARRANTY
Submittal #4

WARRANTY COVERAGE

This Standing Seam Metal Roof (SSMR) System is delivered to the United States Government subject to a full material and workmanship warranty for 20 years that guarantees that the manufacturer will pay all costs necessary to maintain the SSMR roofing system in a watertight condition during the life of the warranty.

The specified roof system is equal to and comparable to our _____ 20-year system design and the components specified are compatible with our material. As the manufacturer of this system, we also accept responsibility for making repairs to the roofing system at no additional cost to the Government, to correct defective materials and workmanship down to the structural deck.

If the manufacturer fails to make required emergency and permanent repairs during the warranty period, as stated after notice by telephone from the Contracting Officer, the Government may have the work done by other authorized applicators and charge the cost to the manufacturer. The warranty provisions of this contract apply notwithstanding government inspection and acceptance. A separate warranty is required for each building. Failure to perform the work, resulting in the Government having the work performed, will not void this warranty.

TERMS, CONDITIONS, LIMITATIONS

Emergency repairs shall be made by the manufacturer or his licensed applicator within 48 hours of receipt of notice by telephone from the Contracting Officer and weather permitting, the manufacturer agrees to permanently repair the affected areas within 30 days by restoring them to a watertight condition, without cost to the government. If it is determined that leaks were caused by either an exclusion from coverage or a specific condition listed below, the manufacturer will repair the defects and payment will be made by the Government based on invoices supplied by the manufacturer.

The monetary liability to the manufacturer for replacement of a defective system is limited to the cost of the original installation of the total roof system.

EXCLUSIONS FROM COVERAGE

1. Natural disasters, acts of God (lightning, hurricanes, tornadoes, sustained winds exceeding 72 mph as recorded at the nearest meteorological center, earthquakes, hail).

2. Acts of negligence or abuse and misuse of Government personnel, accidents, vandalism, civil disobedience, war, or damage caused by falling objects.

3. Damage by structural failure, settlement, movement, distortion, warpage, or displacement of structure.

4. Failure of material or flashing caused by movement of metal work not supplied by manufacturer issuing the warranty.

5. Leaks caused by repairs or alterations of roof system or installation of structures, fixtures or utilities on or through roof without prior written approval of manufacturer.

6. Storage of material on roof.

7. Moisture entering roof system through walls, coping, or any part of building structure except the roof, including from adjacent building.

8. Fire.

9. Faulty construction or design of building, including parapet wall, copies, chimneys, skylights, vents, or of structural roof deck.

10. Infiltration or condensation of moisture in or through underlying area; vapor condensation beneath the roof greater than the acceptable ambient moisture content for the given material as established by the appropriate American Society for Testing and Materials (ASTM) standard in effect at the time of installation.

11. Under no circumstances is the manufacturer responsible for damages to the building, its contents, or structural roof deck.

12. Membrane deterioration due to chemical attack from: HVAC oil, lubricating oil, solvents or other petroleum products.

SPECIFIC CONDITIONS THAT VOID THE WARRANTY

1. Failure by the owner to use, reasonable care in maintenance; failure to follow manufacturer's written maintenance instructions.

2. Failure of owner to make repairs to leaks not covered by manufacturer's warranty.

3. Repair work by any Contractor other than SSMR manufacturer's licensed applicator or use of unapproved material.

4. Changes in building usage which may affect roof performance unless approved in writing by the manufacturer prior to such change.

DETERMINATION OF RESPONSIBILITY

A government representative will call the manufacturer immediately when a leak is discovered. Receipt of notice by telephone or in writing from the Contracting Officer is evidence that the Contracting Officer has had the roof examined by a technically qualified representative of the government and has determined, based on this examination, that none of the above exclusions or specific conditions apply and the manufacturer is obligated to make the repairs.

After completion of the 48-hour emergency repair, the manufacturer, to avoid application of the warranty, must notify the Contracting Officer in writing of the existence of an exclusion stated herein. Failure to provide such notice will preclude the manufacturer from later disputing the coverage of the warranty. The burden to establish the existence of an exclusion or specific condition affecting the warranty is on the manufacturer.

After the occurrence of an exclusion from coverage or a specific condition which renders the warranty ineffective, the warranty shall be allowed to continue as long as the government returns the roofing system to its original condition and the manufacturer is allowed to make an oversee the repair. The manufacturer and his authorized installer will be paid for time and transportation to make or supervise the non-warranty repair.

BENEFICIARY

The warranty period starts on the date the roofing system (work) is accepted by the government from the roofing manufacturer's technical representative and the roofing contractor.

It is understood by the manufacturer and his licensed/approved applicator (contractor) that the warranty provided herein shall be for the benefit of the United States Government.

BURDEN OF PROOF

The manufacturers shall have the burden of proving the existence of a condition which established an exclusion from coverage, or which would render the warranty ineffective or null and void.

OTHER WARRANTIES

SIGNATURE The warranty contained herein shall be in addition to and not in lieu of any warranty otherwise applicable to the work or materials used in the Contract.

Manufacturer Firm Name _____
Address _____

Authorized Representative's Signature _____
Date _____

Authorized Representative's Name _____
Title _____

Manufacturer's Warranty/Serial
Number of Building Number _____

Located at _____

Warranty/Guaranty Expiration Date _____

ROOF PANEL SAMPLE IDENTIFICATION TAGS
Submittal #5

Roof Panel Sample Identification Tags:

Include this attachment in the envelope with sample. Use indelible ink or typing.

Sample No. _____

Project No. _____

Air Base _____

Bldg No. _____

Roof Panel Membrane Mfg. _____

Roof Panel Type _____

Roof Panel Thickness _____

Roof Panel Lot Number _____

AS-BUILT ROOF SYSTEM SUMMARY
Submittal #6

As-Built Roof System Summary:

After completion of construction, accurately fill in the information required on this sheet. If more than one system applies to the same building, complete one sheet for each system. Submit in quadruplicate before final acceptance.

Bldg No. _____ Project _____ _____AFB

Total Project Area in Square Feet _____

Building Area Where This System is Installed _____

_____

Deck Type _____ Deck Slope _____

Underlayment Components (type and number) _____

Underlayment Attachment Method _____

Support Structure:

Type _____

Manufacturer _____

Primary: Thickness _____ Attachment _____

Secondary: Thickness _____ Attachment _____

Metal Roof Panel:

Manufacturer _____

System Designation _____

Type of Metal _____

Type of Finish _____

Type of Seam _____

Type of Fastening _____

Was this a new system installed over existing roof? _____
Roof Completion Date _____

Roofing Contractor _____
(NAME)

_____
(ADDRESS)
Day _____ 24 Hour _____
(TELEPHONE)

U.S. ARMY CORPS OF ENGINEERS
MISSOURI RIVER DIVISION
TESTING FOR WIND UPLIFT LOADING ON CONCEALED
ANCHOR CLIPS CONNECTION TO ROOFING PANEL
STANDING SEAM METAL ROOF SYSTEM (SSMRS)

ATTACHMENT 1

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PURPOSE

The purpose of this test method is to obtain data from a short-term static load test to use in assessing the wind uplift resistance performance of the concealed anchor clip connection to the roofing panel seams. The capacity and/or the acceptability of this connection, based on the prescribed wind uplift test loadings, are to be determined by this test.

INTRODUCTION

The requirements contained herein will be used, as referenced in SECTION: STANDING SEAM METAL ROOFING SYSTEMS (SSMRS) for wind uplift testing for this SSMRS connection.

This test method determines the wind uplift pressure resistance for the roof panel to concealed anchor clip connection SSMRS by means of static loading applied as shown in FIGURE 1.

The uplift pressures determined by this test are compared to the design uplift pressures for the building roof given on the Contract Drawings. The required uplift pressures obtained from the results of the tests done in accordance with this document must exceed the design uplift pressure shown on the Contract Drawings multiplied by the appropriate factors of safety. The method used to calculate the design uplift pressures for the building were taken from Corps of Engineers criteria, TM5-809-1, Load Assumptions for Buildings, which, in turn, is based upon Section 6 of ANSI A58.1-1982, Minimum Design Loads for Buildings and Other Structures. The design pressures shown are dependent upon many factors such as wind gusts, roof height, the shape and configuration of the roof, roof slope, roof edge conditions, and the landscape surrounding the building. Design uplift pressures and thus the required uplift pressures for the tests will be greater around the perimeter of the roof, and for certain roof configurations along the ridges as well, than the uplift pressures in the center of roof areas.

This testing method may also be used to determine the ultimate uplift pressure for this SSMRS connection. Using the ultimate uplift pressure, the rated uplift pressure as defined hereinafter may be determined. This rated uplift pressure for this SSMRS connection may then be used on other Missouri River Division building projects whenever the required uplift pressures do not exceed the rated uplift pressures.

TEST REQUIREMENTS

GENERAL

1. Scope

1.1. The test method specified in this document is intended to provide test loading data that can be used to determine the uplift resistance for SSMRS concealed anchor clips connection to the roofing panel seams by using statically applied loads as shown on FIGURE 1. It is applicable to any type of SSMRS.

1.2. This test determines the ability of the SSMRS components at this connection including the panels, panel seams and concealed anchor clips to resist the prescribed test loading. The supporting structural members and fasteners shown on FIGURE 1 are not part of the test assembly for this test. This test may also be used to determine the ultimate uplift pressure of the connection by determining the pressure load level at failure. The rated uplift pressure of the roof test assembly may then be determined for the purpose of using the SSMRS on other Missouri River Division projects. See paragraphs 7.2, 7.5, 8.2, and 8.3.

2. Test Facilities

2.1. Location: This test may be done at a location owned and operated by the manufacturer of the SSMRS or at an established commercial testing laboratory. In either case, certification of the test reports will be as required in paragraph 8.2.

2.2. Environment: Testing shall be performed in an area of sufficient size to allow easy access, for the purpose of observation of all exposed components of the test assembly, at all times during the testing process. The test assembly is to be at room temperature when testing is performed.

3. Definitions:

3.1. Standing Seam Metal Roof System (SSMRS): As used in this testing document, the term "SSMRS" refers to concealed fastener type roof systems, which are sold as complete "standard products" by a single manufacturer.

3.2. Concealed anchor clip connection to roof panel: As used in this testing document, the connection controlled by this test consists of three items. They are:

a. The integrity of the standing seam rib - the ability of the rib seam to resist the concentrated loading applied by the clip and remain intact.

b. The restraint of the roof panels by the clips - the ability of the clip to stay within the rib seam under the concentrated loading applied to the clip.

c. The integrity of the concealed anchor clip - the ability of the clip to resist excessive deformations and distortions, and for multi-piece clips, to remain intact.

The conditions of the components of this connection, after testing, and the definitions of failure of the connection are given in paragraphs 7.3 and 7.5.

3.3 Uplift pressures: As used in this document, uplift pressures are the concentrated loads applied to the concealed anchor clip as contained or referenced hereinafter divided by the tributary load area of the concealed anchor clip being tested. The uplift pressures used herein are:

3.3.1. Design uplift pressures: The design uplift pressures are the wind uplift pressures that were calculated from Corps of Engineers design criteria and are given on the contract drawings.

3.3.2. Required uplift pressures: the required uplift pressure is the design uplift pressure, defined above, multiplied by the appropriate factor of safety.

3.3.3. Ultimate uplift pressure: The ultimate uplift pressure is the highest incremental uplift test pressure level sustained by the roof system test assembly before failure as defined in paragraphs 7.3 and 7.5 first occurs. The ultimate uplift pressure will be the highest load level that can be sustained by the test assembly for 1 minute without failure divided by the tributary load area of the concealed anchor clip. This will normally be the uplift pressure at the load cycle just prior to the cycle where failure occurred.

3.3.4. Rated uplift pressure: The rated uplift load will be either the required uplift pressure multiplied by the tributary load area of the concealed anchor clip, when testing for a particular building application; or the load where failure first occurs, when testing for the ultimate uplift pressure to rate a SSMRS.

PERFORMANCE

4. Test Apparatus

4.1. The test apparatus will consist of support framing, steel channels, steel angles, steel straps, fasteners, and other components and equipment needed to maintain a uniform steady static loading on the test assembly described in paragraph 5 below as shown on FIGURE 1. The apparatus shall allow the performance of the test procedures prescribed herein within the allowable tolerances. The apparatus will be of sufficient dimensions to uniformly load and support the test assembly.

4.2. The load application apparatus will load the test assembly at a uniform rate that is slow enough to easily establish the point when failure as defined in paragraphs 7.3 and 7.5 first occurs. The load application apparatus will be capable of providing both: (1) A continuous reading of the loading as it is being applied during the test, and (2) At the conclusion of the test, the highest loading that was applied.

5. Test Assembly

5.1. The roof system components used in the test assembly shall be representative of the actual SSMRS components proposed for use in the roof installation as to materials, workmanship, and details. The clip attachment and seaming of the rib shall be done under conditions that are representative of the normal field conditions in the building construction industry. Properties of the materials and components used in the test assembly shall be recorded.

5.2. The test assembly shall be of sufficient size to construct as shown in FIGURE 1 and to test using the testing procedures contained herein.

6. Test Procedure

6.1. The test load conditions are regulated by changing the pull tension in the steel strap (see FIGURE 1). Testing will be done by loading in cycles. Testing will begin by applying 100 pounds on the strap in the first load cycle and increasing the loading by 25 pounds on each subsequent load cycle. Each test load will be applied for 1 minute. The applied load shall be reduced to zero after each load cycle. The test assembly shall be loaded in this cyclic manner until the prescribed uplift load is reached. Tolerances for the cyclic load values contained herein shall be:

a. Plus or minus 5 pounds for loads up to 200 pounds.

b. Plus or minus 10 pounds for loads greater than 200 pounds.

c. The time limits given for loads shall be the absolute minimum values.

6.2. Repairs or modifications, except to the load application apparatus, are not to be made during the test.

7. Test Results

7.1. The factors or safety used to determine the required uplift pressures shall be those given in the specification to which this testing criteria is attached.

7.2. The roof system manufacturer may choose to determine the rated uplift pressure for the SSMRS being tested. If so, the test loads applied to the test assembly are increased in the cyclic manner described in paragraph 6.1 until the failure load of the test assembly is determined. The rated uplift pressure is then calculated by taking 90% of the ultimate uplift pressure determined from the test. If the roof system manufacturer does not wish to reduce the uplift test pressure for the single test by this 90% factor, the uplift capacity pressures from 3 tests performed on 3 separate identical test assemblies may be averaged to establish the rated uplift pressure of the system. See paragraphs 7.5, 8.2, and 8.3.

7.3. A test assembly loaded to the required uplift pressure level shall comply with the following items during and at the conclusion of the test procedure described in paragraph 6.1:

7.3.1. Deformation of all components shall be elastic throughout the entire range of testing. Roofing panel ribs and concealed anchor clips shall show no sign of buckling or other permanent deformation or distortion.

7.3.2. The test assembly shall show no evidence of unseaming or rupture of the standing seam rib. Multi-piece concealed anchor clips shall maintain the securement and integrity of the connected components and show no sign of loosening.

7.3.3. The test assembly shall show no evidence of excessive opening of twisting of the roofing panel seam rib that would be uncharacteristic of an installed SSMRS.

7.4. Tests done on test assemblies which are loaded to the required uplift pressure level in accordance with paragraph 6 will be terminated in one of the following ways:

7.4.1. The test assembly passes if the required uplift pressure, based on the prescribed uplift load applied as designated in paragraph 6.1, is sustained for 1 minute and all the requirements of paragraph 7.3 are met.

7.4.2. The test assembly fails when it does not comply with paragraphs 6.1 and 7.3, or when the prescribed uplift load cannot be sustained by the test equipment for 1 minute.

7.5. Tests done to determine the ultimate uplift pressure of the roof system will be terminated at the failure load level. When testing to determine the ultimate uplift pressure level, failure will occur when any of the conditions given in paragraphs 7.3.1, 7.3.2, or 7.3.3 are not met or when

the static load cannot be sustained by the equipment for 1 minute. The recorded value for the ultimate uplift pressure will be based upon the highest load level that can be sustained by the test assembly for 1 minute without failure. This will normally be the uplift pressure based upon the load at the cycle just prior to where failure occurred. The ultimate uplift pressure will be recorded in pounds per square foot (psf). The rated uplift pressure will then be determined in the manner described in paragraphs 7.2 and recorded in psf.

MARKING

8. Details and Submittals

8.1. Before testing begins, the following shall be submitted for approval:

8.1.1. Test Apparatus: A description of the testing apparatus along with sketches that completely identify and dimension the test equipment members. Details of the load application apparatus, including the load indicating devices.

8.1.2. Test Assembly: A description of the test assembly along with sketches that completely identify, dimension, and locate all components. Connection details of multi-piece concealed anchor clips and clip attachments to the panels.

8.1.3. Testing Procedure: A complete description of the testing procedure.

8.2. Certified Test Reports: After the testing has been completed the results shall be submitted in a certified test report as follows:

8.2.1. General: Regardless of the test location (see paragraph 2.1), the certification of the test will be done by a representative of a recognized independent commercial testing laboratory that is not associated in any way with the manufacturer of the SSMRS, with the contractor, or with any subcontractors that have or will perform work of the project.

8.2.2. Content: The test report shall be organized in an orderly manner. It shall contain the following:

8.2.2.1. All of the information required in paragraph 8.1 concerning the test apparatus, test assembly and testing procedures.

8.2.2.2. A narrative statement certifying compliance with all of the testing criteria and requirements contained herein.

8.2.2.3. For tests done to determine the rated uplift pressure, a statement containing the rated pressure level of the roof system along with the failure mode of the test assembly or assemblies on which the rating is based. The failure of the test assembly should be referenced to the

requirements listed in paragraph 7.3. A short narrative explaining what component failed and how failure occurred should accompany the certification.

8.2.3. When testing for the required uplift pressures for a particular building project, the report shall be submitted with the shop drawings that detail the SSMRS installation.

8.2.4. When testing for the rated uplift pressure, a certified test report may be submitted for approval prior to use of the SSMRS on a Missouri River Division project.

8.3. Use of Rated Standing Seam Roofing Systems: Once the rated uplift pressure for a roofing system has been determined, that system may then be used on Missouri River Division building projects under the following conditions. Whenever the required uplift pressures do not exceed the rated uplift pressure of the roof system, the system may be used on that project without further testing. The certified test report that contains the rated uplift pressure, along with a complete description of pertinent information regarding the components and assembly details for the SSMRS (see paragraph 8.2), will be included with the project shop drawings.

** End of Test **

U.S. ARMY CORPS OF ENGINEERS
MISSOURI RIVER DIVISION
AIR BAG TESTING FOR WIND UPLIFT LOADING ON
STANDING SEAM METAL ROOF SYSTEMS (SSMRS)

ATTACHMENT 2

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PURPOSE

The purpose of this test method is to obtain data from a short-term static load test to use in assessing the wind uplift resistance performance of SSMRS. The acceptability and the capacity of SSMRS; including the roof panels and the panel attachment to concealed anchor clips and other members; concerning resistance to prescribed wind uplift loading pressures are to be determined by this test.

INTRODUCTION

The requirements contained herein will be used, as referenced in SECTION: STANDING SEAM METAL ROOFING SYSTEMS (SSMRS) (AND FASCIAS), for wind uplift testing for SSMRS.

This test method determines the wind uplift pressure resistance for SSMRS by means of static air pressure applied to the underside of a SSMRS test assembly by inflated air bags.

The uplift pressures determined by this test is compared to the design uplift pressures for the building roof given on the contract drawings. The required uplift pressures obtained from the tests done in accordance with this document must exceed the design uplift pressure, shown on the contract drawings multiplied by the appropriate factors of safety. The method used to calculate the design uplift pressures for the building were taken from Corps of Engineers criteria, TM5-809-1, Load Assumptions for Buildings, which, in turn, is based upon Section 6 of ANSI A58-1-1982, Minimum Design Loads for Buildings and Other Structures. The design pressures shown are dependent upon many factors such as wind gusts, roof height, the shape and configuration of the roof, roof slope, roof edge conditions, and the landscape surrounding the building. Design uplift pressures and thus the required uplift pressures will be greater around the perimeter of the roof, and for certain roof configurations along the ridges as well, than the uplift pressures in the center of roof areas. Multiple tests may be necessary to model the uplift loading conditions for the various areas of building roof to produce the most efficient overall SSMRS installation.

This testing method may also be used to determine the ultimate uplift pressure for the SSMRS. Using the ultimate uplift pressure, the rated uplift pressure as defined hereinafter may be determined. The rated SSMRS may then be used on other Missouri River Division building projects whenever the required uplift pressures do not exceed the rated uplift pressures.

SSMRS TEST REQUIREMENTS

GENERAL

1. Scope

1.1. The test method specified in this document is intended to provide uplift resistance data for SSMRS by using statically applied pressures from confined air bags on the underside of the roof panels. It is applicable to any type of SSMRS.

1.2. This test determines the ability to the system of SSMRS components including roof panels, concealed anchor clips, fasteners, accessories, etc., and insulation, if applicable, to resist the prescribed uplift pressure. Supporting structural roof system members and the connections thereto, including structural roof deck of the type controlled be the Steel Deck Institute, are not part of this test. This test may also be used to determine the ultimate uplift pressure of the SSMRS by determining the pressure level at failure. The rated uplift pressure of the roof test assembly may then be determined for the purpose of using the SSMRS on other Missouri River Division projects. See paragraph 7.2, 7.5, 8.2, and 8.3.

2. Test Facilities:

2.1. Location: This test may be done at a location owned and operated by the manufacturer of the SSMRS or at an established commercial testing laboratory. In either case, certification of the test reports will be as required in paragraph 8.2.

2.2 Environment: Testing shall be performed in an area of sufficient size to allow easy access, for the purpose of observation of all exposed components of the test assembly, at all times during the testing process. The test assembly is to be at room temperature when testing is performed.

3. Definitions:

3.1. Standing Seam Metal Roof (SSMR): As used in this testing document, the term “SSMRS” refers to concealed fastener type roof systems, which are sold as complete “standard products” by a single manufacturer.

3.2. Air Bag Test: The air bag test utilizes a test apparatus that consists of inflatable pleated air bags and a controllable blower to create and maintain a static air pressure that simulates a uniform steady negative (outward) static pressure on the test assembly of a roofing system.

3.3. Design Uplift Pressures: The design uplift pressures are wind uplift pressures that were calculated from Corps of Engineers design criteria and are given on the contract drawings.

3.4. Required Uplift Pressure: The required uplift pressure is the design uplift pressures, defined above, multiplied by the appropriate factor of safety.

3.5. Ultimate Uplift Pressure: The ultimate uplift pressure is the highest incremental uplift pressure level sustained by the SSMRS test assembly before failure as defined in paragraphs 7.3 and 7.5 first occurs. The ultimate uplift pressure will be the highest loading level that can be sustained by the test assembly for 1 minute without failure. This will normally be the uplift pressure at the load cycle just prior to the cycle where failure occurred.

3.6. Rated Uplift Pressure: The rated uplift pressure of a tested roof system shall be either 90% of the tested ultimate uplift pressure from one roof test or the average tested ultimate uplift pressures from 3 tests on 3 separate identical test assemblies of the roof system under consideration. See paragraphs 7.2, 7.5, 8.2, and 8.3.

3.7. Prescribed Uplift Pressure: The prescribed uplift pressure may be either the required uplift pressure, when testing for a particular building application; or the pressure where failure first occurs, when testing for the ultimate uplift pressure to rate a SSMRS.

PERFORMANCE

4. Test Apparatus

4.1. The test apparatus will consist of inflatable pleated air bags, located on the underside of the test assembly, and all other equipment needed to maintain a uniform steady negative (outward on the roof) static pressure on the test assembly. The apparatus will allow performance of the test procedures prescribed herein within the allowable tolerances. The apparatus will be of sufficient dimensions to uniformly load all of the roofing system test assembly described in paragraph 5 below. The apparatus will include a sufficient number of pleated air bags with enough extra bag material and excess volume to uniformly load the entire test assembly during all conditions of deflections of the roofing system. At least two static pressure taps, one at each end of the test assembly, shall be provided to measure the air bags pressures and shall be located so that the pressure readings are unaffected by the velocity of the air supply to the bags or by any other air movement. The test pressure will be the average of the pressure readings from the taps. A single manifold that is connected to all air bags and is of sufficient size to equalize the pressure under the entire test assembly will be used.

4.2. The air system is to consist of a controllable blower, or a constant volume blower, or both, with an adjustable pressure relief damper capable of providing constant static air pressure differential across the roofing system test assembly for the duration of the test. A manometer(s) shall be used to determine air pressure differences.

5. Test Assembly

5.1. The roof system test assembly shall be representative of the actual SSMRS installation proposed for use as to materials, workmanship, and details. It shall be assembled under conditions that are representative of the normal field conditions in the building construction industry. Properties of the materials and components used in the test assembly shall be recorded.

5.2. The dimensions of the test assembly are to be a minimum of 5 panels wide and 5 spans long but not less than 6 feet wide by 12 feet long. The test assembly shall contain one intermediate panel splice joint if panel splices will occur in the actual field installation. Only one panel within a test assembly will have an intermediate splice joint. The intermediate splice shall be located near the center roof panel and near the center most standing seam panel-span that is used for deflection readings. See paragraph 6.3. The assembly components, are to be sized, located, and have materials strengths to best simulate the field conditions of the installed SSMRS.

5.3. The periphery of the roofing system test assembly shall be the manufacturers actual components at eaves, ridges, and edges. Concealed anchor clips shall be spaced no closer in the test than will be used in the actual roof installation. Test assemblies shall model end and edge attachment conditions and panel splice conditions (as stated in paragraph 5.2) in such a way that items which do not occur in close proximity on the roof are not placed in close proximity in the test assembly. All fasteners used in the test assembly shall be the same as those used in the actual roof system installation.

6. Test Procedure

6.1. The test pressure conditions are regulated by changing the static pressure in the air bags to, in turn, change the uplift pressure on the test assembly. Testing will start by raising the air pressure to 5 pounds per square foot (psf) and holding for 1 minute while initial position deflection readings are taken. After the initial readings have been recorded, the roof system shall be loaded in a cyclic manner until the prescribed uplift pressure is reached. The air pressure for successive load cycles shall be increased in increments not greater than 15 psf up to 50 psf, in increments not greater than 10 psf between 50 and 90 psf, in increments not greater than 5 psf above 90 psf. The test pressure shall be held at each increment for 1 minute. The air pressure shall be returned to

6.2. Repairs or modifications, except to the load application apparatus, are not to be made during the test.

7. Test Results

7.1. The factors of safety used to determine the required uplift pressures shall be those given in the specification to which this testing criteria is attached.

7.2. The roof system manufacturer may choose to determine the rated uplift pressure for the SSMRS being tested. If so, the test loads applied to the test assembly are increased in the cyclic manner described in paragraph 6.1 until the failure load of the test assembly is determined. The

rated uplift pressure is then calculated by taking 90% of the ultimate uplift pressure determined from the test. If the roof system manufacturer does not wish to reduce the uplift test pressure for the single test by this 90% factor, the uplift capacity pressures from 3 tests performed on 3 separate identical test assemblies may be averaged to establish the rated uplift pressure of the system. See paragraphs 7.5, 8.2, and 8.3.

7.3. A test assembly loaded to the required uplift pressure level shall comply with the following items during and at the conclusion of the test procedure described in paragraph 6.1:

7.3.1. Deformation of all components shall be elastic throughout the entire range of testing. Roofing panel ribs and concealed anchor clips shall show no sign of buckling or other permanent deformation or distortion.

7.3.2. The test assembly shall show no evidence of unseaming or rupture of the standing seam rib. Multi-piece concealed anchor clips shall maintain the securement and integrity of the connected components and show no sign of loosening.

7.3.3. The test assembly shall show no evidence of excessive opening or twisting of the roofing panel seam rib that would be uncharacteristic of an installed SSMRS.

7.4. Tests done on test assemblies which are loaded to the required uplift pressure level in accordance with paragraph 6 will be terminated in one of the following ways:

7.4.1. The test assembly passes if the required uplift pressure, based on the prescribed uplift load applied as designated in paragraph 6.1, is sustained for 1 minute and all the requirements of paragraph 7.3 are met.

7.4.2. The test assembly fails when it does not comply with paragraphs 6.1 and 7.3, or when the prescribed uplift load cannot be sustained by the test equipment for 1 minute.

7.5. Tests done to determine the ultimate uplift pressure of the roof system will be terminated at the failure pressure level. When testing for the ultimate uplift pressure level, failure will occur when any of the conditions given in paragraphs 7.3.1, 7.3.2 or 7.3.3. are not met or when the static pressure cannot be sustained by the equipment for 1 minute. The recorded value for ultimate uplift pressure will be the highest loading level that can be sustained by the test assembly for 1 minute without failure. This will normally be the uplift pressure at the load cycle just prior to the cycle where failure occurred. The ultimate uplift pressure will be recorded in psf. The rated uplift pressure will then be determined in the manner described in paragraph 7.2 and recorded in psf.

MARKING

8. Details and Submittals

8.1. Before testing begins, the following shall be submitted for approval:

8.1.1. Test Apparatus: A description of the testing apparatus along with sketches that completely identify and dimension the test equipment members. Details of the air circulation system including manifold, piping and pressure reading devices. Details of the air supply system.

8.1.2. Test Assembly: A description of each roof panel test assembly along with sketches that completely identify locations and spacings of all components of the system. Connection details of all roof panel anchorages including hold-down clips, ridge attachments, eave attachments, splice connections and attachments at roof edges. Fastener types, numbers and sizes for all attachments and connections.

8.1.3. Testing Procedure: A complete description of the testing procedure. When testing for a particular building project, a listing of the maximum static test pressures along with all cyclic pressure increments. When testing for the ultimate uplift pressure, a listing of the cyclic load increments up to a load level well above the anticipated failure load. A diagram showing the locations of all required deflection readings. A description of the deflection reading devices.

8.2. Certified Test Reports: After the testing has been completed the results shall be submitted in a certified test report as follows:

8.2.1. General: Regardless of the test location (see paragraph 2.1), the certification of the test will be done by a representative of a recognized independent commercial testing laboratory that is not associated in any way with the manufacturer of the SSMRS, wit the contractor, or with any subcontractors that have or will perform work on the project.

8.2.2. Content: The test report shall be organized in an orderly manner. It shall contain the following:

8.2.2.1. All of the information required in paragraph 8.1 concerning the test apparatus, test assembly and testing procedures.

8.2.2.2. The deflection readings taken during the test along with a narrative description of any significant observations concerning deflections.

8.2.2.3. A narrative statement certifying compliance with all of the testing criteria and requirements contained herein.

8.2.2.4. For tests done to determine the rated uplift pressure, a statement containing the rated pressure level of the roof system along with the failure mode on which the rating is based. The failure of the system should be referenced to the requirements listed in paragraph 7.3. A short

narrative explaining what roof system component failed and the how failure occurred should accompany the certification.

8.2.3. When testing for the required uplift pressures for a particular building project, the report shall be submitted with the shop drawings that detail the SSMRS installation.

8.2.4. When testing for the rated uplift pressure, a certified test report may be submitted for approval prior to use of the SSMRS on a Missouri River Division project.

8.3. Use of Rated Standing Seam Roofing Systems: Once the rated uplift pressure for a roofing system has been determined, that system may then be used on Missouri River Division building projects under the following conditions: Whenever the required uplift pressures do not exceed the rated uplift pressure of the roof system, the system may be used on that project without further testing. The certified test report that contains the rated uplift pressure, along with a complete description of pertinent information regarding the components and assembly details for the SSMRS (see paragraph 8.2), will be included with the project Shop Drawings.

** End of Test **

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:

1. Exposed trim and fascia.
2. Metal flashing.
3. Downspouts and gutters.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone:

1. Wind Zone 3: Wind pressures of 46 to 104 psf.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

D. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.

1. 8 inch square Samples of specified sheet materials to be exposed as finished surfaces.

E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.6 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 METALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

1. Anodized Aluminum Sheet: ASTM B 209, 5005-H14, with a minimum thickness of 0.050 inch.

B. Galvanized Steel Sheet: ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

B. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

2.3 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.4 SHEET METAL FABRICATIONS

A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

B. Downspouts: Fabricate from the following material:

1. Aluminum: 0.024 inch thick.

C. Built-in Gutters: Fabricate from the following material:

1. Stainless Steel: 0.0156 inch thick.

D. Exposed Trim and Fascia: Fabricate from the following material:

1. Aluminum: 0.050 inch thick.

E. Base Flashing: Fabricate from the following material:

1. Aluminum: 0.040 inch thick.

F. Counterflashing: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

G. Drip Edges: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

H. Equipment Support Flashing: Fabricate from the following material:

1. Galvanized Steel: 0.0276 inch thick.

I. Roof-Penetration Flashing: Fabricate from the following material:

1. Galvanized Steel: 0.0276 inch thick.

2.5 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.

1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

a. Color and Gloss: As selected by Contracting Officer’s Representative from manufacturer's full range of choices for color and gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

1. Use joint adhesive for nonmoving joints specified not to be soldered.

F. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

H. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.

I. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.

J. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:

1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 07620

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DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Floors.
2. Roofs.
3. Walls and partitions.
4. Smoke barriers.
5. Construction enclosing compartmentalized areas.

1.3 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
3. Fire-resistance-rated floor assemblies.
4. Fire-resistance-rated roof assemblies.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of through-penetration firestop system product indicated.

C. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Government's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, or an equal approved by the Contracting Officer, but are not limited to, the following:

1. A/D Fire Protection Systems Inc.
2. DAP Inc.
3. Firestop Systems Inc.
4. Hilti Construction Chemicals, Inc.
5. Instant Firestop Mfg. Inc.
6. International Protective Coatings Corp.
7. Isolatek International.
8. Nelson Firestop Products.
9. NUCO Industries.
10. RectorSeal Corporation (The).
11. Specified Technologies Inc.
12. 3M Fire Protection Products.
13. Tremco.
14. United States Gypsum Company.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer

and approved by the qualified testing and inspecting agency for firestop systems indicated.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems as indicated on Drawings. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

D. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

F. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

G. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

I. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate

proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Government will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.

1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.

B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07841

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DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07901 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following locations:

1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:

a. Control and expansion joints in unit masonry.
b. Control and expansion joints in E.I.F.S. system.
c. Perimeter joints between materials listed above and frames of doors and existing windows.
d. Other joints as indicated.

2. Exterior joints in horizontal traffic surfaces as indicated below:

a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
b. Other joints as indicated.

3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:

a. Perimeter joints of exterior openings where indicated.
b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
c. Perimeter joints of toilet fixtures.
d. Tile control and expansion joints.
e. Other joints as indicated.

4. Interior joints in horizontal traffic surfaces as indicated below:

a. Control and expansion joints in cast-in-place concrete slabs.
b. Control and expansion joints in tile flooring.
c. Other joints as indicated.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water-resistant and cause no staining or deterioration of joint substrates.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature that has not been hi-lited, except to reject the Submittal.

B. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

C. Product data from manufacturers for each joint sealant product required.

1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

D. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

E. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

F. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

G. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.

H. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F.
3. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.7 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438 Phone: (215) 723-6051 523-6688, fax: (215) 721-0286.
2. Tremco, Inc., Sealants Div., 220 Wickstead Ave., Toronto, ON Phone: (416) 292-5108.
3. Sika Corp., 201 Polito Ave., Lyndhurst, NJ 07071 Phone: (201) 933-8800, Fax: (201) 933-6225.
4. GE Silicones, 260 Hudson River Road, Waterford, NY 12188 Phone: (800)332-3390, Fax: (518) 233-3795.

2.2 JOINT SEALANT MATERIALS

A. Sealant #1:

1. Type: Single component moisture curing polyurethane sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, and O.
2. Products:

   a. Pecora Dynatrol I.
   b. Tremco Dymonic.
   c. Sika Sikaflex-1A.
   d. Equal approved by Contracting Officer.

3. Color: To be selected by Contracting Officer.

B. Sealant #2:

1. Type: Single component moisture curing polyurethane sealant; ASTM C 920, Type S.
2. Grade P, Class 25, Use T, M, A, and O.
3. Movement capability: 25% in extension and compression.
4. Products:

   a. Pecora NR-201.
   b. Sika Sikaflex-1CSL.
   c. Equal approved by Contracting Officer.

5. Color: To be selected by Contracting Officer.

C. Sealant #3:

1. Type: Single component neutral moisture curing silicone sealant; ASTM C 920, Type S, Grade NS, Class 25, USDA Approved, Use NT, M, G, and A.
2. Movement capability: 25% in extension and compression.
3. Products:

   a. Pecora 898.
   b. GE Sanitary 1700.
   c. Equal approved by Contracting Officer.

4. Color: To be selected by Contracting Officer.

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Open-cell polyurethane foam.
2. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.

3. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 g/cc per ASTM C 1083.
4. Any material indicated above.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical

abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    a. Do not leave gaps between ends of joint fillers.

b. Do not stretch, twist, puncture, or tear joint fillers.
c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

F. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after during period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that all installations with repaired areas are indistinguishable from original work.

3.6 SCHEDULE

A. Sealant #1:

1. Vertical Joints in E.I.F.S.
2. Masonry expansion and control joints.
3. Perimeter joints at frames of doors & windows-interior and exterior.
4. Penetrations in exterior wall system.

B. Sealant #2:

1. Control, expansion, and isolation joints in interior and exterior concrete slabs.

C. Sealant #3:

1. Tile control and expansion joints.
2. When tile meets another surface (ex: casework, painted gyp. bd.).
3. Perimeter joints of bathroom fixtures.

END OF SECTION 07901

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DIVISION 8 - DOORS AND WINDOWS

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes steel doors and frames.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

D. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

E. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

1. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.3 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.

B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Government; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Steel Doors and Frames:

a. Amweld Building Products, Inc.
b. Ceco Door Products.
c. Fenestra Corp.
d. Steelcraft.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569.

B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366, commercial quality, or ASTM A 620, drawing quality, special killed.

C. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526, commercial quality, or ASTM A 642, drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 or G 60 coating designation, mill phosphatized.

D. Supports and Anchors: Fabricated from not less than 0.0478-inch thick steel sheet; 0.0516-inch thick galvanized steel where used with galvanized steel frames.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2.3 DOORS

A. Steel Doors: Provide 1-3/4-inch thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:

1. Interior Doors: Grade II, heavy-duty, Model 1, full flush design, minimum 0.0478-inch thick cold-rolled steel sheet faces.
2. Exterior Doors: Grade II, heavy-duty, Model 1, full flush design, minimum 0.0516-inch thick galvanized steel sheet faces.

2.4 FRAMES

A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 0.0478-inch thick cold-rolled steel sheet.

1. Fabricate frames with mitered or coped and continuously welded corners.
2. Form exterior frames from 0.0635-inch thick galvanized steel sheet.

B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

C. Plaster Guards: Provide minimum 0.0179-inch thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

D. Grout: When required in masonry construction, as specified in Division 4 Section "Unit Masonry."

2.5 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.

1. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:

a. Rigid polystyrene conforming to ASTM C 578.

2. Clearances: Not more than 1/8-inch at jambs and heads, except not more than 1/4-inch between non-fire-rated pairs of doors. Not more than 3/4-inch at bottom.

a. Fire Doors: Provide clearances according to NFPA 80.

B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.

C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

E. Galvanized Steel Doors, Panels, and Frames: For the following locations, fabricate doors, panels, and frames from galvanized steel sheet according to SDI 112. Close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

1. At exterior locations and where indicated.

F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

G. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

H. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

I. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

J. Glazing Stops: Minimum 0.0359-inch thick steel or 0.040-inch thick aluminum.

1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

C. Apply primers and organic finishes to doors and frames after fabrication.

2.7 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

2.8 STEEL SHEET FINISHES

A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

B. Pretreatment: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.

C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.
5. In in-place gypsum board partitions, install knock-down, slip-on, drywall frames.
6. Install fire-rated frames according to NFPA 80.

C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.

1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
2. Smoke-Control Doors: Comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

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DIVISION 8 - DOORS AND WINDOWS

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Solid-core doors with plastic-laminate faces.
2. Factory finishing flush wood doors.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of door. Include details of core and edge construction, trim for openings, and louvers.

1. Include factory-finishing specifications.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate fire ratings for fire doors.

D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:

1. Plastic-laminate door faces. Show the full range of colors, textures, and patterns available.

E. Samples for Verification: As follows:

1. Plastic laminate, 6 inches square, for each color, texture, and pattern selected.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with the following standard:

1. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.6 WARRANTY

A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Government of other rights the Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span, or do not comply with tolerances in referenced quality standard.

1. Warranty shall be in effect during the following period of time after the date of Substantial Completion:

a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flush Wood Doors:

a. Algoma Hardwoods Inc.
b. Ampco Products, Inc.
c. Eggers Industries; Architectural Door Division.
d. Vancouver Door Company, Inc.
e. Weyerhaeuser Co.

2.2 DOOR CONSTRUCTION, GENERAL

A. Plastic-Laminate-Faced Doors: Comply with the following requirements:

1. Grade: Premium.
2. Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
3. Colors, Patterns, and Finishes: As indicated or, if not otherwise indicated, as selected by Contracting Officer from laminate manufacturer's full range of products.
4. Stiles: Plastic-laminate matching faces, applied before faces.

2.3 SOLID-CORE DOORS

A. Interior Plastic-Laminate-Faced Doors: Comply with the following requirements:

1. Core: Particleboard core.
2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before faces and crossbands are applied.

B. Fire-Rated Doors: Comply with the following requirements:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as required to provide fire rating indicated.
2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated and as follows:

    a. As necessary to eliminate need for through-bolting hardware.

3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
4. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.4 FABRICATION

A. Fabricate flush wood doors in sizes indicated for Project site fitting.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8-inch at heads, jambs, and between pairs of doors. Provide 1/8-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch from bottom of door to top of threshold.

   a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8-inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8-inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08211

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DIVISION 8 - DOORS, WINDOWS, GLASS

SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior entrance systems.
2. Interior entrance systems.
3. Storefront systems.

1.2 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:

1. Air infiltration and water penetration exceeding specified limits.
2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loading: Provide capacity to withstand loading indicated below, tested per ASTM E 330.

1. Uniform pressure of 30 psf inward and 30 psf outward.
2. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
3. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing

members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
b. Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.

E. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever are more stringent.

F. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.

G. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.

H. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.

I. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:

1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

J. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

K. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

L. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.

M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

E. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

G. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

B. Testing Agency Qualifications: Demonstrate to Contracting Officer’s satisfaction, based on Contracting Officer's evaluation of criteria conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY

A. General Warranty: Provide manufacturer’s standard warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. International Aluminum Corporation; U.S. Aluminum.
2. Kawneer Company, Inc.
3. Pittco Architectural Metals, Inc.
4. Tubelite Architectural Systems.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Bars, Rods, and Wire: ASTM B 211.
5. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing as specified in Division 8 Section "Glazing."

C. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

D. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."

E. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-thick glazed doors with minimum 0.125-inch-thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.

1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
2. Stile Design: Wide stile; 6 inch nominal width.

B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Reinforce members as required to retain fastener threads.
2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.

E. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:

1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

F. Hardware: Provide heavy duty hardware units as recommended for entrances indicated. Finish exposed parts to match door finishes. Refer to Hardware and Door Schedule in the Contract Drawings.

2.4 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1. Fabricate components for screw-spline frame construction.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.

1. Color: Dark bronze, Contracting Officer approved.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

E. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.

F. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

G. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

H. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified independent testing agency to perform field quality-control testing indicated.

1. Test a minimum of 2 areas.

B. Water Spray Test: After completing the installation of test areas indicated, test storefront system for water penetration according to AAMA 501.2 requirements.

C. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.4 ADJUSTING AND CLEANING

A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08410

DIVISION 8 - DOORS AND WINDOWS

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Architectural Grade aluminum windows of the performance class indicated. Window types required include the following:

1. Single-hung windows.
2. Fixed windows.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each type of window required, including the following:

1. Construction details and fabrication methods.
2. Profiles and dimensions of individual components.
3. Data on hardware, accessories, and finishes.

D. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:

1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot scale and typical window unit elevations at 3/4 inch = 1 foot scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Hardware, including operators.
5. Glazing details.
6. Accessories.

E. Samples for Verification: The Contracting Officer's Representative reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

1.4 PROJECT CONDITIONS

A. Field Measurements: Check window openings by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

1.5 TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units:

1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/NWWDA 101/I.S.2-97.
2. Thermal test unit sizes shall be 4 foot - 0 inch by 6 foot - 0 inch. Unit shall consist of a single-hung window.

B. Test Procedures and Performances:

1. Windows shall conform to all AAMA/NWWDA 101/I.S.2-97 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
2. Air Infiltration Test:

a. With window sash closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 1.56 psf.
b. Air infiltration shall not exceed 0.13 cfm per sq. ft. of unit.

3. Water Resistance Test:

   a. With window sash closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 6 psf.
   b. There shall be no uncontrolled water leakage.

4. Uniform Load Deflection Test:

   a. With window sash closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 40 psf, positive and negative pressure.
   b. No member shall deflect over L/175 of its span.

5. Uniform Load Structural Test:

   a. With window sash closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 60 psf, both positive and negative.
   b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.

6. Condensation Resistance Test (CRF):

   a. With window sash closed and locked, test unit in accordance with AAMA 1503-98.
   b. Condensation Resistance Factor (CRF) shall not be less than 54.

7. Thermal Transmittance Test (Conductive U-Value):

   a. With window sash closed and locked, test unit in accordance with AAMA 1503-98.
   b. Conductive thermal transmittance (U-Value) shall not be more than 0.64 BTU/hr/ft^2/deg F.

1.6 WARRANTIES

A. Total Window System:

1. The responsible Contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the Specifications and approved Shop Drawings.

2. Any deficiencies due to such elements not meeting the Specifications shall be corrected by the responsible Contractor at his/her expense during the warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Single-hung fixed windows as shown in the Contract Drawings:

a. EFCO Corporation: Series 3460 Thermal H-HC40 Single-hung and fixed.

1) A sample window, 2 foot - 0 inch by 3 foot - 0 inch single unit, as per requirements of Contracting Officer.
2) Test reports documenting compliance with requirements of Section 1.05.

2.2 MATERIALS

A. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.

B. Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

C. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.

D. Wire-Fabric Insect Screen: To match size of operable window area.

E. Glazing: All exterior glazing to be 1 inch laminate, insulated glass. See Section 08800 “Glazing”.

F. Thermal Barrier:

1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this Specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. All members are thermally broken using the latest technology in two part, high density polyurethane. A nonstructural thermal barrier is unacceptable.

2.3 HARDWARE

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

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on outside of window sash. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches.

a. Provide removable PVC spline-anchor concealing edge of screen frame.

2.5 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.

1. Color: Dark bronze.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect openings before installation. Verify that rough or masonry opening is correct and sill plate is level.

1. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal surfaces shall be dry; clean; free of grease, oil, dirt, rust and corrosion, and welding slag; without sharp edges or offsets at joints.

3.2 INSTALLATION

A. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.

B. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

C. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.

1. Sealants, joint fillers, and gaskets to be installed after installation of window units are specified in another Division 7 Section.

3.3 ADJUSTING

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

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08520

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DIVISION 8 - DOORS AND WINDOWS

SECTION 08711 - DOOR HARDWARE (SCHEDULED BY NAMING PRODUCTS)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.
b. Other doors to the extent indicated.

2. Cylinders for doors specified in other Sections.

B. Related Sections include the following:

1. Division 8 Section "Steel Doors and Frames" for astragals provided as part of a fire-rated labeled assembly and for door silencers provided as part of the frame.
2. Division 8 Section "Flush Wood Doors" for astragals provided as part of a fire-rated labeled assembly.
3. Division 8 Section "Aluminum Entrances and Storefronts" for entrance door hardware, except cylinders.
4. Division 8 Section “Electronic Locking System” for electronic door locks.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1. Cylinders for locks on aluminum and glass entrance doors.
2. Final replacement cores and keys to be installed by Government.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. System schematic.
b. Point-to-point wiring diagram.
c. Riser diagram.
d. Elevation of each door.

2. Detail interface between electrified door hardware and building control system.

D. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of door hardware indicated.

E. Samples: For exposed door hardware of each type indicated below, in specified finish, full size. Tag with full description for coordination with the Door Hardware Schedule. Submit samples before, or concurrent with, submission of the final Door Hardware Schedule.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

F. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

4. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit the final Door Hardware Schedule after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

G. Keying Schedule: Prepared by or under the supervision of supplier, detailing Government's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

H. Product Certificates: Signed by manufacturers of electrified door hardware certifying that products furnished comply with requirements.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

I. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

1. Include lists of completed projects with project names and addresses of architects and owners, and other information specified.

J. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.

K. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

L. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Contracting Officer, and Government about door hardware and keying.

1. Electrified Door Hardware Supplier Qualifications: An experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.

a. Engineering Responsibility: Prepare data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

D. Keying Conference: Conduct conference at Project site at a time and date to be designated for a keying conference. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver keys to Government by registered mail or overnight package service.

1.5 COORDINATION

A. Coordinate layout and installation of recessed pivots and closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

B. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to applied systems.

1.6 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Government of other rights Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

2.2 HINGES AND PIVOTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hinges:

a. Bommer Industries, Inc. (BI).
b. Cal-Royal Products, Inc. (CRP).
c. Stanley Commercial Hardware; Div. of The Stanley Works (SCH).

B. Standards: Comply with the following:

1. Butts and Hinges: BHMA A156.1.

C. Hinge Weight: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Interior Doors: Standard-weight hinges.

2.3 LOCKS AND LATCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mechanical Locks and Latches:

a. Best Lock Corporation (BLC).
b. Schlage.

B. Standards: Comply with the following:

1. Bored Locks and Latches: BHMA A156.2.

2.4 DOOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flush Bolts:

a. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
b. Hager Companies (HAG).

c. Ives: H. B. Ives (IVS).
d. NT Quality Hardware; an Ingersoll-Rand Company (NTQ).

B. Standards: Comply with the following:

1. Automatic and Self-Latching Flush Bolts: BHMA A156.3.
2. Manual Flush Bolts: BHMA A156.16.

C. Surface Bolts:

1. Flush Bolt Heads: Minimum of 1/2-inch diameter rods of brass, bronze, or stainless steel with minimum 12 inch long rod for doors up to 84 inches in height. Provide longer rods as necessary for doors exceeding 84 inches.

2.5 EXIT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Adams Rite Manufacturing Co. (ARM).
2. Arrow Architectural Hardware; Div. of ESSEX Industries, Inc. (AAH).
3. NT Dor-O-Matic Hardware Div.; an Ingersoll-Rand Company (NTD).
4. Precision Hardware, Inc. (PH).
5. Von Duprin; an Ingersoll-Rand Company (VD).

B. Standard: BHMA A156.3.

C. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

D. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

2.6 CYLINDERS AND KEYING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cylinders (Provide Type “A” Keyway - A2 System, 7-Pin with interchangeable core, or approved equal):

a. Best Lock Corporation (BLC).

b. Falcon.
c. Onity/Tesa, Inc.

2. Key Control Systems:

a. Onity/Tesa, Inc.

B. Standards: Comply with the following:

1. Cylinders: BHMA A156.5.
2. Key Control System: BHMA A156.5.

C. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

D. Construction Keying: Comply with the following:

1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys or as directed by Contracting Officer.

E. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:

1. Master Key System: Cylinders are operated by a change key and a master key.
2. Existing System: Master key or grand master key locks to Government's existing system.

F. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.

2.7 OPERATING TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Baldwin Hardware Corporation (BH).
2. Builders Brass Works Corporation.
3. Hager Companies (HAG).
4. Ives: H. B. Ives (IVS).
5. Triangle Brass Manufacturing Company, Inc. (TBM).

B. Standard: Comply with BHMA A156.6.

2.8 CLOSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Surface-Mounted Closers:

a. Arrow Architectural Hardware; Div. of ESSEX Industries, Inc. (AAH).
b. DORMA Door Controls Inc.; Member of The DORMA Group (DC).
c. LCN Closers; an Ingersoll-Rand Company (LCN).

B. Standards: Comply with the following:

1. Closers: BHMA A156.4.
2. Closer Holder Release Devices: BHMA A156.15.

C. Surface Closers: BHMA.

D. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."

E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.9 STOPS AND HOLDERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Baldwin Hardware Corporation (BH).
2. DORMA Door Controls Inc.; Member of The DORMA Group (DC).
3. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
4. Ives: H. B. Ives (IVS).
5. NT Quality.

B. Standards: Comply with the following:

1. Stops and Bumpers: BHMA A156.16.
2. Mechanical Door Holders: BHMA A156.16.
3. Door Silencers: BHMA A156.16.

C. Floor Stops: For doors, unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.

1. Where floor or wall stops are not appropriate, provide overhead holders.

2.10 THRESHOLDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies (HAG).
2. National Guard Products, Inc. (NGP).
3. Pemko Manufacturing Co., Inc. (PEM).
4. Reese Enterprises, Inc. (RE).

B. Standard: Comply with BHMA A156.21.

2.11 FABRICATION

A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Contracting Officer.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2.12 FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Comply with base material and finish requirements indicated by BHMA Standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

3.2 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

D. Instruct Government's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.3 DOOR HARDWARE SCHEDULE

A. General: Provide hardware for each door to comply with requirements of this Section. Refer to door schedule of Contract Documents.

END OF SECTION 08711

DIVISION 8 - DOORS AND WINDOWS

SECTION 08720 - ELECTRONIC LOCKING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnishing and installing room locks, cards, encoders, computers and hard-wired stand-alone card readers to provide a complete room locking system.
2. Items commonly known as door Hardware are provided under Section 08711.

1.2 REFERENCES

A. Standards of the following as referenced:

1. American National Standards Institute (ANSI).
2. Builders Hardware Manufacturers Association (BHMA).
3. Door and Hardware Institute (DHI).
4. Factory Mutual (FM).
5. National Fire Protection Association (NFPA).
6. Underwriters' Laboratories, Inc. (UL).

B. Industry standards of the following as referenced:

1. Department of Justice, Office of the Attorney General, Americans with Disabilities Act, Public Law 101-336, (ADA).
2. ANSI A1171.1: Providing Accessibility and Usability for Physically Handicapped People, 1986 edition.
3. Federal Register Part III, Department of Justice, Office of the Attorney General, 28 CFR Part 36: Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities; Final Rule, July 26, 1991.
4. Federal Register Part II, Architectural and Transportation Barriers Compliance Board, 36 CFR Part 1191: Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Amendment to Final Guidelines, September 6, 1991.

1.3 SYSTEM DESCRIPTION

A. Furnish and install an electric lock system, complete and including without limitation, the following components:

1. Complete programming and data storage, hardware and software, including procesing unit with display, card maker, unlimited workstations as specified.
2. Workstation equipment connector package and cable, as necessary.
3. Lock units.
4. Batteries.
5. Portable programmer for lock units.
6. Special tools.
7. Operating manuals.
8. Initial supply of dormitory cards and staff level cards.
9. On-site training of the Government.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Shop Drawings:

1. Provide complete shop Drawings and all electrical requirements for the complete locking system.
2. Templates: After approval of Shop Drawings, furnish lock templates to door and frame manufacturers for fabrication use.

C. Samples: Each item type if requested by Contracting Officer. Samples will be returned to supplier. Tag samples with opening identification.

D. Contract Close-out Submittals:

1. Operation and Maintenance Data: Complete information for locking system.
2. Warranty: Completed and executed warranty forms.
3. Complete system operating and maintenance manuals.
4. As-built wiring diagrams for hard-wired electrical components.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer shall have had experience in the installing and servicing of electronic lock systems and shall be approved by the manufacturer of the system.

B. Regulatory requirements:

1. Furnish locks for fire-rated openings in compliance with requirements of NFPA 80-1999 and NFPA 101-2000.

1.6 DELIVERY, STORAGE, AND HANDLING

A. System components, including locksets must be stored in a dry temperature controlled environment.

1.7 WARRANTY

A. Special Warranty: From Date of Installation.

1. Door locksets: Two (2) years.
2. Computer Systems: One (1) year.
3. Card Readers and Other Electrical Equipment: Two (2) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following or an equal approved by the Contracting Officer's Representative:

1. Model: TESA HT24 Lock System.

a. Onity/Tesa Entry Systems, Inc.
2100 A Nancy Hanks Drive
Norcross, GA 30071
(770) 447-4105

2.2 MANUFACTURED UNITS

A. System Functions:

1. Keying: Locks shall be opened by a correctly coded card, upon removal after insertion. Use of a newly issued card shall automatically re-key the lock and void the previous card, and dormitory cards shall additionally self cancel by date and time automatically. Perimeter door reader to allow authorized dormitory cards. Canceled card must not access perimeter reader.

a. Audit Trail in lock of last 100 entries - time, date and card identification.
b. 250 “Look Ahead”.
c. Office/Passage Function by card.
d. Reusable ABA standard magstripe cards.
e. Four (4) standard AA alkaline batteries.
f. Non-volatile memory-lock will not lose program even if the batteries are removed.
g. 15 levels of master/staff cards.
h. All cards are time limited.
i. Choice of finish and lever design with no additional charge.
j. Deadbolt override cards for emergency level (programmable).
k. Simultaneous retraction of deadbolt and latch bolt (1 inch steel dead bolt with security pins and 3/4 inch anti friction latch bolt.)
l. Low battery indicator.
m. Mortise lockset to conform to BHMP Grade One, and meet Underwriters Fire Rating C through A.
n. Staff cards shall be individualized to identify individual card holder via lock audit.
o. Exterior door applications shall have special weather protection package.

2.3 FRONT DESK SYSTEM

A. Software to be installed in standard 1.3GHZ. Pentium 8 or equal computer can be interfaced with any hotel property management system. System has to have the following:

1. Password access to host computer.
2. Transaction log of last 10,000 transactions on host computer.
3. Back up power supply/surge protector.
4. Simple three-step check in process.
5. Group check in.
6. Programming of cards for advanced check in.
7. Encoder to be either swipe or motor driven.

8. Encoder must erase, encode and validate cards.
9. Encoder must be able to "read a card".
10. Encoder to store key codes and keep back-up transaction of card in case of host computer breakdown.
11. Back-up cards in case of catastrophic power failure.
12. Portable programmer - password protected and be able to program up to 250 locks.
13. Real time clock.
14. Perform diagnostic check.
15. Interrogate up to last 100 entries - time, date and card identification.

PART 3 - EXECUTION

3.1 INSPECTION

A. Require installer to inspect doors and areas where equipment is to be applied and notify contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions and recommendations for installation of system components.

B. Install electronic lock units at the following locations, as directed:

1. Individual dormitory entry doors.
2. Building entrances.
3. Other doors as shown on Door Hardware Schedule.

C. Check and adjust operation of lock units in place, to ensure proper latching and locking. Replace units if any are not fully functional as received.

3.3 TRAINING

A. Provide instruction to the Government's personnel to insure that the electronic lock system is operated properly. This training shall be accomplished before Government's personnel are allowed to operate the system, and shall occur at the site of the dormitory. The cost of this training shall be fully included in the hardware quotation.

END OF SECTION 08720

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DIVISION 8 - DOORS AND WINDOWS

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors - vision lites.
3. Storefront framing.

1.2 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required.

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Minimum glass thickness, normally, of lites in exterior walls is 1/4 inch.
b. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each glass product and glazing material indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Single Source Responsibility for Glass:

1. Primary glass of each (ASTM C 1036).
2. Heat treated glass of each (ASTM C 1048).
3. Laminated glass of each (ASTM C 1172).
4. Insulated glass of each construction indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Government of other rights Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Government and signed by laminated-glass manufacturer agreeing to furnish replacements for laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Government and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated in schedules at the end of Part 3.

2.2 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.3 HEAT-TREATED FLOAT GLASS

A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

1. Comply with ASTM C 1048; Type I (transparent glass, flat); Quality 83.

2.4 WIRED GLASS

A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:

1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:

a. Mesh m1 (diamond).

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Polished Wired Glass:

a. Ashai Glass Co./Ama Glass Corp.
b. Central Glass Co., Ltd.
c. Nippon Sheet Glass Co., Ltd.
d. Pilkington Glass Ltd.

2.5 LAMINATED GLASS

A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule at the end of Part 3.

B. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

1. Interlayer Material: Polyvinyl butyral sheets.

C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.

B. Spacer Specifications: Manufacturer's standard spacer material and construction.

C. All exterior insulated glass to have laminated glass on interior lite.

2.7 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service

and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

2.8 GLAZING TAPES

A. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.

2.9 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomeric indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

2.10 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking as recommended by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Install gaskets so they protrude past face of glazing stops.

3.6 PROTECTION AND CLEANING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

PRODUCT DATA SHEET 1 - PRIMARY CLEAR FLOAT GLASS

A. Primary Clear Float Glass Designation:

B. Class: Class 1 (clear) float glass.

C. Nominal Performance Characteristics are as indicated below:

1. Visible Light Transmittance: 89 percent.
2. Shading Coefficient: .98.
3. Outdoor Visible Reflectance: 8 percent.

D. Available Product(s):

1. PPG Industries.
2. Libbey Owens Ford.
3. AFG Industries.
4. Ford.

PRODUCT DATA SHEET 2 - WIRE GLASS UNITS

A. Polished Wire-Glass Units - Form 1 (wire glass, polished both sides), Quality - Q8, Mesh-Diamond.

B. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:

1. Polished Wire Glass:

a. Ashai Glass Corp.
b. Central Glass Co. LTD.
c. Nippon Sheet Glass Co. LTD.
d. Pilkington Glass LTD.

PRODUCT DATA SHEET 3 - LAMINATED GLASS

A. Kind of Laminated Glass per ASTM C 1172: Kind LA (two lites of annealed Type I glass).

1. Clear Inner Lite: Glass 1 (clear) float glass, with a thickness of 0.12 inch.
2. Clear Outer Lite: Class 1 (clear) float glass, with a thickness of 0.12 inch.
3. Total Thickness of Laminate: 7/32 inch.
4. Thickness of Plastic Interlayer: 0.030 inch.
5. Color of Plastic Interlayer: 99 percent.

a. Visible Light Transmittance: 83 percent.
b. Outdoor Visible Reflectance: 12 percent.

B. Available Products:

1. Northwestern Industries, Seattle, WA.

PRODUCT DATA SHEET 4 - INSULATING GLASS

A. Insulating Glass Unit Designation: Window Type A, B, C, F, G, J, I, H.

1. Type B units to have obscure glazing. Glazing on exterior lite.
   a. Color No: P-516
   b. Thickness: 5.0 mm.

B. Classification of Units: Class CBA per ASTM E 774.

C. Air Space Width: Nominal 1/2 inch measured perpendicularly from surfaces of glass lites at unit's edge.

D. Gas Filling: Fill air space with argon.

E. Sealing System: Manufacturer's standard sealants, polysulfide, polyurethane.

F. Spacer Specifications: Manufacturer's standard metal.

1. Desiccant: Either molecular sieve or silica gel or blend of both.
2. Corner Construction: Manufacturer's standard corner construction.

G. Glass Specifications: Comply with the following requirements:

1. Thickness of each unit: 1 inch.
2. Laminated Interior Lite: Class 1 (clear) float glass, complying with requirements specified for laminated glass products.
3. Low-Emissivity Coating: Pyrolytic on second surface.
4. Nominal Performance Characteristics are as indicated below:

   a. Visible Light Transmittance: 53 percent.
   b. Summer Daytime U-Value: 0.34.
   c. Winter Nighttime U-Value: 0.30.
   d. Shading Coefficient: 0.40.
   e. Outdoor Visible Reflectance: 12 percent.

H. Available Products:

1. Northwest Glass.
2. Associated Glass.
3. Northwestern Industries.

END OF SECTION 08800

DIVISION 8 – DOORS AND WINDOWS

SECTION 08817 – FIRE-RATED GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-rated glazing materials installed windows in fire-rated frames.

1.2 REFERENCES

A. ASTM E 163 – Methods for Fire Tests of Window Assemblies.

B. FGMA GM – Glazing Manual.

C. FGMA SM – Sealant Manual.

D. CSFM 43-7 – Fire Tests for Doors and Window Assemblies.

E. NFPA 80 – Fire Doors and Windows.

F. NFPA 257 – Fire Tests of Window Assemblies.

G. UL 9 – Fire Tests of Window Assemblies.

H. ULC Standard CAN4 S-106 – Fire Tests of Window Assemblies.

I. 1997 Uniform Building Code.

1.3 PERFORMANCE REQUIREMENTS

A. Fire-rated glass ceramic clear and wireless glazing material listed for use in non-impact safety-rated locations such as transoms and borrowed lites with fire rating requirements ranging from 20 to 60 minutes with hose stream test.

B. Passes positive pressure test standards UBC 7-2 and UBC 7-4.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.

C. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for Project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.5 QUALITY ASSURANCE

A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.

B. Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of UL or WHI certifying it for use in tested and rated fire protective assemblies.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to specified destination in manufacturer's or distributor's packaging, undamaged, complete with installation instructions.

B. Store off ground, under cover, protected from weather and construction activities.

PART 2 - PRODUCTS

2.1 FIRE-RATED GLAZING MATERIALS

A. Manufacturer: FireLite as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, Kirkland, Washington, voice 1-800-426-0279, fax 1-800-451-9857, e-mail: sales@fireglass.com, web site www.fireglass.com or an equal approved by Contracting Officer.

B. Properties:

1. Thickness: 3/16-inch
2. Weight: 2.4 lbs./sq. ft.
3. Approximate Visible Transmission: 88 percent.

4. Approximate Visible Reflection: 9 percent.
5. Hardness (Vicker's Scale): 700.
6. Fire-rating: 60 minutes.
7. Impact Safety Resistance: None.
8. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
9. Surface Finish: Premium (polished).

C. Maximum sheet sizes based on surface finish:

1. Premium: 48-inches by 96-inches.

D. Labeling: Permanently label each piece of FireLite with the FireLite logo, UL and/or WHI logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with NPFA 252, NFPA 257, UL 9, and UL 10B.

2.2 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

A. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:

1. Dow Corning 795 - Dow Corning Corp.
2. Silglaze-II 2800 - General Electric Co.
3. Spectrem 2 - Tremco Inc.

B. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

C. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.3 FABRICATION

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Minimum required face or edge clearances.
3. Observable edge damage or face imperfections.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.2 INSTALLATION (GLAZING)

A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

E. Place setting blocks located at quarter points of glass with edge block no more than 6 - inches from corners.

F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

G. Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.

H. Install so that appropriate UL markings remain permanently visible.

3.3 PROTECTION AND CLEANING

A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.

B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

3.4 GLAZING SCHEDULE

Rating	Assembly	Max. Exposed Area (Sq. In.)	Max. Width Of Exposed Glazing (In.)	**OR**	Max. Height Of Exposed Glazing (In.)	Stop Height
60 min.	Other than doors	2,721	77		77	5/8-inch

END OF SECTION 08817

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DIVISION 9 - FINISHES

SECTION 09215 - GYPSUM VENEER PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Gypsum veneer plaster over masonry surfaces.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product specified. Include applicable details for finishes, materials, dimensions, and profiles.

C. Shop Drawings: Showing locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

D. Samples: Of joint tape and each type of accessory required, in 12 inch lengths.

E. Product Certificates: Signed by manufacturers of gypsum veneer plaster assembly components certifying that the products furnished comply with requirements.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing gypsum veneer plaster assemblies similar to those required for this Project and with a record of successful in-service performance.

B. Fire-Resistance-Rated Assemblies: Where fire-resistance-rated gypsum veneer plaster assemblies are indicated, provide assemblies as follows:

1. Assemblies comply with requirements of fire-response-tested assemblies indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual"; or design designations in UL's "Fire Resistance Directory" or certification listings of Warnock Hersey or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Fire-resistance ratings were determined by testing assemblies for fire response per ASTM E 119.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside, under cover, and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes. Neatly stack gypsum base panels flat on leveled supports off the ground to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for application of gypsum veneer plaster to comply with ASTM C 843 requirements or gypsum veneer plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain not less than 55 deg F or more than 80 deg F for 7 days before application of gypsum base, if any, and gypsum veneer plaster. Maintain temperature within range indicated above continuously during and after application until gypsum veneer plaster is dry.

C. Avoid conditions that result in gypsum veneer plaster drying too rapidly.

1. Distribute heat evenly; prevent concentrated or uneven heat on gypsum veneer plaster.
2. Maintain relative humidity levels according to manufacturer's written recommendations for prevailing ambient temperature to provide normal drying conditions.
3. Ventilate building spaces according to manufacturer's written recommendations. Prevent drafts of air from contacting surfaces during gypsum veneer plaster application and until veneer plaster is dry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering steel framing and furring that may be incorporated into the Work include, but are not limited to, the following or an equal approved by the Contracting Officer:

1. Two-Component Gypsum Veneer Plaster:

a. National Gypsum Co.; Gold Bond Building Products Division Products:

1) Base Coat: Kal-Kote Base Plaster.
2) Smooth Finish Coat: Kal-Kote Smooth Finish.
3) Smooth Finish Coat: Uni-Kal Plaster.
4) Smooth Finish Coat: X-KALibur Plaster.
5) Textured Finish Coat: Kal-Kote Texture Finish.

b. USG Corp.; United States Gypsum Co. Products:

1) High-Strength Base Coat: IMPERIAL Basecoat Plaster.
2) Base Coat: DIAMOND Veneer Basecoat Plaster.
3) High-Strength, Smooth Finish Coat: IMPERIAL Finish Plaster.
4) Smooth Finish Coat: DIAMOND Interior Finish Plaster.
5) Smooth Finish Coat: RED TOP Finish Plaster.
6) Textured Finish Coat: Job-Aggregated DIAMOND Interior Finish.

2.2 TRIM ACCESSORIES

A. Standard Trim Accessories: Cornerbead, edge trim, and control joints provided or approved by manufacturer for use in gypsum veneer plaster applications indicated and complying with ASTM C 1047 and the following requirements:

1. Material: Formed metal, plastic, or metal combined with paper, with metal complying with the following requirement:

a. Steel sheet zinc-coated by hot-dip process.

2.3 JOINT REINFORCING MATERIALS

A. General: Provide joint reinforcing materials complying with joint strength requirements of ASTM C 587 and with written recommendations of gypsum veneer plaster manufacturer for each application indicated.

B. Joint Tape for Gypsum Base: Provided or approved by gypsum veneer plaster manufacturer and of the following material:

1. Material: As recommended in writing by gypsum veneer plaster manufacturer for application indicated.

C. Embedding Material for Gypsum Base Joint Tape: Provided and recommended in writing by gypsum veneer plaster manufacturer for use with joint-tape material and gypsum veneer plaster applications indicated.

2.4 GYPSUM VENEER PLASTER MATERIALS

A. Two-Component Gypsum Veneer Plaster: Separate veneer plaster formulations complying with ASTM C 587; one for base-coat and one for finish-coat application over substrates indicated.

1. Provide high-strength, ready-mixed, base-coat plaster containing mill-mixed, fine silica sand and having a compressive strength of 3000 psi when tested according to ASTM C 472.

B. Finish-Coat Aggregate: For textured finish, provide white silica sand passing a 30-mesh screen.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum veneer plaster construction that comply with referenced standards and gypsum veneer plaster manufacturer's written recommendations.

B. Bonding Compound for Gypsum Veneer Plaster: ASTM C 631.

2.6 GYPSUM VENEER PLASTER MIXES

A. Mechanically mix gypsum veneer plaster materials to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum veneer plaster assemblies attach or abut, including installed hollow-metal frames, cast-in anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other

conditions affecting performance of veneer plaster assemblies. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare unit masonry substrates for gypsum veneer plastering according to gypsum veneer plaster manufacturer's written recommendations. Clean masonry to remove dirt, grease, oil, and other foreign matter and deposits that could impair bond with plaster.

3.3 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum base. Otherwise, fasten accessories according to accessory manufacturer's written recommendations for type, length, and spacing of fasteners.

B. Install corner beads at external corners.

C. Install metal edge trim where edges of gypsum base would otherwise be exposed or semiexposed. Provide edge-trim type with face flange formed to receive gypsum veneer plaster, unless otherwise indicated.

1. Install aluminum trim and other accessories where indicated.

D. Install control joints according to ASTM C 844 and manufacturer's written recommendations and in specific locations approved by Contracting Officer’s Representative for visual effect.

3.4 GYPSUM VENEER PLASTERING

A. Gypsum Veneer Plaster Application Standard: Apply gypsum veneer plaster to comply with ASTM C 843 and gypsum veneer plaster manufacturer's written recommendations.

B. Grout frames solidly and continuously where indicated or required for fire-resistance ratings.

C. Provide textured finish matching Contracting Officer’s Representative's sample and approved mockups, in locations indicated.

D. Where gypsum veneer plaster abuts metal door frames, windows, and other units in veneer plaster, groove finish coat to eliminate spalling.

3.5 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Contracting Officer's Representative will conduct an above-ceiling observation before installing gypsum panels for gypsum veneer plaster ceilings and will report deficiencies in the Work observed. Do not proceed with installation of gypsum base, or backing panels in multilayer construction, to ceiling support framing until deficiencies have been corrected.

1. Notify Contracting Officer's Representative 7 days in advance of the date and time when the Project, or part of the Project, will be ready for an above-ceiling observation.
2. Before notifying Contracting Officer's Representative, complete the following in areas to receive gypsum veneer plaster ceilings:

    a. Installation of 80 percent of lighting fixtures, powered for operation.
    b. Installation, insulation, and leak and pressure testing of water piping systems.
    c. Installation of air-duct systems.
    d. Installation of air devices.
    e. Installation of mechanical system control-air tubing.
    f. Installation of ceiling support framing.

3.6 CLEANING AND PROTECTION

A. Remove temporary coverings used to protect other work.

B. Promptly remove veneer plaster spillage from door frames, windows, and other adjacent surfaces. Repair surfaces damaged by gypsum veneer plastering.

C. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum veneer plaster assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09215

DIVISION 9 - FINISHES

SECTION 09255 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Nonload-bearing steel framing members for gypsum board assemblies.
2. Gypsum board assemblies attached to steel framing.
3. Gypsum board bonded adhesively to interior concrete and masonry substrates.

1.3 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

B. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each type of product specified.

D. Shop Drawings showing locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

E. Product certificates signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:

1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
3. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Framing and Furring:

a. National Gypsum Co.; Gold Bond Building Products Division.
b. USG Interiors, Inc.

2. Grid Suspension Assemblies:

a. Armstrong World Industries, Inc.
b. Chicago Metallic Corp.
c. USG Interiors, Inc.

3. Gypsum Board and Related Products:

a. Domtar Gypsum.
b. Georgia-Pacific Corp.
c. National Gypsum Co.; Gold Bond Building Products Division.
d. United States Gypsum Co.

B. Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated:

1. Gyprock Fireguard C Gypsum Board; Domtar Gypsum.

2. Firestop Type C; Georgia-Pacific Corp.
3. Fire-Shield G; National Gypsum Co.; Gold Bond Building Products Division.
4. SHEETROCK Brand Gypsum Panels, FIRECODE C Core; United States Gypsum Co.
5. SHEETROCK Brand Gypsum Panels, ULTRACODE Core; United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. General: Provide components complying with ASTM C 754 for conditions indicated.

B. Cast-in-Place and Postinstalled Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials, with holes or loops for attaching hanger wires, and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.

1. Cast-in-place type designed for attachment to concrete forms.
2. Chemical anchor.
3. Expansion anchor.

C. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190 conducted by a qualified independent testing agency.

D. Wire Ties: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch thick.

E. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.

F. Channels: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch wide flanges, and as follows:

1. Carrying Channels: 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.
2. Finish: Rust-inhibitive paint, unless otherwise indicated.

G. Steel Studs for Furring Channels: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 22 gauge, unless otherwise indicated.
2. Depth: As indicated.
3. Protective Coating: Manufacturer's standard corrosion-resistant coating.

H. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth of 7/8-inch, and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 20 gauge, unless otherwise indicated.
2. Protective Coating: Manufacturer's standard corrosion-resistant coating.

I. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch deep channel of the following configuration:

1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch wide face connected to flanges by double-slotted or expanded-metal legs (webs).

J. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General: Provide steel framing members complying with the following requirements:

1. Protective Coating: Manufacturer's standard corrosion-resistant coating.

B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 20 gauge as follows:

a. For head runner, sill runner, jamb, and cripple studs at door and other openings.
b. In locations to receive cementitious backer units.
c. Where indicated.

2. Depth: As indicated.

C. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 20 gauge, unless otherwise indicated.
2. Depth: 7/8-inch.

D. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329-inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

E. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch deep channel of the following configuration:

1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch wide face connected to flanges by double-slotted or expanded-metal legs (webs).

F. Steel Channel Bridging: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch wide flanges, 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.

G. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Widths: Provide gypsum board in widths of 48 inches.

B. Gypsum Wallboard: ASTM C 36 and as follows:

1. Type: Regular for vertical surfaces, unless otherwise indicated.
2. Type: Type X where required for fire-resistance-rated assemblies.
3. Edges: Tapered.
4. Thickness: 5/8-inch.

C. Gypsum Board Base Layer(s) for Multilayer Applications: Gypsum wallboard, ASTM C 36, and as follows:

1. Type: Regular for vertical surfaces, unless otherwise indicated.

2. Type: Type X where indicated or required for fire-resistance-rated assemblies.
3. Edges: Manufacturer's standard.
4. Thickness: 5/8-inch.

2.5 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal with metal complying with the following requirement:

a. Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.

2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

a. Cornerbead on outside corners, unless otherwise indicated.

2.6 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

1. Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

C. Joint Tape for Cementitious Backer Units: As recommended by cementitious backer unit manufacturer.

D. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
2. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.
3. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.

4. For topping compound, use sandable formulation.

E. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-Mixed Formulation: Factory-mixed product.

a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
b. Topping compound formulated for fill (second) and finish (third) coats.
c. All-purpose compound formulated for both taping and topping compounds.

2. Job-Mixed Formulation: Powder product for mixing with water at Project site.

a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
b. Topping compound formulated for fill (second) and finish (third) coats.
c. All-purpose compound formulated for both taping and topping compounds.

F. Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated in the Work include, but are not limited to, the following:

D. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.

b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
c. SHEETROCK Acoustical Sealant; United States Gypsum Co.

2. Acoustical Sealant for Concealed Joints:

a. BA-98; Pecora Corp.
b. Tremco Acoustical Sealant; Tremco, Inc.

2.8 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

C. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

D. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.

E. Steel drill screws complying with ASTM C 1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.033-inch thick.
2. Fastening gypsum board to gypsum board.

F. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

G. Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.

H. Gypsum Board Nails: ASTM C 514.

I. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8-inch thick, in width to suit metal stud size indicated.

J. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).

1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

K. Polyethylene Vapor Retarder: ASTM D 4397, thickness and maximum permeance rating as follows:

1. 6 mils, 0.19 perms.

L. Vapor Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

1. Furnish concrete inserts and other devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

C. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 24 inches o.c.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs 1/2 inch short of full height to provide perimeter relief.
2. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Terminate partition framing at suspended ceilings where indicated.

E. Install steel studs and furring in sizes and at spacings indicated.

1. Single-Layer Construction: Space studs 24 inches o.c., unless otherwise indicated.
2. Cementitious Backer Unit Construction: Space studs 16 inches o.c., unless otherwise indicated.

F. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install 2 studs at each jamb, unless otherwise indicated.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

I. Install thermal insulation as follows:

1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Erect insulation vertically and hold in place with Z-furring members spaced 600 mm o.c.
3. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
4. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
5. Until gypsum board is installed, hold insulation in place with 10 inch staples fabricated from 0.0625-inch diameter tie wire and inserted through slot in web of member.

J. Install polyethylene vapor retarder where indicated to comply with the following requirements:

1. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with mechanical fasteners or adhesives. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.

2. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16 inches o.c.
3. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor retarder tape.
4. Repair any tears or punctures in vapor retarder immediately before concealing it with the installation of gypsum board or other construction.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

I. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch wide joints to install sealant.

K. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

1. Space screws a maximum of 12 inches o.c. for vertical applications.

3.7 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.
3. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistance-rated assemblies. Use maximum-length panels to minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of board.
b. At stairwells and other high walls, install panels horizontally.

B. Wall Tile Substrates: For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:

1. Install cementitious backer units to comply with ANSI A108.11 at showers, tubs, and where indicated.
2. Install cementitious backer units to comply with ANSI A108.11 at locations indicated to receive wall tile.

C. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and gypsum wallboard face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one

stud or furring member with base-layer joints. Stagger joints on opposite sides of partitions.

D. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws.

E. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.8 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install cornerbead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
2. Install L-bead where edge trim can only be installed after gypsum panels are installed.

D. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Contracting Officer for visual effect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 4 for gypsum board surfaces, unless otherwise indicated.

E. Use the following joint compound combination as applicable to the finish levels specified:

1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Sandable, setting-type joint compound.

F. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

G. Where Level 3 gypsum board finish is indicated, embed tape in joint compound and apply first and fill (second) coats of joint compound.

H. Finish cementitious backer units to comply with unit manufacturer's directions.

3.10 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Contracting Officer will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

1. Notify Contracting Officer one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.
2. Prior to notifying Contracting Officer, complete the following in areas to receive gypsum board ceilings:

a. Installation of 80 percent of lighting fixtures, powered for operation.
b. Installation, insulation, and leak and pressure testing of water piping systems.
c. Installation of air duct systems.
d. Installation of air devices.
e. Installation of mechanical system control air tubing.
f. Installation of ceiling support framing.

3.11 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09255

DIVISION 9 - FINISHES

SECTION 09300 - TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section may include the following:

1. Wall tile.
2. Floor tile.
3. Cementitious backer units.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for mortars, grouts, and liquid applied membranes for each assembly indicated in the Product Data Sheets.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If despite these precautions coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.5 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at 50 deg F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

PART 2 - PRODUCTS

2.1 SEE PRODUCT DATA SHEETS AT END OF SECTION.

2.2 MANUFACTURERS

A. If the Product Data Sheet lists a non-proprietary Specification for manufacturers, the following manufacturers may be considered as alternatives.

1. Unglazed Ceramic Mosaic Tile:

a. American Olean Tile Co., Inc.
b. Dal-Tile Corp.

2. Unglazed Quarry Tile:

a. American Olean Tile Co., Inc.
b. Dal-Tile Corp.

3. Glazed Wall Tile:

a. American Marrazzi Tile, Inc.

b. American Olean Tile Co., Inc.
c. Buchtal Corp. USA.
d. Dal-Tile Corp.
e. International American Ceramics/Laufen.
f. Mid-State Tile Co.
g. Monarch Tile Manufacturing, Inc.
h. Summitville Tiles, Inc.
i. United States Ceramic Tile Co.
j. Villeroy & Boch (U.S.A.) Inc.
k. Wenczel Tile Co. of Florida.

4. Latex-Portland Cement Mortars and Grouts:

a. Bostik Construction Products Div. - Hydroment.
b. Laticrete International Inc.
c. Mapei Corp.

5. Acrylic-Portland Cement Mortars & Grouts:

a. Bostik Construction Products Div. - Hydroment.
b. Laticrete International Inc.
c. Mapei Corp.

2.3 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

1. Provide tile trim and accessories that match color and finish of adjoining flat tile unless otherwise indicated in Product Data Sheet.

C. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

D. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

1. Where tile is indicated for installation in swimming pools, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of uses and has been successfully used on other projects.

2.4 TILE PRODUCTS

A. SEE PRODUCT DATA SHEETS AT END OF SECTION.

2.5 WATERPROOFING FOR THINSET TILE INSTALLATIONS

A. Chlorinated Polyethylene Sheet (CPE) Waterproofing: Manufacturer's standard proprietary product consisting of composite sheets, 60 inches wide by a nominal thickness of 0.030, composed of an inner layer of chlorinated polyethylene sheet faced on both sides with laminated high-strength nonwoven polyester material, designed for embedding in latex-portland cement mortar, and as substrate for latex-portland cement mortar setting bed.

B. Urethane Waterproofing and Tile-Setting Adhesive: Manufacturer's standard proprietary product consisting of one-part liquid-applied urethane in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process.

C. PVC membranes are not acceptable.

2.6 SETTING MATERIALS

A. Latex-Portland Cement Mortar: Manufacturer's standard, Dry Polymer Additive, ANSI A118.4.

B. Acrylic-Portland Cement Mortar: Manufacturer's standard acrylic resin, ANSI A118.4.

2.7 GROUTING MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Dry-Set Grout: ANSI A118.6, color as indicated.

C. Latex-Portland Cement Grout: ANSI A118.6, color as indicated. Manufacturer's standard dry polymer additive.

D. Acrylic-Portland Cement Grout: ANSI A118.6, color as indicated. Manufacturer's standard acrylic resin.

2.8 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Division 7 Section "Joint Sealers," including ASTM C 920 as referenced by Type, Grade, Class, and Uses.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. Multipart Pourable Urethane Sealant for Use T: Type M; Grade P; Class 25; Uses T, M, A, and as applicable to joint substrates indicated, O.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Multipart Pourable Urethane Sealant:

a. "Chem-Calk 550"; Bostik Construction Products Div.
b. "Vulkem 245"; Mameco International, Inc.
c. "Urexpan NR-200"; Pecora Corp.
d. "THC-900"; Tremco Corp.

2.9 CEMENTITIOUS BACKER UNITS (GLASS MESH MORTAR UNITS)

A. Proprietary backing units with glass fiber mesh reinforcing and water-resistant coating on both faces, over a core of aggregated portland cement slurry, 7/16 to 1/2-inch thick, weighing 3.0 to 3.8 psf.

B. Mortar Unit Finishing Materials: Tape and joint compounds as recommended by manufacturer of cementitious backer units.

C. Available Products: Subject to compliance with requirements, cementitious backer units which may be incorporated in the Work include, but are not limited to, the following:

1. "Wonder-Board"; Modulars Inc.
2. "Durock Tile Backer Board"; Durabond Div., USG Industries, Inc.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

B. Mortar and grout mixes to be stored at room temperature, out of direct sunlight. Only mix ingredients that are room temperature.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

B. Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces. Ensure that coating is compatible with tile and mortar/grout products, and is easily removable after grouting is completed without damaging grout or tile.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Tiles fitting around outside corners such as floor tiles around fixtures, cabinets, and ends of partitions; and wall tiles fitting around wall openings, shall have the intruding corner cut from the tile with a tile saw. Corner shall not be accommodated by snapping the tile into multiple pieces.

F. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles. Locate joints in tile surfaces directly above joints in concrete substrates.

H. Grout tile to comply with the requirements of the following installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, latex-portland cement and acrylic-portland cement grouts) comply with ANSI A108.10.

I. At showers, tubs and similar wet areas, install cementitious backer units and treat joints to comply with manufacturer's instructions for type of application indicated.

3.4 WATERPROOFING

A. Install waterproofing in compliance with waterproofing manufacturer's instructions.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR INSTALLATION METHODS

A. Latex-Portland Cement Mortar: ANSI A108.5.

B. Acrylic-Portland Cement Mortar: ANSI A108.5.

3.6 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement and acrylic-portland cement grout residue from tile as soon as possible. Buff dry installation with cheese cloth.
2. Tile shall not be cleaned with acid solutions.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

PRODUCT DATA SHEET 1

TILE

Tile Symbol/Abbreviation: Description: QT (floor and base)

Unglazed quarry tile.
Special Patterns: None
Nominal Dimensions: 6” x 6” floor tile, 6 inch base.
Edge Condition: Cushioned.
Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
Base: Straight (thinset).
Wainscot Cap: Surface bullnose (thinset). External Corners: Select one. 3/4-inch radius bullnose (thickset). Surface bullnose (thinset).
Internal Corners: Field-butted square corners.
Extra Materials: Full-size tile and trim units equal to 3 percent of installed amount.
Manufacturers: Daltile – Quarry textures, Q44 Tempest Gray.

GROUT

Grout Type: Epoxy grout.
Color: To match field tile.
Joint Width: 1/4 inch.
Joint Profile: Full flush.
Manufacturers: Non-Proprietary will allow equals. Manufacturers for equals are listed in paragraph 2.1.
Coating: Not required.

INSTALLATION METHOD

TCA #F115-98

BOND COAT

MORTAR TYPE: Latex-Portland Cement.

PRODUCT DATA SHEET 2

TILE

Tile Symbol/Abbreviation: Description: CT (floor and base).

Unglazed ceramic mosaic.
Special Patterns: None.
Nominal Dimensions: 2 x 2.
Edge Condition: Cushioned.
Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
Base: Straight (thinset).
Wainscot Cap: Surface bullnose (thinset).
Internal Corners: Field-butted square corners.
Extra Materials: Full-size tile and trim units equal to 3 percent of installed amount.
Manufacturers: Daltile – Mosaics, DK-114 mottled Light Gray.
Non-Proprietary Spec: Subject to compliance with requirements, select products from manufacturers listed under PART 2 – PRODUCTS of this Specification Section, that are equal to:

GROUT

Grout Type: Dry-Set Latex-Portland Cement.
Color: To be selected.
Joint Width: 1/8 inch.
Joint Profile: Full flush.
Non-Proprietary: Subject to compliance with requirements, select products from manufacturers listed under PART 2 – PRODUCTS.

INSTALLATION METHOD

TCA #F122-98

BOND COAT

MORTAR TYPE: Latex-Portland Cement.

MEMBRANE

Waterproof Membrane:
Trowel Applied: Hydroment “Ultra-Set”; Bostik Construction Products Div.
“Ultra Cure 5000”; C-Cure Chemical Co.

PRODUCT DATA SHEET 3

TILE

Tile Symbol/Abbreviation: Description: CT (wall).

Ceramic mosaic.
Special Patterns: None.
Nominal Dimensions: 4 x 4 glazed wall tile.
Edge Condition: Cushioned.
Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
Wainscot Cap: Surface bullnose (thinset).
Internal Corners: Field-butted square corners.
Extra Materials: Full-size tile and trim units equal to 3 percent of installed amount.
Manufacturers: Daltile – K101 White.

GROUT

Grout Type: Dry-Set Latex-Portland Cement.
Color: Match field tile.
Joint Width: 1/8 inch.
Joint Profile: Full flush.
Non-Proprietary: Subject to compliance with requirements, select products from manufacturers listed under PART 2 – PRODUCTS of this Specification Section, that are equal to:

INSTALLATION METHOD

TCA #W244-98

BOND COAT

MORTAR TYPE: Latex-Portland Cement.

MEMBRANE

Waterproof Membrane:
Sheet: "Nobleseal TS"; Noble Co.
Trowel Applied: Hydroment "Ultra-Set"; Bostik Construction Products Div.
"Ultra Cure 5000"; C-Cure Chemical Co.

END OF SECTION 09300

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DIVISION 9 - FINISHES

SECTION 09511 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes ceilings consisting of acoustical panels and exposed suspension systems.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product specified.

C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension system members.
2. Method of attaching suspension system hangers to building structure.
3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.

D. Samples for Initial Selection: Manufacturer's color charts consisting of actual acoustical panels or sections of acoustical panels, suspension systems, and moldings showing the full range of colors, textures, and patterns available for each type of ceiling assembly indicated.

E. Samples for Verification: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

1. 6 inch square samples of each acoustical panel type, pattern, and color.
2. Set of 12 inch long samples of exposed suspension system members, including moldings, for each color and system type required.

F. Product Test Reports: Indicate compliance of acoustical panel ceilings and components with requirements based on comprehensive testing of current products.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
3. Fire-resistance-rated assemblies, which are indicated by design designations from UL's "Fire Resistance Directory," from ITS/Warnock Hersey's "Directory of Listed Products," or from the listings of another testing and inspecting agency, are identical in materials and construction to those tested per ASTM E 119.
4. Products are identified with appropriate markings of applicable testing and inspecting agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.6 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size units equal to 2.0 percent of amount installed.
2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Panel Ceiling Schedule at the end of Part 3.

2.2 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

1. Postinstalled Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and

with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Angle Hangers: Angles with legs not less than 7/8-inch wide; formed with 0.04-inch thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.

G. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
2. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong World Industries, Inc.
b. Celotex Corporation (The); Building Products Division; Architectural Ceilings Marketing Dept.
c. Chicago Metallic Corporation.
d. USG Interiors, Inc.

H. Hold-Down Clips for Non-Fire-Resistance-Rated Ceilings: For interior ceilings consisting of acoustical panels weighing less than 1 lb/sq. ft., provide hold-down clips spaced 24 inches o.c. on all cross tees.

2.4 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. PL Acoustical Sealant; Chemrex, Inc., Contech Brands.
b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
c. SHEETROCK Acoustical Sealant; United States Gypsum Co.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
3. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
4. U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
7. Do not attach hangers to steel deck tabs.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.
b. Install panels with pattern running in one direction parallel to long axis of space.

2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated or required.
5. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Government will engage a qualified independent testing agency to perform field quality-control testing.

B. Extent and Testing Frequency: Testing will take place in successive stages in areas described below. Proceed with installation of acoustical panel ceilings only after test results for previously installed hangers comply with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
2. Within each test area, testing agency will select one of every 10 powder-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
3. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 consecutively pass and then will resume initial testing frequency.

C. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer.

D. Remove and replace those fasteners and anchors that test results indicate do not comply with specified requirements.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 ACOUSTICAL PANEL CEILING SCHEDULE

A. Acoustical Panel Ceiling Designation: 2 x 2.

B. Acoustical Panel Characteristics: Provide panels complying with ASTM E 1264 for characteristics described below:

1. Pattern: As specified by product designation below.
2. Color: White.
3. Light Reflectance Coefficient: LR 0.80.
4. Noise Reduction Coefficient: .55 - .65.
5. Ceiling Sound Transmission Class: 35 - 39.
6. Edge Detail: Reveal sized-to-fit flange of exposed suspension system members.
7. Thickness: 5/8 inch.
8. Size: 24 by 24 inches.

C. Suspension System Type: Provide suspension system that complies with requirements in Part 2 “Fire-Resistance-Rated, Direct-Hung Suspension Systems”. Article for wide-face, capped, double-web, steel suspension system.

D. Available Panel Products: Armstrong, Tegular Cortega, #816 Fire Rated, #704 Non-Rated.

END OF SECTION 09511

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DIVISION 9 - FINISHES

SECTION 09651 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Vinyl composition floor tile.
2. Resilient wall base and accessories.
3. Rubber floor tile.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product specified.

C. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.

1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches long, of each resilient accessory color and pattern specified.

D. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.

E. Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 1.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install tiles and accessories after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than one box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.
2. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient accessory installed.
3. Deliver extra materials to Government.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Resilient Tile Flooring Schedule at the end of Part 3, or an equal approved by the Contracting Officer.

2.2 RESILIENT TILE

A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066 and with requirements specified in the Resilient Tile Flooring Schedule.

B. Rubber Floor Tile: Products complying with ASTM F 1344 and with requirements specified in the Resilient Tile Flooring Data Sheet.

2.3 RESILIENT ACCESSORIES

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I and with requirements specified in the Resilient Tile Flooring Schedule.

B. Rubber Accessory Moldings: Products complying with requirements specified in the Resilient Tile Flooring Schedule.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer’s directions.

3.3 TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.

1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

H. Hand roll tiles according to tile manufacturer's written instructions.

3.4 RESILIENT ACCESSORY INSTALLATION

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
5. Install premolded outside corners before installing straight pieces.
6. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.5 RESILIENT TILE FLOORING SCHEDULE

A. Vinyl Composition Tile 'VC1': Where this designation is indicated, provide vinyl composition floor tile complying with the following:

1. Products: As follows:

   a. Mannington Commercial, Inspirations.

2. Color and Pattern: 402 Grey Multiflec.
3. Class: Class 2 (through-pattern tile).
4. Wearing Surface: Smooth.
5. Thickness: 1/8 inch.
6. Size: 12 by 12 inches.

3.6 RUBBER TILE FLOORING SCHEDULE

A. Rubber Tile 'RT': Where this designation is indicated, provide rubber tile complying with the following:

1. Products: As follows:

   a. Nora Rubber Flooring.

2. Color and Pattern: Norament 925 B Lago, Color: 4635 Tobago.
3. Class: Class 2 (through-pattern tile).
4. Wearing Surface: Hammered.
5. Thickness: 0.14 inch.
6. Size: 39.37 inch x 39.37 inch.

3.7 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by flooring manufacturer.
4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.

1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.

a. Use commercially available product acceptable to flooring manufacturer.

2. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Government's maintenance program.

END OF SECTION 09651

DIVISION 9 - FINISHES

SECTION 09652 - SHEET VINYL FLOOR COVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Sheet vinyl floor coverings without backing.

B. Related Sections include the following:

1. Division 9 Section "Resilient Tile Flooring" for resilient wall base, reducer strips, and other accessories installed with sheet vinyl floor coverings.
2. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with sheet vinyl floor coverings.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product specified.

C. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch sections of each different color and pattern of sheet vinyl floor covering specified, showing the full range of variations expected in these characteristics.

D. Maintenance Data: For sheet vinyl floor coverings to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who is competent in the technique required by manufacturer for heat-welding seams.

1. Engage installers who are certified by floor covering manufacturer for heat-welded seam installation.

B. Source Limitations: Obtain each type, color, and pattern of sheet vinyl floor covering specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet vinyl floor coverings and installation accessories to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

C. Store rolls upright.

D. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive sheet vinyl floor coverings for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.

B. Do not install sheet vinyl floor coverings until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during sheet vinyl floor covering installation and for time period after installation recommended in writing by manufacturer.

D. Install sheet vinyl floor coverings and accessories after other finishing operations, including painting, have been completed.

E. Where demountable partitions and other items are indicated for installation on top of sheet vinyl floor coverings, install floor coverings before these items are installed.

F. Do not install sheet vinyl floor coverings over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by floor covering manufacturer's recommended bond and moisture test.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than 10 linear feet in roll form for each 500 linear feet or fraction thereof, of each different composition, wearing surface, color, and pattern of sheet vinyl floor covering installed.
2. Deliver extra materials to Government.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Sheet Vinyl Floor Covering Schedule at the end of Part 3.

2.2 SHEET VINYL FLOOR COVERINGS

A. Unbacked Sheet Vinyl Floor Coverings: Products complying with ASTM F 1303, Type II, except for wear-layer binder content and backing requirements, and with requirements specified in the Sheet Vinyl Floor Covering Schedule.

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by floor covering manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit sheet vinyl floor covering and substrate conditions indicated.

C. Chemical Bonding Compound: Product of floor covering manufacturer for chemically bonding seams.

D. Transition Strips: Rubber transition as noted on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of sheet vinyl floor coverings will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for floor covering installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by floor covering manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with sheet vinyl floor covering manufacturer's written installation instructions for preparing substrates indicated to receive sheet vinyl floor coverings.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before installing sheet vinyl floor coverings. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Comply with sheet vinyl floor covering manufacturer's written installation instructions.

B. Unroll sheet vinyl floor coverings and allow them to stabilize before cutting and fitting, if recommended in writing by manufacturer.

C. Lay out sheet vinyl floor coverings to comply with the following requirements:

1. Maintain uniformity of sheet vinyl floor covering direction.
2. Arrange for a minimum number of seams and place them in inconspicuous and low-traffic areas, and not less than 6 inches away from parallel joints in flooring substrates.
3. Match edges of sheet vinyl floor coverings for color shading and pattern at seams according to manufacturer's written recommendations.
4. Avoid cross seams.

D. Scribe, cut, and fit sheet vinyl floor coverings to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

G. Install sheet vinyl floor coverings on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

H. Adhere sheet vinyl floor coverings to flooring substrates to comply with floor covering manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Produce completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Heat Welded Seams: Prepare seams and apply welding rod according to manufacturer's written instructions and ASTM F 693 to produce tightly fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.

J. Hand roll sheet vinyl floor coverings in both directions from center out to embed floor coverings in adhesive and eliminate trapped air. At walls, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing sheet vinyl floor coverings:

1. Remove adhesive and other surface blemishes using cleaner recommended by floor covering manufacturer.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor covering until after time period recommended by floor covering manufacturer.
4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by floor covering manufacturer.

1. Apply protective floor polish to sheet vinyl floor covering surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.

a. Use commercially available product acceptable to floor covering manufacturer.
b. Coordinate selection of floor polish with Government's maintenance service.

2. Cover sheet vinyl floor coverings with undyed, untreated building paper until inspection for Substantial Completion.
3. Do not move heavy and sharp objects directly over sheet vinyl floor coverings. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean sheet vinyl floor coverings not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean floor coverings according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by floor covering manufacturer.
2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to floor covering manufacturer's written recommendations. Coordinate with Government's maintenance program.

3.5 SHEET VINYL FLOOR COVERING SCHEDULE

A. Sheet Vinyl with Backing SV: Where this designation is indicated, provide sheet vinyl floor covering with backing complying with the following:

1. Available Products: Mannington Commercial.
2. Pattern: Magna Multiflec.
3. Color: Jute 18005.
4. Wear-Layer Thickness: Minimum Grade 1 thickness according to ASTM F 1303 for Type indicated. 0.020.
5. Overall Thickness: As specified by manufacturer's product designation indicated above. 0.080 inches.
6. Wearing Surface: Smooth.
7. Backing Class: Class B (nonfoamed plastic).
8. Sheet Width: 6 feet.

END OF SECTION 09652

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DIVISION 9 - FINISHES

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Resilient wall base.
2. Resilient flooring accessories.

B. Related Sections include the following:

1. Division 9 Section "Sheet Vinyl Floor Coverings."

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product specified.

C. Samples for Verification: In manufacturer's standard sizes, but not less than 12 inches long, of each product color and pattern specified.

D. Product Certificates: Signed by manufacturers of resilient wall base and accessories certifying that each product furnished complies with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, of each different type, color, pattern, and size of resilient product installed.
2. Deliver extra materials to Government.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Resilient Wall Base and Accessory Schedule at the end of Part 3.

2.2 RESILIENT WALL BASE

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I and with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.3 RESILIENT ACCESSORIES

A. Rubber Accessories: Products complying with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install resilient products according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

5. Form outside corners on job, from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
6. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum horizontal surfaces thoroughly.
3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
4. Damp-mop or sponge resilient products to remove marks and soil.

B. Protect resilient products against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by resilient product manufacturer.

1. Apply protective floor polish to vinyl resilient products installed on floors and stairs that are free from soil, visible adhesive, and surface blemishes, if recommended by manufacturer.

    a. Use commercially available product acceptable to resilient product manufacturer.
    b. Coordinate selection of floor polish with Government's maintenance service.

2. Cover resilient products installed on floors and stairs with undyed, untreated building paper until inspection for Substantial Completion.

C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied to vinyl products on floors and stairs after completing installation only if required to restore polish finish and if recommended by resilient product manufacturer.
2. After cleaning, reapply polish on vinyl products on floors and stairs to restore protective floor finish according to resilient product manufacturer's written recommendations. Coordinate with Government's maintenance program.

3.5 RESILIENT WALL BASE AND ACCESSORY SCHEDULE

A. Rubber Wall Base R4: Where this designation is indicated, provide rubber wall base complying with the following:

1. Available Products: Johnsonite.
2. Color and Pattern: 92 Blue Lagoon.
3. Style: Cove with top-set toe.
4. Minimum Thickness: 1/8 inch.
5. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet.
6. Outside Corners: Job formed.
7. Inside Corners: Job formed.
8. Surface: Smooth.

B. Rubber Accessory Molding RAM: Where this designation is indicated, provide rubber accessory molding complying with the following:

1. Available Products: Johnsonite.
2. Color: As selected by Contracting Officer from manufacturer's full range of colors produced for rubber accessory molding complying with requirements indicated.
3. Profile and Dimensions: As specified by product designation indicated on Plans.

END OF SECTION 09653

DIVISION 9 - FINISHES

SECTION 09680 - CARPET

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Tufted carpet.
2. Carpet cushion.
3. Carpet base.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: 12-inch square Sample.

D. Maintenance Data: For carpet to include in maintenance manuals specified in Division 1. Include the following:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.

2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered if submitted to and approved by the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI 104, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Special Carpet Cushion Warranty: Written warranty, signed by carpet cushion manufacturer agreeing to replace carpet cushion that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse. Failure includes, but is not limited to, permanent indentation or compression.

1. Warranty Period: 10 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET

A. Products: Subject to compliance with requirements, provide the following:

1. 'CP1':

a. Manufacturer: Shaw Carpets.
b. Color: 12510 Fusion.
c. Pattern: Solaris.
d. Installation: Double glue with carpet cushion.

2. 'CP2':

a. Manufacturer: Mohawk.
b. Color: 563 Illusions.
c. Pattern: Sureal.
d. Installation: Direct glue.

3. 'M':

a. Manufacturer: Van Dyke.
b. Color: 14 Lt. Grey.
c. Pattern: Atlas NOP.
d. Installation: Direct glue.

B. Fiber Content: Per product specifications.

C. Fiber Type: Per product specifications.

D. Face Construction: Level-loop pile and cut pile.

E. Gauge: Per product specifications.

F. Stitches: Per product specifications.

G. Pile Height: Per product specifications.

H. Total Weight: Per product specifications.

I. Primary Backing: Action Bac.

J. Secondary Backing: Action Bac.

K. Width: 12 foot.

L. Performance Characteristics: As follows:

1. Critical Radiant Flux Classification: Not less than 0.22 W/sq. cm.
2. Dry Breaking Strength: Not less than 100 lbf per ASTM D 2646.
3. Resistance to Insects: Comply with AATCC-24.
4. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC-165.
5. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) per AATCC-16.
6. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC-174.

2.2 CARPET CUSHION CC

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Traffic Classification: CCC Class I, moderate traffic.

C. Fiber Cushion: Synthetic.

1. Thickness: 0.250 inches.
2. Density: 14 lbs.

2.3 CARPET BASE

A. Provide carpet base with bound edge in color to match carpet.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the following:

1. Carpet manufacturer.

2. Carpet cushion manufacturer.

C. Tackless Carpet Stripping: Water-resistant plywood in strips as required to match cushion thickness and that comply with CRI 104, Section 11.3.

D. Transition Strips: Rubber transitions; see details on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the following:

a. Carpet manufacturer.
b. Carpet cushion manufacturer.

2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Direct-Glue-Down Installation: Comply with CRI 104, Section 8, "Direct Glue-Down Installation." (corridors)

B. Stretch-in Installation: Comply with CRI 104, Section 11, "Stretch-in Installation." (rooms)

C. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

1. Bevel adjoining border edges at seams with hand shears.
2. Level adjoining border edges.

D. Do not bridge building expansion joints with carpet.

E. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

I. Install carpet cushion seams at 90-degree angle with carpet seams.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

B. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09680

DIVISION 9 - FINISHES

SECTION 09801 - POWDER COATINGS

PART 1 - SCOPE

1.1 SCOPE

A. This Specification covers powder coatings for exterior steel, aluminum, copper-nickel, and bronze surfaces.

1.2 CLASSIFICATION

A. Powder coatings covered by this Specification are of the following types and classes as specified herein.

1. Type I: Epoxy.
2. Type II: Epoxy polyester hybrid.
3. Type III: Polyester.
4. Type IV: Polyester triglycedial isocyanurate (TGIC).
5. Type V: Polyester urethane hybrid.
6. Type VI: Acrylic.
7. Type VII: Acrylic polyester hybrid.
8. Type VIII: Acrylic urethane hybrid.
9. Type IX: Urethane.
10. Type X: Polyurethane.
11. Type XI: Vinyl.
12. Type XII: Nylon.

B. Classes: The classes of powder coatings are as follows:

1. Class 1: Interior, dry service.
2. Class 2: Interior, wet spaces, immersion service.
3. Class 3: Exterior.

PART 2 - APPLICABLE DOCUMENTS

2.1 GOVERNMENT DOCUMENTS

A. Specifications, Standards, and Handbooks: The Specifications, standards, and handbooks listed herein form a part of this Document. Unless otherwise specified, the issues of these Documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS).

B. Other Government Documents, Drawings, and Publications: The following other Government Documents, Drawings, and publications form a part of this Document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

1. Department of Labor (DOL): Code of Federal Regulations, Title 29, Part 1910, 1915, 1917, 1918, 1926, and 1928 - Hazard Communications Act, Final Rule. (Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)
2. Environmental Protection Agency (EPA): SW 846, Chapter 3.3, method 7471 - Test Methods for Evaluating Solid Waste; Physical/Chemical Methods. (Application for copies should be addressed to National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.)

2.2 ORDER OF PRECEDENCE

A. In the event of a conflict between the text of this Document and the references cited herein, the text of this Document takes precedence. Nothing in this Document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

PART 3 - REQUIREMENTS

3.1 QUALIFICATIONS

A. The powder coatings furnished under this Specification shall be products with are authorized by the qualifying activity for listing on the applicable qualified products list at the time of award of Contract.

3.2 MATERIALS

A. The material shall be a finely ground, free-flowing powder of a one-component material consisting of a resin and curing agent system, as specified catalysts, fillers, colorants, and flow control agents in order to form a powder formulation capable of being electrostatically applied and conforming to the requirements of this Specification.

1. Workmanship: The powder shall be uniform, free from grit, and free of solvent, abrasives, water, chlorides, or other impurities.
2. Hydrogen Cyanide: When specified, the combustion products of the coating in an as-applied form, shall not contain detectable concentrations of hydrogen cyanide. Monitoring for hydrogen cyanide shall be performed in accordance with the guidance provided in ASTM E 800.
3. Toxic Products: When evaluated as specified, the materials used in the powder coating shall not contain known or potentially carcinogenic materials, as identified by:

    a. The Occupational Safety and Health Administration (regulated carcinogens).
    b. International Agency for Research on Cancer (IARC) (latest monographs).
    c. National Toxicology Program (latest annual report).

4. The manufacturer is responsible for maintaining “carcinogen free” materials.
5. The powder coating, as supplied, shall not contain the following materials in excess of 0.06 percent by weight:

    a. Asbestos or any asbestos-form materials.
    b. Benzene.
    c. Toluene.
    d. Chlorinated solvents.
    e. Hydrolyzable chlorine derivatives.
    f. Lead.
    g. Chromium.
    h. Cadmium.
    i. Mercury.
    j. Nitrosamines.

6. Toxicity: The powder coating shall have no adverse effect on the health of personnel when used for its intended purpose in accordance with the precautions delineated on the Material Safety Data Sheet and Hazardous Chemical Warning Label.

B. Material Safety Data Sheet (MSDS): The contracting activity shall be provided by a material safety data sheet at the time of Contract award. The MSDS shall be provided in accordance with the requirements of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this Specification.

C. Disposal Requirement: Waste powder and removed coating shall be disposed of in an ordinary landfill. To minimize dusting at landfills, the powder coating shall be sintered (solidified) before disposal. All disposal shall be in accordance with both the state and federally imposed Environmental Protection Agency (EPA) regulations.

D. Metal Content: The content of each soluble metals and total content of each metal of the powder coating shall be not greater than the values listed in Tables I and II when tested as specified.

TABLE I. Soluble Metals Content. 1/

Soluble Metal and/or Its Compound	Maximum, mg/L
Antimony and/or its compounds	15
Arsenic and/or its compounds	5
Barium and/or its compounds (excluding barite)	100
Beryllium and/or its compounds	0.75
Cadmium and/or its compounds	1
Chromium (VI) compounds	5
Chromium and/or chromium (III) compounds	560
Cobalt and/or its compounds	10
Copper and/or its compounds	25
Fluoride salts	180
Lead and/or its compounds	0.5
Mercury and/or its compounds	0.2
Molybdenum and/or its compounds	350
Nickel and/or its compounds	10
Selenium and/or its compounds	1
Silver and/or its compounds	5
Tantalum and/or its compounds	800
Thallium and/or its compounds	7
Tungsten and/or its compounds	800
Vanadium and/or its compounds	24
Zinc and/or its compounds	250

1/ The values in Table I are instantaneous values for toxic materials and are not time weighted averages.

TABLE II. Total Metals Content. 1/

Metal	Maximum, %WT
Antimony and/or its compounds	0.015
Arsenic and/or its compounds	0.001
Barium and/or its compounds (excluding barite)	0.10
Beryllium and/or its compounds	0.0002
Cadmium and/or its compounds	0.0005
Chromium (VI) compounds	0.0005
Chromium and/or chromium (III) compounds	0.56
Cobalt and/or its compounds	0.0005
Copper and/or its compounds	0.01
Fluoride salts	0.18
Lead and/or its compounds	0.005
Mercury and/or its compounds	0.0002
Molybdenum and/or its compounds	0.35
Nickel and/or its compounds	0.02
Selenium and/or its compounds	0.001
Silver and/or its compounds	0.001
Tantalum and/or its compounds	0.8
Thallium and/or its compounds	0.007
Tungsten and/or its compounds	0.8
Vanadium and/or its compounds	0.01
Zinc and/or its compounds	0.25

1/ The values in Table II are instantaneous values for toxic materials and are not time weighted averages.

3.3 COATING CHARACTERISTICS

A. When applied to a substrate and subjected to a heating cycle, as required by the Contractor, the material shall melt, fuse, and subsequently cure to form a coating which conforms to all the requirements of this Specification. The Contractor shall specify the application procedure and shall provide detailed health and safety information, by means of Material Safety Data Sheets, Product Specification/Data Sheets, and Hazardous Chemical Warning Labels, needed to ensure:

1. Optimum performance of the powder coating.
2. All procedures are performed safely.

3.4 FILM PROPERTIES

A. The powder coating shall be applied by established commercial powder coating methods over abrasive blasted steel, aluminum, copper-nickel, or bronze surfaces, as applicable. Coatings shall have a total dry film thickness for interior, dry service surfaces, and exterior and interior wet spaces immersion service surfaces, aluminum, copper-nickel, or bronze surfaces of 51 to 102 micrometers (μm) (2 to 4 mils) and 102 to 152 μm (4 to 6 mils), respectively. The cured coating shall be uniform, smooth, even, and free of runs, sags, and streaks. The coating shall be not less than 0.5 mm (2.0 mils) above the blasted profile.

3.5 CURE TIME

A. The powder shall have a cure cycle (time and temperature) of less than 30 minutes at a temperature of less than 400 ± 10 deg F and meet the cure test specified. At 350 ± 10 deg F, the powder shall have an overbake stability of at least 100 percent of the recommended cure time. The temperature and time duration of the powder coating cure cycle shall not effect the material properties of the coated substrate.

3.6 GEL TIME

A. Epoxy gel time of a film of applied powdered materials shall be not less than 20 seconds or greater than 60 seconds when tested as specified. Other powders gel time of the film of the applied powdered materials shall be not greater than 125 seconds when tested as specified. The gel time for Class 2 powdered materials shall not be less than 4 seconds nor greater than 60 seconds when tested as specified. Types XI and XII are not required to meet this requirement.

3.7 WEATHERING PROPERTIES (FOR CLASS 3 ONLY)

A. The weathering properties for Class 3 only shall be as follows:

1. Accelerated Weathering: The cured film of applied powder coating shall show no cracking, a loss of not greater than 30 percent of the gloss measured before exposure, no color change, blistering, wrinkling, or loss of adhesion of the coating nor evidence of substrate corrosion after 1,000 hours exposure to accelerated weathering.
2. Humidity Resistance: The cured film of applied powder coating shall show no corrosion, blistering, wrinkling, or loss of adhesion.

3.8 COLOR

A. Color of the cured film of applied powder coatings shall be as specified and in accordance with FED-STD-595 color chip.

3.9 FLEXIBILITY (FOR CLASSES 1 AND 3 ONLY)

A. When specified, the cured film of applied powder coating shall show no cracking or loss of adhesion in the bend area.

3.10 ADHESION

A. The cured film of applied powder coating shall have a minimum classification of 5B.

3.11 SPECULAR GLOSS

A. Initially, the 60 degree specular gloss of the cured film of applied powder coating (for all colors except Navy haze-gray) shall have a minimum requirement of 45 and a maximum requirement of 85. The 60 degree specular gloss requirement for Navy haze-gray shall have a minimum requirement of 45 and a maximum requirement of 60.

3.12 DIELECTRIC STRENGTH

A. When specified, the cured film of applied powder coating shall have an average dielectric strength greater than 30 volts per micrometer (762 volts per mil).

3.13 THERMAL SHOCK RESISTANCE (FOR CLASS 3 ONLY)

A. The cured film of applied powder coating shall withstand 10 cycles between 165 ± 4 deg F) and minus 65 ± 4 deg F without cracking, checking, or disbonding.

3.14 IMPACT RESISTANCE

A. The cured film of applied powder coating shall provide a coating that will have a direct and reverse impact resistance of not less than 160 inch pounds and 25 inch pounds respectively, without forming a holiday when inspected with a 67.5 volt detector. Except Type XII shall have a direct and reverse impact resistance of not less than 125 inch pounds without forming a holiday when inspected with a 67.5 volt detector.

3.15 ABRASION RESISTANCE

A. Weight loss from the cured film of applied epoxy powder coating shall be not greater than 0.0001 pound and all other powder coatings not greater than 0.0002 pound.

3.16 SALT SPRAY RESISTANCE (FOR CLASSES 2 AND 3)

A. A cured film of applied powder coating shall show undercutting of not greater than 1/4 inch from the score lines. There shall also be no blistering, wrinkling, or loss of adhesion of the coating or any general surface corrosion or pitting.

3.17 FLUID RESISTANCE PROPERTIES (FOR CLASS 2 ONLY)

A. The fluid resistance properties for Class 2 shall be as follows:

1. Boiling Water Immersion: The cured film of applied powder coating shall show no wrinkling, blistering, or loss of adhesion.
2. Hydrocarbon Immersion: A cured film of applied powder coating shall show no softening, blistering, rusting, or other visible defects.
3. Hydraulic Fluid Immersion: A cured film of applied powder coating shall show no softening, blistering, rusting, or other visible defects.

3.18 CHEMICAL RESISTANCE

A. The cured film of applied powder coating shall not blister, soften, lose bond, discolor, change greater than 50 percent in gloss, nor develop holidays and intentionally made holes shall exhibit no undercutting during the 45-day test period.

3.19 WEATHERING PROPERTIES (FOR CLASS 2 ONLY)

A. The weathering properties for Class 2 only shall be as follows:

1. Humidity Resistance: The cured film of applied powder coating shall show no corrosion, blistering, wrinkling, or loss of adhesion.

3.20 HARDNESS

A. The cured film of applied powder coating shall have a pencil hardness of not less than 2H.

3.21 HOLIDAY

A. The cured film of applied powder coating shall be free of holidays.

3.22 SHELF LIFE

A. Powder coating materials shall meet the requirements of this Specification for 1 year from the date of manufacture when stored unopened in the original container at or below 72 deg F and at a relative humidity less than 50 percent.

3.23 OUTGASSING (FOR CLASSES 1 AND 2)

A. Outgassing, when conducted as specified, shall not contaminate a ship or submarine atmosphere.

3.24 TOUCHUP

A. The cured powder coating, when touched up with silicone alkyd copolymer enamel conforming to MIL-E-24635, Type II, Class 2, shall exhibit good adhesion. For Type I powder coatings, touchup powder coatings with epoxy-polyamide, exterior topcoat conforming to MIL-P-24441 and Formula 151, Type I or MIL-P-24441/2.

3.25 LABEL

A. Manufacturer's container label instructions for the powder coating shall be in accordance with the requirements of 29 CFR 1910, 1915, 1917, 1918, 1926, and 1928.

3.26 SUBSTITUTION

A. In lieu of powder coating, Contractor may provide one of the following systems, installed according to manufacturer's requirements.

1. Mild Environment (High-Gloss Finish): One finish coat over an intermediate coat and a primer.

a. Primer: Acrylic primer applied at spreading rate recommended by manufacturer.

1) DuPont: Tufcote 72P Waterborne Acrylic Enamel.
2) ICI: Devflex 4020 DTM Flat Interior/Exterior Waterborne Primer and Finish.

3) International: Intercryl 520 WB Waterborne Acrylic Primer or Finish.
4) Moore: M04 Acrylic Primer.
5) PPG: 90-7XX Series Pitt-Tech One Pack Interior/Exterior Primer Finish DTM Industrial Enamel.
6) R-O: 5269/5281 System Labor Saver Industrial Enamel High Performance Acrylic Primers.
7) S-W: Kem Kromik Universal Metal Primer B50Z Series.
8) Tnemec: Series 18 Enviroprime.

b. Intermediate Coat: Acrylic enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 1.5 to 4.0 mils.

1) DuPont: Tufcote 72P Waterborne Acrylic Enamel.
2) ICI: Devflex 4208 Interior/Exterior Waterborne Acrylic Gloss Enamel.
3) International: Intercryl 530 WB Waterborne Acrylic Gloss Finish.
4) Moore: M28 Acrylic Gloss Enamel.
5) PPG: 90-3XX Series Pitt-Tech One Pack Interior/Exterior High Performance Waterborne High Gloss DTM Industrial Enamels.
6) R-O: 5200 System Labor Saver Industrial Enamel High Performance Acrylic Semi-Gloss Finishes.
7) S-W: DTM Acrylic Gloss Coating B66W100 Series.
8) Tnemec: Series 28 Tufcryl Acrylic Emulsion.

c. Topcoat: High-gloss acrylic enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 1.5 to 4.0 mils.

1) DuPont: Tufcote 72P Waterborne Acrylic Enamel.
2) ICI: Devflex 4208 Interior/Exterior Waterborne Acrylic Gloss Enamel.
3) International: Intercryl 530 WB Waterborne Acrylic Gloss Finish.
4) Moore: M28 Acrylic Gloss Enamel.
5) PPG: 90-3XX Series Pitt-Tech One Pack Interior/Exterior High Performance Waterborne High Gloss DTM Industrial Enamels.
6) R-O: 5200 System Labor Saver Industrial Enamel High Performance Acrylic Semi-Gloss Finishes.
7) S-W: DTM Acrylic Gloss Coating B66W100 Series.
8) Tnemec: Series 28 Tufcryl Acrylic Emulsion.

B. Automotive paint may be substituted at overhead doors.

PART 4 - QUALITY ASSURANCE PROVISIONS

4.1 RESPONSIBILITY FOR INSPECTION

A. Unless otherwise specified in the Contract, the Contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the Contract the Contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the Specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

END OF SECTION 09801

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DIVISION 9 - FINISHES

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Contracting Officer will select from standard colors and finishes available.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork and casework.
b. Unit kitchens.
c. Finished mechanical and electrical equipment.
d. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.

b. Furred areas.
c. Ceiling plenums.
d. Pipe spaces.
e. Duct shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.

4. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each paint system specified. Include block fillers and primers.

1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

B. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.

C. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

1. Fuller-O'Brien Paints (Fuller).
2. Benjamin Moore & Co. (Moore).
3. Sherwin-Williams Co. (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Contracting Officer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Contracting Officer about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen

as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.

2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
5. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
6. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
7. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Piping, pipe hangers, and supports.
2. Heat exchangers.
3. Tanks.
4. Ductwork.
5. Insulation.
6. Motors and mechanical equipment.
7. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.
2. Switchgear.
3. Panelboards.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

3.4 FIELD QUALITY CONTROL

A. The Government reserves the right to invoke the following test procedure at any time and as often as the Government deems necessary during the period when paint is being applied:

1. The Government will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Government:

    a. Quantitative material analysis.
    b. Abrasion resistance.
    c. Apparent reflectivity.
    d. Flexibility.
    e. Washability.
    f. Absorption.
    g. Accelerated weathering.
    h. Dry opacity.
    i. Accelerated yellowness.
    j. Recoating.
    k. Skinning.
    l. Color retention.
    m. Alkali and mildew resistance.

3. The Government may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Contracting Officer.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

A. Concrete, Stucco, and Masonry (Other than Concrete Masonry Units): Provide the following finish systems over exterior concrete, stucco, and brick masonry surfaces:

1. Flat Acrylic Finish: 2 finish coats over a primer.

a. Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) Fuller: 220-17 Acrylic Concrete and Masonry Primer Sealer.
2) Moore: Primer not required over this substrate.
3) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.

b. First and Second Coats: Flat, exterior, acrylic-emulsion paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

1) Fuller: 262-XX Exterior "All Surface" 100 Percent Acrylic Flat Paint.
2) Moore: MoorLife Latex House Paint #105.
3) PPG: 10 Line Pitt-Cryl Exterior Water Base Paint.

B. Concrete Masonry Units: Provide the following finish systems over exterior concrete masonry units:

1. Flat Acrylic Finish: 2 finish coats over a block filler.

a. Block Filler: High-performance, latex block filler applied at spreading rate recommended by the manufacturer to achieve a total dry mill thickness of not less than 4.0 mils.

1) Fuller: 280-00 Interior/Exterior Latex Block Filler.
2) Moore: Moorcraft Interior & Exterior Block Filler #173.
3) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.

b. First and Second Coats: Flat, exterior, acrylic-emulsion paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

1) Fuller: 262-XX Exterior "All Surface" 100 Percent Acrylic Flat Paint.
2) Moore: MoorLife Latex House Paint #105.
3) PPG: 72 Line Sun-Proof Exterior Flat Latex House Paint.

C. For all Exterior Metal Items: See Specification Section 09801 Powder Coatings.

3.8 INTERIOR PAINT SCHEDULE

A. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units:

1. Semigloss, Alkyd-Enamel Finish: 2 finish coats over an undercoat and a filled surface.

a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 5.0 mils.

1) S-W: Heavy-Duty Block Filler B42W46.

b. Undercoat: Interior, alkyd- or latex-based, enamel undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Eggshell, Interior Latex Finish: 2 finish coats over a primer.

a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) S-W: ProMar 200 Interior Latex Wall Primer B28W200.

b. Finish Coat: No VOCs Interior Latex Paint.

1) Sherman Williams Harmony.

C. Natural-Finish Woodwork: Provide the following natural finishes over new, interior woodwork:

1. Alkyd-Based, Satin-Varnish Finish: 2 finish coats of an alkyd-based, clear-satin varnish over a sanding sealer. Provide wood filler on open-grain wood before applying first varnish coat.

a. Filler Coat: Paste-wood filler applied at spreading rate recommended by the manufacturer.

1) S-W: Sher-Wood Fast-Dry Filler.

b. Sealer Coat: Clear sanding sealer applied at spreading rate recommended by the manufacturer.

1) S-W: ProMar Varnish Sanding Sealer B26V3.

c. First and Second Finish Coats: Alkyd-based or polyurethane varnish, as recommended by the manufacturer, applied at spreading rate recommended by the manufacturer.

1) S-W: Oil Base Varnish, Gloss A66V91.

D. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss, Alkyd-Enamel Finish: One finish coat over an enamel undercoater and a primer.

a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) S-W: Kem Kromik Metal Primer B50N2/B50W1.

b. Undercoat: Alkyd, interior enamel undercoat or semigloss, interior, alkyd-enamel finish coat, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) S-W: ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200.

c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.

1) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

3.9 PAINT SCHEDULE

P1 - Sherwin Williams SW - 1910 Tennis White (rooms).
P2 - Sherwin Williams SW - 1235 Rhinestone (corridors).
P3 - Same as P1.
P4 - Sherwin Williams SW - 1252 Vibrato Blue (metal handrails, metal door frames, stair stringers).

END OF SECTION 09900

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DIVISION 10 - SPECIALTIES

SECTION 10260 - CRASH RAILS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. 4 inch crash rails.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Submit manufacturer's product data.

C. Shop Drawings: Submit Shop Drawings showing components, dimensions, and anchorage details.

D. Samples: Submit 12 inch long sample of each model and color specified, including end caps and corner units for Contracting Officer's approval.

E. Certification: Submit manufacturer's certification indicating compliance with ADA requirements.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 101 for interior finish materials. Smoke developed less than 450 and flame spread of 25 or less in accordance with ASTM E 84.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging with labels clearly indicating manufacturer and material.

B. Storage: Store materials indoors in a clean, dry area protected from damage and in accordance with manufacturer's instructions.

C. Handling: Protect materials during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following or an equal approved by the Contracting Officer:

1. Manufacturer:

a. Koroseal Wall Protection Systems or equal.

2.2 CRASH RAILS

A. Koroseal "Korogard" C460 Crash Rail or equal: Crash rail mounted over wall brackets 16 inch O.C. Exposed surface shall be free of wrinkling, chipping, and discoloration.

1. Dimensions:

a. Height: 4 inch.
b. Width: 7/8-inch.

2. Profile: High-impact vinyl acrylic extrusion locked in place, nominal 0.078 inch thick. Glass 1/A fire rating, tested in accordance with ASTM E 84.
3. Extrusion: Pebble grain finish. Contains EPA-registered Micro-Chek antimicrobial agent.
4. Retainer Clips: Minimum 2 inches wide by 0.062 inches thick 6063-T6 aluminum.
5. End Caps: Injection-molded preassembled wall return unit of color and texture similar to that of rail.
6. Corners: Internal and External corner units of similar material to end cap units. Carry line of crash rail continuously around corner, unless otherwise indicated on Drawings.
7. Color: Color as noted on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect wall surfaces to receive crash rails. Notify the Contracting Officer in writing if wall surfaces are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Install crash rails to walls securely in accordance with manufacturer's written instructions.

B. Install crash rails accurately in location, alignment, and elevation.

C. Provide manufacturer's standard fasteners for masonry walls.

END OF SECTION 10260

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DIVISION 10 - SPECIALTIES

SECTION 10425 - SIGNS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of signs:

1. Panel signs for entry doors.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

D. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.

1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.

E. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for verification of color, pattern, and texture selected and compliance with requirements indicated:

a. Plastic Laminate: Provide a sample panel actual size for each material, color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.3 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work. For each separate sign type required, obtain signs from one source of a single manufacturer.

B. Size: Submit samples for verification by the Contractor's Representative. Signs are indicated on Drawings for location and numbering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following or an equal approved by the Contracting Officer:

1. Manufacturers of Panel Signs:

a. ABC Architectural Signing System.
b. Allenite.
c. ASI Sign Systems, Inc.
d. Modulex.
e. Spanjer Brothers, Inc.
f. The Supersine Company.
g. Vomar Products, Inc.

2.2 MATERIALS

A. Plastic Laminate: Provide high-pressure plastic laminate engraving stock with face and core plies in contrasting colors, in finishes and color combinations as selected from the manufacturer's standards.

B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

2.3 PANEL SIGNS

A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.

B. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit sign panel construction and mounting conditions indicated. Factory-paint brackets in a color matching the background color of the sign panel.

C. Engraved Copy: Machine-engrave letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply formed edges.

1. Engraved Plastic Laminate: Engrave through the exposed face ply of the plastic laminate sheet to expose the contrasting core ply.

2.4 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Contracting Officer from the manufacturer's standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:

1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
2. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
3. Shim Plate Mounting: Provide 1/8-inch-thick concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach the plate with fasteners and anchors suitable for secure attachment to the substrate. Attach panel sign units to the plate using the method specified above.

3.2 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Government.

END OF SECTION 10425

DIVISION 10 - SPECIALTIES

SECTION 10512 - TENANT STORAGE LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single tier tenant storage lockers.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data consisting of manufacturer's specification, technical data, and installation instructions.

C. Shop drawings showing fabrication and installation of wire mesh partitions. Include plans, elevations, and large scale details showing anchorage and accessory items. Provide location template drawings for items supported or anchored to permanent construction.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide wire mesh partitions as complete units produced by a single manufacturer, including necessary mounting accessories, fittings, and fastenings.

1.4 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work. However, allow for adjustments and fitting wherever taking of field measurements before fabrication might delay work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Cutler Manufacturing Corp.
2. Folding Guard Corp.
3. Valiant Products, Inc.

2.2 ARCHITECTURAL SPECIFICATIONS

A. Furnish all steel ventilated tenant storage lockers. All doors, frames and partitions to be constructed of 1" x 1-1/2" x 1" 12 gauge formed steel Channel, 1-1/4" x 1" 12 gauge formed angle and 1-1/2" x #16 non-flattened expanded metal. Doors to be prehung with Transom and to be equipped with 2" x 2" steel pin butt hinges and 12 gauge formed metal padlock hasp and door stops. Double tier lockers to be equipped with 22 gauge galvanized steel separation shelves with stiffening ribs. Finish to be semi-gloss machinery gray enamel with polyurethane base.

B. Tops: Furnish lockers with tops fabricated of 1-1/2" x #16 expanded metal with matching enamel finish secured firmly to locker frames.

C. Backs: Furnish 22 gauge galvanized steel backs secured firmly to locker frames. (Recommended when lockers are mounted back or as free standing units.)

D. Size:

1. Width: 4'-0" or as indicated on Drawings.
2. Depth: 3'-0" or as indicated on Drawings.
3. Height: 7'-0" or as indicated on Drawings.
4. See construction drawings for layout.

2.3 FABRICATION

A. Do not use components greater than sizes indicated. Use smaller size components as recommended by partition component manufacturer. Modify units to fit within finished space.

B. Provide bolts, hardware, and accessories for complete installation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. Erect partitions plumb, rigid, properly aligned, and securely fastened in place, complying with drawings and manufacturer's recommendations.

B. Provide additional field bracing as shown or necessary for rigid, secure installation. Erector to provide additional clips and bracing as required.

3.3 ADJUST AND CLEAN

A. Adjust moving components for smooth operation without binding.

B. Touch-up damaged finish after completion of installation using field-applied paint to match color of shop-applied finish.

END OF SECTION 10512

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DIVISION 10 - SPECIALTIES

SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fire extinguishers.
2. Fire extinguisher cabinets.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product data for cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.

D. Samples for initial selection purposes in the form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of cabinet finish indicated or exposed to view.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain extinguishers and cabinets from one source from a single manufacturer.

B. UL-Listed Products: Fire extinguishers shall be UL listed with UL listing mark for type, rating, and classification of extinguisher.

C. FM-Listed Products: Fire extinguishers approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher with FM marking.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by Contracting Officer¦s Representative:

1. Ansul Fire Protection.
2. Badger-Powhatan.
3. American Specialties Inc.
4. Bobrick Washroom Equipment, Inc.
5. Croker Div., Fire-End and Croker Corp.
6. Filtrine Manufacturing.
7. Lyon Metal Products.
8. J.L. Industries.
9. Larsen's Manufacturing Co.
10. Modern Metal Products by Muckle.
11. Potter-Roemer, Inc.
12. Samson Metal Products, Inc.

2.2 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each cabinet and other locations indicated, in colors and finishes selected by Contracting Officer from manufacturer's standard, that comply with authorities having jurisdiction.

B. Multipurpose Dry Chemical Type: UL-rated 4-A:60-B:C, 10-lb nominal capacity, in enameled steel container.

2.3 CABINETS

A. Construction: Manufacturer's standard box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

B. Cabinet Type: Suitable for containing the following:

1. Fire extinguisher.

C. Cabinet Mounting: Suitable for the following mounting conditions:

1. The fire extinguisher cabinet will be installed recessed with flat face and mounted into the wall, 3-¦0¦ above finish floor to bottom of cabinet. Cabinet size will be a

minimum of 8 inches by 8 inches by 28 inches in size and flat faced type. No bubble face. Fire extinguisher to sit on base of cabinet.

D. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.

1. Enameled Steel: Manufacturer's standard finish, hollow steel door construction with tubular stiles and rails.
2. Door Glazing: Clear float glass complying with ASTM C 1036, Type I, Class 1, Quality q3.

E. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door. Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location.

1. Application Process: Silk screen.

F. Door Style: Manufacturer's standard design.

1. Full-Glass Panel: Float glass, 1/8 inch thick.

G. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 deg.

2.4 FINISHES FOR CABINETS, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying temporary strippable protective covering prior to shipping.

2.5 STEEL CABINET FINISHES

A. Surface Preparation: Solvent-clean surfaces complying with SSPS-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5 (white metal blast cleaning) or SSPC-SP 8 (pickling).

B. Baked-Enamel Finish: Immediately after cleaning and pretreatment, apply manufacturer's standard two-coat baked-enamel finish consisting of prime coat and

thermosetting topcoat. Comply with paint manufacturer's instructions for applying and baking to achieve a minimum dry film thickness of 2.0 mils.

1. Color and Gloss: Manufacturer's standard color and gloss designations. Paint the following:

    a. Exterior of cabinet, except for those surfaces indicated to receive another finish.
    b. Interior of cabinet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer's printed instructions for installation.

B. Install in locations and at mounting heights as shown on Drawings to comply with applicable regulations of governing authorities.

    1. Fasten cabinets to structure, square and plumb.

END OF SECTION 10522

DIVISION 10 - SPECIALTIES

SECTION 10801 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Toilet and bath accessories.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

C. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

D. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.

E. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.3 QUALITY ASSURANCE

A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Contracting Officer.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

1. Toilet and Bath Accessories:

a. A & J Washroom Accessories, Inc.
b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. General Accessory Manufacturing Co. (GAMCO).
f. McKinney/Parker Washroom Accessories Corp.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.

C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60.

E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

F. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

G. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

A. General: One, maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Contracting Officer, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

C. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Government's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

A. Paper Towel Dispensers:

1. Surface-Mounted Towel Dispensers: Fabricate of stainless steel with hinged front equipped with tumbler lockset. Provide pierced slots at sides as refill indicators.

a. Capacity: Not less than either 300 C-fold or 400 multifold paper towels without special adapters.
b. Capacity: Not less than 1000 single-fold paper towels.

B. Toilet Tissue Dispensers:

1. Single-Roll Dispenser: Size to accommodate core type tissue to 5 inch diameter roll.

a. Mounting: Semirecessed for nominal 4 inch wall depth.

2. Surface Roll Tissue Dispenser: Fabricate of stainless steel with satin finish for recessed mounting in nominal 4 inch wall depth. Provide complete with drywall mounting clamp.

a. Size: Unit to accommodate core-type tissue roll up to 5 inches in diameter.
b. Size: Unit to accommodate two separate core-type tissue rolls up to 5 inches in diameter.

C. Grab Bars:

1. Stainless Steel Type: Provide grab bars with wall thickness not less than 0.05 inch and as follows:

a. Mounting: Concealed, manufacturer's standard flanges and anchorages.
b. Clearance: 1-1/2 inch clearance between wall surface and inside face of bar.
c. Gripping Surfaces: Manufacturer's standard nonslip texture.
d. Heavy-Duty Size: Outside diameter of 1-1/2 inches.

D. Sanitary Napkin Vendors:

1. General: Fabricate cabinet of stainless steel, not less than 0.034 inch thick, all-welded construction. Provide door of seamless stainless steel, minimum 0.05 inch thick, with returned edges and equipped with tumbler lockset. Provide identification reading "Napkins" and "Tampons" at coin slots; brand name advertising is not allowed. Capacity not less than 15 napkins and 20 tampons.

a. Mounting: Surface-mounted type.
b. Operation: Fifty-cent coin operation, with locked coin box keyed separately from door and other accessory units.

E. Soap Dispensers:

1. Liquid Soap Dispenser, Wall-Mounted: Wall-mounted piston and spout-type unit with a minimum 16 fluid ounce capacity, polyethylene reservoir concealed below deck. Piston and 4 inch long spout of stainless steel with brightly polished finish with chrome-plated deck escutcheon.

a. Provide unit designed for mounting on vanity deck.
b. Equip unit with valve for dispensing soap in liquid form.

F. Shower and Bath Accessories:

1. Shower Curtain Rod, Heavy-Duty: 1-1/4 inch o.d., 0.05 inch stainless steel, satin finish; furnish with 3 inch o.d., minimum 0.04 inch stainless steel flanges with satin finish, designed for exposed fasteners.
2. Antibacterial Shower Curtain: 42 inches wide by 72 inches high, 10 ounce per square yard, nylon-reinforced, antibacterial vinyl fabric with hemmed edges. Fabricate to be flameproof, stain-resistant and self-deoderizing, with stainless steel grommets at minimum 6 inches o.c. through top hem. Furnish in surgical white color.
3. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap, fasteners, sized to accommodate specified curtain rod size. Provide one hook per curtain grommet.
4. Towel Bar: 24 inch long, satin-finished, Type 304 stainless steel tubular (3/4 inch square) bar and rectangular end brackets. Provide galvanized backplates for concealed mounting.

G. Miscellaneous Accessories:

1. Mop and Broom Holder/Utility Shelf: Combination unit with 0.05 inch, Type 304, stainless steel shelf with 1/2 inch returns, 0.062 inch support brackets for wall mounting. Provide 0.062 inch stainless steel hooks for wiping rags on front of shelf, together with spring-loaded, rubber hat, cam-type mop/broom holders; 1/4 inch diameter stainless steel drying rod suspended beneath shelf. Provide unit 36 inches long and complete with four mop/broom holders and three hooks.
2. Double-Prong Robe Hook: Heavy-duty satin finished stainless steel double-prong robe hook; rectangular wall bracket with backplate for concealed mounting.

H. Mirror Units:

1. Standard Stainless Steel Framed Mirror Units: Fabricate frame with channel shapes not less than 0.04 inch, with square corners carefully mitered to hairline joints and mechanically interlocked. Provide in Type 430 bright polished finish.

I. Medicine Cabinet:

1. Standard Recessed Medicine Cabinet: Fabricate frame and door of steel. Provide two adjustable shelves and continuous hinge. Approximate size of 21 x 18. Paint to match wall.

END OF SECTION 10801

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DIVISION 12 - FURNISHINGS

SECTION 12491 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of venetian blinds and accessories:

1. Miniblinds with aluminum louver slats.

1.3 DEFINITION

A. Miniblind: Venetian blind with nominal 1-inch- wide louver slat.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. The Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

C. Samples for Verification: For the following products, prepared on Samples from the same material to be used for the Work.

1. Louver Slat: Not less than 12 inches long.
2. Valance: Full-size unit, not less than 12 inches wide.

D. Window Treatment Schedule: Include horizontal louver blinds in schedule using same room designations indicated on Drawings.

E. Maintenance Data: For horizontal louver blinds to include in maintenance manuals. Include the following:

1. Methods for maintaining horizontal louver blinds and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to finishes and performance.
3. Operating hardware.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

C. Corded Window Covering Product Standard: Provide horizontal louver blinds complying with WCMA A 100.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver blinds in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Contracting Officer’s Representative of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by Contracting Officer:

1. Horizontal Louver Blinds, Aluminum Louver Slats:

a. Hunter Douglas Window Fashions.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM LOUVER SLATS - HB

A. Products: Subject to compliance with requirements, provide one of the following or an equal approved by Contracting Officer:

1. Hunter Douglas-Lightlines with "Delight":

a. Color: 718 Pearl Frost.

B. Louver Slats: Aluminum, alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.

1. Aluminum.

C. Headrail/Valance:

1. Finish Color Characteristics: Match color, texture, pattern, and gloss of louver slats.

D. Maximum Light Blocking Blinds: Eliminate all visible light gaps if slats are tilted closed; with tight tape spacing indicated and slats with minimal-sized rout holes for ladders hidden and placed near back edge for maximum slat overlap; with headrail and bottom rail extended and formed for light-tight joints between rail and adjacent slats or construction. Block 99 percent of visual light.

E. Tilt Control:

1. Tilt Operation: Manual with wand.

F. Lift Operation: Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.

G. Tilt-Control and Cord-Lock Position: Right side and left side of headrail, respectively, unless otherwise indicated.

H. Ladders: Evenly spaced to prevent long-term louver sag.

1. Braided string.

I. Valance: Manufacturer's standard.

1. Finish Color Characteristics: Match color, texture, pattern, and gloss of louver slats.

J. Mounting: Wall mounting permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.

1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

K. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard, as indicated.

2.3 HORIZONTAL LOUVER BLINDS FABRICATION

A. Product Standard and Description: Comply with AWCMA Document 1029, unless otherwise indicated, for each horizontal louver blind designed to be self-leveling and consisting of louver slats, rails, ladders, tapes, lifting and tilting mechanisms, cord, cord lock, tilt control, and installation hardware.

B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lifting and Tilting Mechanisms: With permanently lubricated moving parts.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Blind Units Installed between (Inside) Jambs: Width equal to 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch, less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch, plus or minus 1/8 inch, less than head-to-sill dimension of opening in which each blind is installed.
2. Blind Units Installed Outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

D. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.

E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

F. Color-Coated Finish:

1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

G. Component Color: Provide rails, cords, ladders, and exposed-to-view metal and lastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 HORIZONTAL LOUVER BLIND INSTALLATION

A. Install blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior louver edges in any position are not closer than 1 inchto interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.

B. Flush Mounted: Install blinds with louver edges flush with finish face of opening if slats are tilted open.

C. Jamb Mounted: Install headrail flush with face of opening jamb and head.

D. Head Mounted: Install headrail on face of opening head.

1. Contractor to confirm method of installation.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean blind surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged blinds that cannot be repaired, in a manner approved by Contracting Officer’s Representative, before time of Substantial Completion.

END OF SECTION 12491

DIVISION 12 - FURNISHINGS

SECTION 12690 - FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Surface-type floor mats of the following type: Carpet-type mats.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of floor mat and frame specified, including manufacturer's specifications and installation instructions, details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop drawings showing layout and types of floor mat and frames, full-scale sections of typical installations, details of patterns or designs, anchors, and accessories.

1. Coordinate shop drawing submittal with concrete work shop drawings showing oversized recess for deferred installation of frames.

D. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual sections of floor mat and frame materials, showing full range of colors, textures, finishes, and patterns available, for each type of floor mat and frame indicated.

E. Samples for verification purposes in form of 12-inch-square assembled section of floor mat and frame members with selected tread surface showing each type of metal finish and color of exposed floor mat, frames, and accessories required. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats.

1.3 PROJECT CONDITIONS

A. Field Measurements: Check actual blocked-out openings in floors by accurate field measurements before fabricating frames and mats; show recorded measurements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid a delay of the Work.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain floor mats and frames from one source of a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Carpet-Type Mats:

a. American Floor Products Company, Inc.
b. Arden Architectural Specialties, Inc.
c. Balco, Inc.
d. Durable Mat Mfg. Company.
e. J.L. Industries.
f. Mats, Inc.
g. Metalines, Div. of Balco, Inc.
h. R.C. Musson Rubber Company.
i. Nuway Matting Systems, Inc.

2.2 MATERIALS

A. General: Provide colors, patterns, and profiles of materials, including metals and metal finishes indicated or specified. Where not indicated, provide colors, patterns, and profiles selected by Contracting Officer from manufacturer's standards.

1. Provide mats with custom inlaid or woven-in graphic (design, logo, emblem, characters, or other graphic) as shown and where shown.

B. Carpet-Type Mats: Level-cut-pile nylon carpet bonded to 1/8- to 1/4-inch-thick flexible vinyl backing to form mats 3/8- or 7/16-inch-thick with nonraveling edges.

1. Tapered Flexible Molding: Tapered vinyl carpet edge moldings with flanges fused to back of mat.

a. Provide moldings at ends of runners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install surface-type units to comply with manufacturer's instructions at locations indicated and coordinated with entrance locations and traffic patterns.

1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.2 PROTECTION

A. Defer installation of floor mats until time of Substantial Completion for Project.

END OF SECTION 12690

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DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13110 - CATHODIC PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes passive cathodic protection systems that use zinc anodes to protect iron and steel piping and curb boxes.

1.3 PERFORMANCE REQUIREMENTS

A. Engage a qualified corrosion engineer to design and supervise, test, and inspect installation of cathodic protection systems.

1. Design cathodic protection for pipelines according to NACE RP0169.

B. Select anodes and accessories relevant to level of protection. Design anodes for an estimated life of 30 years before replacement.

C. Survey site and determine soil or water corrosivity (resistivity), current requirements, potential surveys, stray currents, and water chemistry/corrosivity (pH).

D. Cathodic protection systems shall provide protective potential that complies with referenced NACE standards.

E. Measure structure-to-earth according to NACE RP0169, using one of the following two methods:

1. 850-mV Negative Voltage: With cathodic system in operation, measure a negative voltage of at least minus 0.85 V between pipe, fire hydrant, curb box and a saturated copper/copper-sulfate reference electrode contacting the earth directly over pipe, fire hydrant and curb box.

2. 100-mV Polarization Voltage: Determine polarization voltage shift by interrupting protective current and measuring polarization decay. An immediate voltage shift will occur if protective current is interrupted. Use voltage reading, after immediate shift, as base reading from which to measure polarization decay. Measure at least a minimum polarization voltage shift of 100 mV between pipe and fire hydrant and a saturated copper/copper-sulfate reference electrode contacting the earth directly over pipe and curb box.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each of the following items:

1. Anodes.
2. Insulating flange sets.
3. Casings, insulation, and seals.
4. Dielectric unions.

C. Shop Drawings: Detail location of cathodic protection equipment, devices, and outlets, with characteristics and cross-references to products. Include calculations and details of anode designs. Include plans, elevations, sections, details for attachments to other Work, and list of equipment and materials.

D. Qualification Data: For corrosion engineer specified in "Quality Assurance" Article. Submit evidence of current license, corporate registration (if applicable) of the engineering business, and NACE certifications.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include calculations of estimated life of anodes.

F. Maintenance Data: For cathodic protection system to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Corrosion Engineer Qualifications: A professional engineer who is licensed to practice in jurisdiction where Project is located and who is experienced in corrosion engineering. Qualifications shall include education and experience in cathodic protection of buried and submerged metal structures and accreditation or certification by NACE as a Corrosion Specialist or Cathodic Protection Specialist.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect anodes from exposure to rain and direct sunlight. Replace anodes damaged due to improper handling or exposure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Anodes, Cable, and Backfill:

a. Anode Technologies Group.; ELTECH Systems Corporation.
b. Cott Manufacturing Company.
c. CP Masters, Inc.
d. Electrochemical Devices, Inc.
e. Gerome Manufacturing, Inc.
f. Harco Technologies; a Corrpro Company.
g. LORESCO International.
h. MATCOR, Inc.
i. Northern Arizona Wind & Sun, Inc.

2. Wire, Cable, and Wiring Accessories:

a. Continental Industries, Inc.; Thermoweld Division.
b. Electrical Railway Improvement Company.
c. Holloway Shunts.
d. Rome Cable Corporation.
e. Royston Laboratories, Inc.
f. 3M Company; Electrical Products Division.

3. Sealing and Dielectric Compounds:

a. Royston Laboratories, Inc.
b. Tapecoat Company.

4. Heat Shrinkable Sleeves:

a. 3M Company; Electrical Products Division.

2.2 ZINC ANODES FOR BURIED SERVICE, TYPE Z-1

A. Comply with ASTM B 418, Type II.

B. Chemical composition as percent of weight shall be as follows:

1. Aluminum: 0.005 maximum.
2. Cadmium: 0.003 maximum.
3. Iron: 0.0014 maximum.
4. Zinc: Remainder.

C. Bare Anode Ingot Weight: 30 lb, 2 inches square and 30 inches long. Packaged weight of anode bag shall be 70 lb.

D. Anode Wires: Cables, with copper conductors, suitable for direct burial; not less than No. 10 AWG with THWN insulation according to ASTM D 1248 and NEMA WC 5; long enough to extend to accompanying junction box without splicing.

E. Anode Backfill: Backfill materials packaged in water-permeable fabric sack or cardboard container. Anodes shall be factory installed in packaged backfill using methods that result in dense packing of fill with factory-installed anode spacers to ensure centering of anode in packaged anode backfill. Backfill material shall have the following chemical composition by weight:

1. Hydrated Gypsum: 75 percent.
2. Bentonite Clay: 20 percent.
3. Anhydrous Sodium Sulfate: 5 percent.

2.3 WIRE AND CABLE

A. Direct-Burial Cable: Single-conductor Type HMWPE, insulated cable specifically designed for dc service in cathodic protection installations.

1. Conductor: Stranded, annealed, uncoated copper, complying with ASTM B 3 and ASTM B 8.
2. Insulation: High-molecular-weight polyethylene, complying with NEMA WC 5.
3. Minimum Average Thickness of Insulation: 110 mils for Nos. 8 through 2 AWG, and 125 mils for Nos. 1 through 4/0 AWG; rated at 600 V.
4. Connectors: Copper compression type or exothermic welds.

B. Cables for Installation in Conduit: Type THWN copper conductors as specified in Division 16 Section "Conductors and Cables."

2.4 CONDUIT

A. Rigid galvanized steel as specified in Division 16 Section "Raceways and Boxes."

2.5 TEST AND JUNCTION BOXES

A. Junction Boxes: Waterproof; PVC as specified in Division 16 Section "Raceways and Boxes."

B. Test Stations: Flush-mounting type of high-impact-resistant PVC or polycarbonate, with watertight conduit connections and cover and removable terminal board.

C. In-Ground Level Test Stations: Traffic box with cast-iron covers, capable of withstanding AASHTO's "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," H 20 traffic loads, and with welded bead legend "CP TEST."

2.6 PATCH, SEAL, AND REPAIR COATING

A. Sealing and Dielectric Insulating Compound: Black, rubber based, soft, permanently pliable, tacky, moldable, and unbacked; 0.125 inch thick.

B. Coating Compound: Cold-applied, coal-tar-based mastic.

C. Pressure-Sensitive, Vinyl-Plastic Electrical Tape: Comply with UL 510.

2.7 POTTING COMPOUND

A. Cast-epoxy, two-package type; fabricated for this purpose and covered with heat-shrinkable tape.

2.8 IDENTIFICATION MATERIALS

A. Materials are specified in Division 16 Section "Electrical Identification."

1. Wire and Cables: Laminated-plastic material with black letters on yellow background. Include identifier legend on Shop Drawings.
2. Cable Warning Tape: Polyethylene tape, complying with requirements in Division 16 Section "Electrical Identification."

2.9 INSULATING FLANGE SETS

A. Description: Insulating flange sets rated for operation at indicated pressure and temperature of piping system, with full-faced gaskets, insulating sleeves and washers, and steel washers.

1. Gaskets: ASME B16.21. Neoprene-faced phenolic material.
2. Insulating Washers and Sleeves: Two sets of laminated phenolic insulating material. Select washers to fit within bolt facing on flange over the outside of fabric-reinforced phenolic sleeve.
3. Washers: Steel, cadmium plated, to fit within bolt facing on flange.

2.10 STEEL FLANGES AND BOLTS

A. Steel Flanges: ASME B16.5; 150 lb.

B. Bolts: ASTM A 307, Grade B for bolts; ASTM A 194/A 194M, Grade 2 for nuts.

1. Dimensions: ASME B18.2.1 for bolts; ASME B18.2.2 for nuts.
2. Threads: ASME B1.1; Class 2A fit for bolts, Class 2B fit for nuts.
3. Extend bolts completely through nuts.
4. Bolts may have reduced shanks of diameter not less than diameter at roof of threads.

2.11 DIELECTRIC UNIONS

A. Description: ASME B16.39, Class 1 for dimensional, strength, and pressure requirements. Include insulation barrier that limits galvanic current to 1 percent of short-circuit current in a corresponding metallic joint and has insulating material impervious to material in pipe.

2.12 FLEXIBLE PIPE COUPLING BONDS

A. Description: Flexible copper straps with electrical resistance equal to No. 1/0 AWG stranded copper wire and with 5 holes for 5 exothermic welds to pipe.

2.13 EXOTHERMIC WELDS

A. Exothermic Weld Kits: Specifically designed by manufacturer for welding materials and shapes required.

B. Exothermic Weld Caps: Dome of high-density polyethylene, 10-mil minimum thickness, filled with mastic and containing a tunnel portion to separate lead wire from exothermic weld.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Comply with ANSI C2 and NFPA 70.

B. Make connections to ferrous pipe using exothermic welding.

C. Coat welds with primer and exothermic weld cap.

3.2 ZINC ANODE INSTALLATION

A. Install zinc anode horizontally in a hole at least 3 inches larger than anode. Install anode under new copper water tubing, including service lines, fire hydrants, and curb boxes. Separate piping and anode by at least 24 inches, but not more than 60 inches.

B. Install anode midway between both ends of piping. Install anode wire in piping trench and connect to piping at an accessible location. Install anode wire in PVC conduit where rising out of the ground to the aboveground connection.

3.3 CABLE AND WIRE INSTALLATION

A. Install conduit according to Division 16 Section "Raceways and Boxes." Minimum conductor size is No. 10 AWG.

B. Install direct-buried cables according to Division 16 Section "Conductors and Cables."

1. Minimum Conductor Size: No. 8 AWG.

3.4 TEST STATIONS

A. Install test stations as follows:

1. At 1000-foot intervals.
2. At insulating joints.
3. At both ends of casings.
4. Where pipe crosses other metal pipes.

5. Where pipe connects to existing piping system.
6. Where pipe connects to dissimilar metal pipe.

B. Install test stations on controlled backfill complying with requirements for trench bottom fill for anode wires, unless otherwise indicated.

3.5 INSULATING FLANGE SETS

A. Cut piping and install flanges without stressing piping. Weld flanges according to ASME B16.25. Cover flanges with sealing and dielectric compound.

3.6 PIPE JOINTS

A. Electrical Continuity: Install bonding straps on metallic pipe to and across buried flexible couplings, mechanical joints, and flanged joints, except at places where insulating joints are specified. Welded and threaded joints are considered electrically continuous. Size bonding strap to allow for a total of 1-inch pipe expansion or contraction. Connect bonding strap to pipe, coupling follower rings, and coupling middle ring or sleeve. Connect bonding strap to pipe and coupling with five thermowelds.

B. Insulating Unions: Install electrical isolation at each building entrance and at other locations indicated. Cut pipe ends square, remove fins and burrs, and cut tapered pipe threads according to ASME B1.20.1. Apply joint compound or thread tape to male threads only. Install piping without stressing pipe. If joints are backed off to permit alignment of threaded joints, reapply joint compound or tape. Engage threads so not more than three threads remain exposed. Cover unions with sealing and dielectric compound.

3.7 DISSIMILAR METALS

A. Underground Dissimilar Piping: Install electrically isolated joints for new and existing steel piping, except valves. Coat insulating joint and pipe with sealing and dielectric compound for a minimum distance of 10 pipe diameters on both sides of joint.

B. Underground Dissimilar Valves: Coat dissimilar ferrous valves and pipe with sealing and dielectric compound for a minimum distance of 10 pipe diameters on both sides of valve.

C. Aboveground Dissimilar Pipe and Valves: If dissimilar metal pipe joints and valves are not buried and are exposed only to atmosphere, coat connection or valve, including pipe, with sealing and dielectric compound for a minimum distance of three pipe diameters on both sides of junction.

3.8 RECONDITIONING OF SURFACES

A. Sod Restoration: Restore grass and lawn surfaces disturbed during installation of anodes and wires to their original elevation and condition. Preserve sod and topsoil and replace after backfilling is completed. If surface is disturbed in a newly seeded area, re-seed area with same quality and formula of seed as that used in original seeding.

B. Pavement Restoration: Repair pavement, sidewalks, curbs, and gutters if removed or disturbed during construction. Saw cut pavement edges. Graded aggregate base course shall have a maximum aggregate size of 1-1/2 inches. Before paving, prime base course with liquid asphalt, Grade RC-70, complying with ASTM D 2028.

1. Match base course to existing thickness, but not less than 6 inches.
2. Asphalt Aggregate Size: 1/2 inch.
3. Asphalt Cement: Comply with ASTM D 3381, Grade AR-2000.
4. Match asphalt concrete to existing thickness, but not less than 2 inches.
5. Repair portland cement concrete pavement, sidewalks, curbs, and gutters using 3000-psi concrete, complying with Division 3 Section "Cast-in-Place Concrete." Match existing pavement, sidewalk, curb, and gutter thicknesses.

3.9 IDENTIFICATION

A. Identify test station as indicated on Shop Drawings.

3.10 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

B. Testing: Perform the following field quality-control testing under the supervision of a qualified corrosion technician:

1. Static Pull Test: Choose, at random, one completed anode of each type for this destructive test. Demonstrate that anode wire connections have enough strength to withstand a minimum tensile load of 300 lb. If test fails, replace all anodes and repeat test at another randomly selected anode.
2. Insulation Testing: Before anode system is connected to pipe, test insulation at each insulating joint and fitting. Demonstrate that no metallic contact, or short circuit, exists between the two insulated sections of pipe and tank. Replace defective joints or fittings.
3. Baseline Potentials: After backfilling of pipe anodes is completed, but before anodes are connected to pipe, measure the static potential of pipe to soil. Record initial measurements.

4. Anode Output: Measure electrical current as anodes or groups of anodes are connected to pipe. Use a low-resistance ammeter. Record current, date, time, and location of each measurement.
5. Pipe-to-Reference Electrode Potential Measurements: On completion of installation of entire cathodic protection system, make electrode potential measurements using a copper/copper-sulfate reference electrode and a potentiometer-voltmeter, or a dc voltmeter with an internal resistance (sensitivity) of not less than 100,000 ohms per volt and a full scale of 1 or 2 V. Make measurements at same locations as those used for baseline potentials. Record voltage, date, time, and location of each measurement.

C. Location of Measurements for Piping: For coated piping or conduit, measure from reference electrode in contact with the earth directly over pipe. Measure at intervals not exceeding 400 feet. Make additional measurements at each distribution service riser, with reference electrode placed directly over service line.

D. Location of Measurements for Tanks: For underground tanks, measure from reference electrode located as follows:

1. Directly over center of tank.
2. At a point directly over tank and midway between each pair of anodes.
3. At each end of tank.

E. Interference Testing: Test interference with cathodic protection from any foreign pipes in cooperation with Owner of foreign pipes. Report results and recommendations.

3.11 ADJUSTING

A. Adjust cathodic current using resistors as recommended by Corrosion Engineer.

B. During one year after Substantial Completion, test, inspect, and adjust cathodic protection system every three months to ensure its continued compliance with specified requirements.

3.12 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain cathodic protection system.

1. Train Owner's maintenance personnel on procedures for troubleshooting and replacing anodes.
2. Review data in maintenance manuals. Refer to Division 1 Section "Operations And Maintenance Manuals."

3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 13110

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DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13910 - FIRE SPRINKLERS AND STANDPIPE

PART 1 - GENERAL

1.1 SCOPE

A. Furnish and install an automatic sprinkler and dry standpipe system to protect all areas of Building 737 as indicated herein and as shown on the Drawings. Connect system to a water supply of sufficient pressure to ensure full and sustained water discharge immediately from sprinkler heads when opened by fire at rated heat temperatures. Water supply shall conform to NFPA water supply requirements and MIL-HDBK 1008C, Chapter 5 with considerations given to the reliability of the public water supply, taking into account probable minimum pressure conditions. The Contractor shall verify site water pressure before submitting shop drawings.

B. All portions of the systems shall be installed in accordance with the drawings, details, and specifications and as required by jurisdictional authorities and codes. Jurisdictional authorities and codes shall take precedence over plans, details and specifications in the event of a dispute between the requirements of contract documents and jurisdictional authorities or codes.

C. The position is taken that the Government is entitled to a project which meets or exceeds the minimum requirements of nationally recognized fire protection standards. All efforts and installations shall be directed toward this end. Where there is conflict between the Contract Drawings and/or Specifications, and the recommendations of the jurisdictional authorities, the conflict shall be brought to the attention of the Contracting Officer at least ten (10) days prior to bidding or be resolved at no cost to the Government.

D. The intent of these specifications is to describe the complete systems to be installed, including minor details of work or materials not specifically mentioned or shown, but necessary for the successful operation and completion of the installation.

E. Work to be performed under this section shall include, but not be limited to the following:

1. Automatic fire sprinkler systems.

a. Pipe and fittings.
b. Hangers and supports.
c. Earthquake bracing.
d. Valves.
e. Alarms.

f. Flow Switches.
g. Specialties.

2. Partial Class I Dry Standpipe

a. Pipe and fittings.
b. Hangers and supports.
c. Earthquake bracing.
d. Valves.
e. Specialties.

F. The following areas shall be furnished with automatic fire protection system of type or types as required:

1. All residential areas of building per residential requirements of NFPA #13R.
2. All common areas, corridors, storage rooms, and mechanical areas of the building per residential requirements of NFPA.
3. Dry standpipe in center stair tower.

1.2 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary conditions and other Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere:

Water Distribution	Section 02510
Fire Alarm	Section 13851

C. Examine the above referenced specification parts thoroughly before submitting a proposal for accomplishment of work in this section.

D. Recycling Initiative: The Contractor shall provide recycled products specified in this Section to the extent obtainable in accord with the provisions of executive Order 13101, the requirements specified in Section 01000, and the Specification requirements of this Section. If conflicts exist between the products specified in this Section and the recycled product, the Contractor shall provide a recycled product that most nearly matches the salient features of the specified product.

1.3 REGULATORY AGENCIES

A. The term jurisdictional authority used in this section of the specification shall include, as applicable, but not be limited to the following:

1. Malmstrom Air Force Base Assistant Chief of Fire Prevention.
2. Contracting Officer.

B. The design and installation of all systems of fire protection shall conform to all requirements of applicable codes and publications herein defined:

1. Uniform Building Code (1997)
2. Uniform Fire Code (1997)
3. NFPA #13 (1999)
4. NFPA #13R (1999)
5. NFPA #14 (2000)
6. All State and local ordinances
7. Underwriters' Laboratories
8. American Society of Testing Materials
9. American National Standards Institute
10. Occupational Safety and Health Administration

1.4 SUBMITTALS

A. The successful Contractor shall provide submittal data as required under other portions of this specification. Submittals shall conform to the instructions set forth in the General and Special Conditions of these specifications entitled Shop Drawings and Submittals.

B. Submit shop drawings (floor plans - detailed working drawings), showing dimensions, ducts, lights, or other items affecting the fire protection systems to jurisdictional agencies for review and approval. All items identified in NFPA #13 and NFPA #14 for proper working drawings shall be complied with. The Contracting Officer will reject all submittals not in compliance. Submit four (4) sets of shop drawings to Contracting Officer for review. These final acceptance sets shall have all agency`s stamps of review and acceptance.

C. Shop drawings shall be prepared in Auto CADD Release 2000 or compatible software.

D. Contracting Officer's review will be for general location only. It will be the Contractor's responsibility to check his drawings for interferences and to do shop fabrication from measurements taken at the job site.

E. Work on the project shall not begin until plans have been reviewed by the Contracting Officer.

F. Four (4) sets of full catalog information shall be submitted for approval for all materials provided.

G. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

1.5 JOB CONDITIONS

A. The Contractor shall investigate the structural, mechanical, electrical, and finished conditions affecting the piping, and shall arrange the equipment accordingly; furnishing required fittings, offsets and accessories. Route fire protection piping to avoid interference with ductwork and drain piping. In the event it becomes necessary to make field changes in pipe locations due to building construction, the Contractor shall consult with the Contracting Officer before making any changes. Any such changes required shall be made without added cost to the Government.

B. The Contractor shall determine, and be responsible for, the proper locations and type of inserts for hangers, chases, sleeves, and other openings in the construction required for fire protection work, and shall obtain this information well in advance of the construction progress to avoid delay of the work.

C. The drawings indicate approximate locations of sprinkler heads, hose valves and conceptual routing of piping. Contractor is responsible for final locations and routing.

D. All installers shall be competent and shall hold an endorsement by the State of Montana. Prior to beginning Work, current Contractors and Installers licenses and endorsements shall be on file with the Department of Commerce, Professional and Occupational Licensing Bureau, 301 South Park, P.O. Box 200513, Helena, MT 59620-0513. Copies of licenses shall be submitted to the Contracting Officer and Base Fire Prevention Officer (341 CES/CEFT) for approval prior to installation of any Work.

E. Fire Protection Contractors may be required to provide in writing, specific information as to successfully completed projects and references to show cause as to why they should be considered acceptable to the Contracting Officer.

1.6 RECORD DRAWINGS

A. One approved set of drawings shall be maintained on the job at all times.

B. One reproducible set of As-Built drawings shall be provided to the Contracting Officer upon completion of the work.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Four (4) sets of operating and maintenance instructions shall be provided the Government upon completion. Manuals shall include, as a minimum, the following:

1. As-Built Drawings
2. NFPA #25
3. Catalog cut sheets of all materials installed
4. Equipment maintenance manuals
5. Acceptance Test Certificate
6. As-Built Auto CADD drawing (.dwg) file or equal As-Builts on 3.5" disk

1.8 TRAINING

A. The Fire Protection Contractor shall instruct the Government in the operation of the systems. Instruction shall continue until the Government is fully satisfied that they understand the operation of the system.

B. Training sessions shall be scheduled on two different days and at different times to accommodate the base Civil Engineering Plumbing Shop personnel. Coordinate training times with the Civil Engineering Shop supervisor.

1.9 GUARANTEES AND WARRANTIES

A. The Fire Protection Contractor shall guarantee to the Government in writing, all equipment and workmanship for a period of one (1) year after the fire protection system has been placed in continuous service and has been accepted by all authorities having jurisdiction.

B. The Fire Protection Contractor shall not be held responsible for improper or negligent maintenance by the Government after operating and maintenance indoctrination has been given the Government.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements. Provide products by one of the following or an equal approved by Contracting Officer.

2.2 SPRINKLERS

A. Acceptable Manufacturers

1. Central
2. Gem
3. Viking
4. Reliable
5. Or other equal manufacturer.

B. Install sprinklers from reviewed shop drawings.

C. All sprinklers shall be of similar design and from a single manufacturer.

D. The operating temperature of sprinklers shall be as required by the specific location of installation.

E. Sprinkler heads shall conform to the following schedule:

1. Brass upright or pendent may be used in all attic, mechanical, storage or other non-public spaces.
2. White recessed shall be used in all finished areas, offices, etc. Where surface mounted obstructions will not allow for flush installation, additional sprinklers shall be installed as required by NFPA or U.L. listing.
3. White pendent sprinklers with two piece escutcheons may be used as indicated on plans.
4. Sidewall sprinklers may be used when in accordance with all jurisdictional requirements.
5. All sprinklers shall be glass bulb quick-response type.

2.3 HOSE VALVES

A. ACCEPTABLE MANUFACTURERS

1. Potter-Roemer
2. Croker
3. Standard
4. Or other equal manufacturer

B. Provide 2 ½" hose valves with 2 ½" NPT female inlet and 2 ½" male NSHT outlet complete with 2 ½" x 1 ½" hose thread reducer and 1 ½" cap and chain.

C. Hose valves shall be installed 4'0" above floor at primary stair landings as noted on plans.

D. Finish shall be polished brass.

2.4 PIPE AND FITTINGS-INTERIOR

A. Interior piping for automatic sprinkler system shall conform to NFPA #13 and as follows.

B. Sprinkler piping above ground with threaded fittings shall be Schedule 40, Dyna Thread or equal black steel pipe with a corrosion resistance rating equal or greater than 1.0.

C. Sprinkler piping above ground with grooved fittings for sizes 2-1/2-inch and larger shall be Schedule 10, Dyna Flow or equal black steel pipe.

D. Fittings for threaded and coupled pipe shall consist of cast iron or malleable threaded fittings joined with Teflon tape thread sealing compound or pipe joint compound. Pressure rating of fittings shall be as required for application.

E. Fittings for grooved end pipe shall consist of Central or equal couplings and fittings in accordance with NFPA #13.

F. Fittings for plain end pipe shall consist of Victaulic or equal couplings and fittings in accordance with NFPA #13.

G. Threaded thin wall pipe with a corrosion resistance rating less than 1.0 shall not be used.

H. Concealed piping which is properly protected per code and listing requirements may be CPVC plastic with solvent welded fittings. Exposed CPVC shall not be allowed.

I. Alternate piping systems approved by NFPA #13 may be allowed with prior approval of the Contracting Officer.

2.5 HANGERS AND SUPPORTS

A. Space pipe hangers in accord with the requirements of NFPA. Construct hangers, hanger rods, inserts and clamps as approved by the same.

2.6 EARTHQUAKE BRACING

A. Furnish and install all earthquake bracing as specified in NFPA for seismic Zone 4.

2.7 VALVES

A. Acceptable Manufacturers

1. Kennedy
2. Mueller
3. Stockham
4. Nibco
5. Central
6. Or other equal manufacturer

B. Valves shall be approved indicating type as required by the Underwriters' Laboratories and NFPA. Check valves shall be as required by NFPA. Test and drain valves shall be approved brass globe or angle valves. Locate sprinkler system isolation valves as shown on the drawings complete with a tamper alarm.

C. Interior

1. Interior Gate

Make:	Nibco
Sizes:	2 ½"
Ends:	Flanged
Model:	F-607-OTS

2. Ball Valve

Make:	Central
Sizes:	¼" to 2"
Ends:	Threaded
Model:	F19

3. Check Valves

Make:	Central
Sizes:	2 ½" thru 4"
Model:	590F
Ends:	Grooved

4. Drain Valves Interior

Make:	Central
Sizes:	½" through 2"
Model:	F15 and F16
Ends:	Screwed

5. Test N Drain

Make:	AGF
Sizes:	1" - 2"
Model:	1011
Ends:	Screwed

2.8 BACKFLOW PREVENTION DEVICES

A. Acceptable Manufacturers

1. Febco
2. Ames
3. Watts
4. Or other equal manufacturer

B. Install new backflow prevention devices as shown on drawings.

C. Devices shall be UL or FM approved.

2.9 FIRE DEPARTMENT CONNECTIONS

A. Acceptable Manufacturers

1. Potter Roemer
2. Croker
3. Or other equal manufacturer

B. Furnish and install where shown on plans free standing fire department connections, complete with clapper, plugs and chains.

C. Finish shall consist of polished brass.

D. Connections shall be set 2'-6" above grade.

E. Connections for sprinkler system shall be indexed "auto spklr". The indexing shall be "cast in" by the manufacturer. Required indexing shall be permanently installed directly above the connection.

F. Connection shall be complete with interior independent self-closing clapper valves, brass plugs, and chain and shall have threads to meet the local fire department requirements. Provide an automatic ball-drip.

2.10 HOSE VALVE CABINETS

A. ACCEPTEBLE MANUFACTURERS

1. Potter Roemer
2. Larsens
3. Croker
4. Badger-Powhattan
5. Or other equal manufacturer

B. Furnish and install where shown on plans or as specified herein, the following cabinets as scheduled.

C. Cabinet Schedule

Make: Potter Roemer with deep can.

Type	Model	Trim
Surface	1815-RR-F	Steel w/solid door

D. All cabinets shall consist of primed steel trim and shall be furnished under this contract.

2.11 SPECIALTIES

A. Sleeves and Seals

1. Where piping passes through walls, floors or other building construction which by code requires a fire rating, sleeves or approved fire rated assemblies shall be used. Proposed protection shall be submitted for approval.

B. Escutcheon Plates

1. Where exposed piping passes through finish work, chrome plated or other finish acceptable to the Contracting Officer shall be installed. Split wall plates or escutcheons shall be installed to fit snugly around piping. Split wall plates shall be metal.
2. Solid galvanized wall plates shall be used at both sides of all exterior walls. All piping down-stream of drain and check valves shall be galvanized to exterior.

C. Valve Identification

1. All valves within the building shall have permanently marked identification signs provided in accordance with NFPA standards.

D. Spare Head Supply

1. Furnish and install a supply of extra sprinklers of each type and degree link installed in the project, complete with mountable box, mount box on wall next to sprinkler entry, provide wrenches for each type of sprinkler installed in box.

2.12 ELECTRICAL DEVICES

A. All electrical devices shall be coordinated with Electrical (Division 16) and Fire Alarm (Section 13851) requirements for compatibility of voltages and manufacturer.

B. Flow Switch

1. Potter VSR-F or equal
2. Potter VSR-SF
3. Or other equal manufacturer

C. Tamper Switch

1. Potter OSYSU-2
2. Potter PCVS
3. Potter RBVS
4. Or other equal manufacturer

2.13 ALARM DEVICES

A. Audio/Visual Alarm Indicating Appliances

1. Audio/Visual units shall provide a common enclosure for the fire alarm audible and visual alarm devices. The housing shall be designed to accommodate either horns, bells, or chimes. The unit shall be complete with a tamper resistant, Pyramidal shaped lens with "Fire" lettering visible from a 180° field of view. Integral Xenon strobe shall provide a minimum light output of 4.5 candela at 24VDC at a 45 flashes per minute rate. Xenon strobes shall provide a 4-wire connection to insure properly supervised in/out system connection. Unit shall be complete with all mounting hardware including backbox.

PART 3 - EXECUTION

3.1 DESIGN CRITERIA

A. Approximate sprinkler head and hose valve arrangement is indicated on the drawings.

B. The fire protection system supplier shall design the piping to supply the system. Piping shall be laid out so as not to interfere with the installation of other piping, ductwork or light fixtures.

C. The entire fire protection system is not shown on plans. The intent is to provide complete fire protection systems as required. This Contractor shall be responsible for surveying the site, existing construction, and new construction, and prepare working drawings for the total system.

D. All piping shall be run concealed wherever possible. Where piping is run exposed, special notation on Contractor's drawings to that effect shall be evident and conspicuous on the drawings. Any piping determined to be a problem shall be relocated at no cost to the Government.

E. System piping to be hydraulically calculated including system riser and fire pumper connection in accordance with NFPA #13.

F. The preparation of all shop drawings and hydraulic calculations shall be accomplished and stamped by a Registered Professional Engineer, competent in fire protection. Review by a Professional Engineer is not acceptable.

3.2 INSTALLATION

A. Furnish sprinkler system with the following components:

1. Systems shall be equipped with a supervised isolation valve and an approved flow alarm connected to the building fire alarm system.
2. A Fire Department connection shall be installed above the isolation valve complete with its own check valve and ball drip.
3. A main drain shall be installed on each riser or sectional zone control valve and shall drain to the exterior or to an adequate drain connection.
4. Auxiliary drains shall be provided when a change in piping direction prevents drainage of sections of branch lines or mains thru the main drain valve.
5. A test pipe of not less than 1" diameter terminating in an orifice equivalent to one sprinkler shall be provided for each system or sectional zone.
6. Exterior alarm shall be installed as near as practical to Fire Department connection with identification sign. Exterior horn/strobe shall be wired to alarm switch.

B. Where details of installation are not given, the installation shall be made using manufacturer's recommended practices or at the direction of the Contracting Officer.

C. Contractor shall complete the fire protection systems ready for operation, in all respects, as soon as possible. When system is complete and ready for continuous operation, activate the system for it's intended use. After system has been activated for continuous use, water charges will be paid by the Government.

D. This Contractor shall call for inspection and obtain Certificate of Completion and Test from the Contracting Officer.

E. This Contractor shall remove from the building, all rubbish and unused materials due to or connected with this installation.

F. The surface of all piping shall be cleaned and left ready for painting.

3.3 TESTING

A. The entire sprinkler system shall be hydrostatically tested at not less than 200 psig pressure for a period of not less than two (2) hours with no pressure drop in the system.

B. All testing shall be witnessed by the Contracting Officer.

C. Furnish copies of Underground and Aboveground Test Certificates to the Contracting Officer and 341 CES/CEFT Fire Protection Office.

END OF SECTION 13910

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DIVISION 15 - MECHANICAL

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Equipment installation.
3. Painting and finishing.
4. Concrete bases.
5. Erection of metal supports and anchorage.
6. Demolition.
7. Cutting and patching.
8. Access panels and doors.
9. Dielectric fittings.

B. Pipe and pipe fitting materials are specified in piping system Sections.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the “Quality Assurance” Section.

C. Product data for the following:

1. Dielectric fittings.

1.4 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "GENERAL REQUIREMENTS". In addition to the requirements specified in Division 1, indicate the following installed conditions:

1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Refer to Division 15 Section "Mechanical Identification". Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Contract Modifications, actual equipment and materials installed.

1.5 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 Section "GENERAL REQUIREMENTS". In addition to the requirements specified in Division 1. Assemble O & M Manuals as follows:

1. Compile three copies of Operating and Maintenance Manuals for the mechanical systems and equipment. The manuals shall be provided to the Contracting Officer for approval complete and at one time, prior to requesting final payment. Partial or separate data will be returned for completion.
2. Manuals shall be assembled in three-ring binder(s). Binders shall be 3 inches thick or less and more than one binder shall be used for each set of data if required to prevent overfilling of one binder. All information shall be arranged in sections and each section shall have a blank buff colored, heavy paper divider with a protruding tab clearly labeled. Sections shall be arranged in the same order that the equipment is listed in the specification and each Specification Section shall have a separate tab. Shop drawings which are larger than 8-1/2 inches x 11 inches shall be individually folded so they are 8-1/2 inches x 11 inches or less and inserted behind the appropriate tab.
3. Tabs shall be labeled and arranged as follows:

a. Index: Furnish under the first tab an index of sections listing name of Section and Specification numbers.
b. Equipment Manufacturers: Furnish under the second tab a complete typed list of equipment suppliers and manufacturers representative including type of equipment, name, address and phone number. The company listed here

should be the one which could furnish replacement parts and offer technical information about the equipment.

c. Valve Directory: Furnish under this tab a typed copy of the valve schedule required under Specification Section 15075.

d. Product Literature: Each tab, starting with the fourth shall contain the name of a Specification Section. Behind each tab shall be the previously submitted and approved shop drawing, factory published operation and maintenance instructions and parts lists.

4. Upon completion and approval of the booklets, one copy shall be given to the Contracting Officer, and two to the Government. Using the booklet, the Mechanical Contractor shall explain in detail and instruct the Government's operating personnel in the correction operation and maintenance of the equipment.

1.6 QUALITY ASSURANCE

A. Qualify welding processes and operators for piping according the ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".

1. Comply with provisions of ASME B31 Series "Code for Pressure Piping".
2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.

B. Equipment Selection: Equipment of greater or larger powers, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate connection of electrical services.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."

1.9 GENERAL PROVISIONS FOR MECHANICAL WORK

A. Interferences: Project design took into account potential interferences between trades (e.g. mechanical ductwork with piping or with electrical light fixtures), however, not every interference has been eliminated. It shall be the responsibility of the bidder and potential Contractor to field verify all mechanical piping and duct routing, making allowances for existing beams, pipes, ducts, hangers, and other obstructions. Provide HVAC duct offsets and transitions as required maintaining duct aspect rations within 10 percent of design to provide a complete working system. The cost associated with interferences shall be included in the Base Bid.

B. Examination of Project Drawings:

1. The Drawings (plans, elevations, flow schematics, etc.) for the mechanical work are intended to convey scope of work and to indicate the general arrangements and locations of end-use equipment, systems, etc., and the approximate sizes thereof.
2. It should be understood that the Contractor shall determine the exact location and mounting heights of equipment, rough-ins, and the exact routing and positioning of piping/ductwork so as to best fit the layout of the job. Scaling of the Drawings

will not be sufficient or accurate for determining these locations. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Government.

3. Because of the scale of the Drawings, certain basic items/materials and quantities thereof, (e.g. fittings, connectors, flanges, unions, pipe wells, couplings, hangers, sleeves, clamps, screws, hooks, inserts, pipe/duct mounted - meters, gauges, sensors, etc.) may not be shown, but where such items are required by other sections of the Specifications or where they are required for proper installation of the work, such items shall be furnished and installed and the cost thereof, reflected in the base bid.
4. The determination of quantities of HVAC and plumbing end-use systems and equipment required shall be made by the Contractor from the Drawings. Interferences and quantities and locations of basic items/materials may not be indicated on the Drawings and will require field verification and determination by the Contractor.
5. It shall be the responsibility of the Contractor to coordinate the location and method of support of the piping/duct systems with that of all installations under other Divisions and Sections of the Specifications.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refer to individual Division 15 piping Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. ASME B16.20 for grooved, ring-joint, and steel flanges.

C. High Temperature Heating System: Pipe Flange gasket materials suitable for chemical and thermal conditions of piping system contents.

1. Metal spiral would gasket.

a. Class 600 suitable for temperatures up to 500 deg F.

D. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

E. Solder Filler Metals: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.3 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type where required to conceal protruding fittings and sleeves.

1. Inside Diameter: Closely fit around pipe, tube, and insulation.
2. Outside Diameter: Completely cover opening.
3. Cast Brass: One-piece, with set-screw, polished chrome plate.
4. Cast Brass: Split casting, with concealed hinge, set-screw or spring clips, and chrome-plated finish.
5. Cast-Iron Floor Plate: One-piece casting.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.

1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
2. Insulating Material: Suitable for system fluid, pressure, and temperature.
3. Dielectric Couplings: Galvanized-steel coupling, having inert and noncorrosive, thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 deg F temperature.
4. Dielectric Nipples: Electroplated steel nipple, having inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig working pressure at 225 deg F temperature.

5. Dielectric Flanges: Factory-fabricated, companion flange assembly, for 150, 300 or 600 psig minimum working pressure as required to suit system pressures.

C. Mechanical Sleeve Seals: Modular, watertight mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber sealing elements to expand when tightened.

D. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet-Metal: 24 gauge or heavier galvanized sheet metal, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.

2.4 ACCESS PANELS AND DOORS

A. Mechanical Contractor to provide access doors in walls or ceilings in order to provide access to concealed mechanical devices. Refer to drawings for locations and specifications.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, unless piping Sections specifies otherwise. Individual Division 15 piping Sections specifies unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

C. Flush all piping after installation and before filling.

D. Install piping at indicated slope.

E. Install components with pressure rating equal to or greater than system operating pressure.

F. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

G. Install piping free of sags and bends.

H. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

I. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
2. Wall Escutcheons for Piping in Finished Areas: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
3. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

N. Sleeves are not required for core drilled holes.

O. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

P. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than 6 inch NPS.

Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1 inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

S. Verify final equipment locations for roughing-in. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
4. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter.
5. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
6. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

U. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2 inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2 inch NPS or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Contracting Officer.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

3.3 PAINTING AND FINISHING

A. Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000 psig, 28-day compressive-strength concrete and reinforcement.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.6 DEMOLITION

A. Disconnect, demolish, and remove Work specified in Division 15 Sections.

B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.

E. Removal: Remove indicated equipment from Project site.

F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

G. Ownership: Removed equipment, materials, etc., shall be the property of the Government at its option. Items that the Government chooses to retain shall be moved by the Contractor to a secure location within the construction site designated by the Government. Items the Government doesn't want shall be moved off site by the Contractor and legally disposed of.

3.7 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.8 ACCESS PANELS AND DOORS

A. Mechanical Contractor shall furnish and install access panels and doors required for access to, but not limited to, the following: fire dampers, smoke dampers, fire/smoke dampers, valves, accessories, meters, gauges and similar items requiring periodic maintenance or replacement. Access panels and doors shall comply with fire protection ratings indicated on architectural Drawings. Access panels and doors to be installed so they will open completely without obstruction.

END OF SECTION 15050

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes mechanical identification materials and devices.

1.2 QUALITY ASSURANCE

A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

A. General: Products specified are for applications referenced in other Division 15 Sections. If more than single type is specified for listed applications, selection is Installer's option, but provide single selection for each product category.

B. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.

1. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
2. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.
3. Lettering: Manufacturer's standard preprinted captions as selected by Contracting Officer.
4. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.

C. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils thick.

1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

D. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.

1. Material: 0.032-inch- thick, polished brass.
2. Size: 1-1/2-inches diameter, unless otherwise indicated.
3. Shape: As indicated for each piping system.
4. Fasteners: Brass, wire-link chain; beaded chain; or S-hooks.

E. Access Panel Markers: 1/16-inch- thick, engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve. Provide 1/8-inch center hole for attachment.

F. Valve Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include screws.

1. Frame: Finished hardwood or extruded aluminum.
2. Glazing: ASTM C 1036, Type I, Class 1, Glazing quality B, 2.5-mm, single-thickness glass.

G. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: 1/8 inch.
3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

H. Provide a laminated copy of the controls schematic diagram to hang on the mechanical room wall.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems. Install on pipe insulation segment where required for hot non-insulated pipes. Fasten markers on pipes smaller than 6 inches by snap-on application of pre-tensioned semi-rigid plastic pipe marker or taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2-inch wide, lapped 3-4 inches minimum at both ends of pipe marker, and covering full circumference of pipe. Fasten markers on pipes 6 inches and larger taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 2-1/2-inches wide, lapped 1-1/2 inches minimum at both ends of pipe marker, and covering full circumference of pipe or strapped to pipe (or insulation) with manufacturer's standard stainless steel bands.
2. Locate pipe markers and color bands as follows wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations. No identification required on sanitary waste and vent piping.

    a. Near each branch connection, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
    b. Near penetrations through walls, floors, ceilings, or enter non-accessible enclosures.
    c. At access doors, manholes, and similar access points that permit view of concealed piping.
    d. Near major equipment items and other points of origination and termination.
    e. Spaced at a maximum of 50-feet intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
    f. On piping above removable acoustical ceilings, at 50-feet maximum spacing.

B. Valve Tags: Install valve tag on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shut-off valves, faucets, convenience and lawn-watering hose bibbs, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule with headings "Tag ID," "Location," "Service," "Valve Type," "Valve Size," "Normal Position."

C. Valve Schedule: Provide Valve Schedule in frame. Type data for each valve. Include framed Drawings with reduced building plans and piping diagrams having valves keyed back to Valve Schedule. Use multiple schedules and frames as needed in each mechanical room.

1. List tagged valves in Valve Schedule with headings “TAG ID”, “LOCATION”, “SERVICE”, “VALVE TYPE”, “VALVE SIZE”, and “NORMAL POSTION”.
2. Install mounted Valve Schedule in each major equipment room.

D. Equipment: Install engraved plastic laminate signs or equipment markers on or near each major item of mechanical equipment. Provide signs for following general categories of equipment: boilers, furnaces, heaters, pumps, compressors, chillers, condensers, heat exchangers, cooling towers, heat recovery units, fans, variable volume units, packaged HVAC central-station and zone-type units, tanks and pressure vessels, filters, humidifiers and water treatment systems.

END OF SECTION 15075

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15110 - VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general duty valves common to several mechanical piping systems.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Where possible, provide valves from a single manufacturer.

B. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.

C. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements. Provide products by one of the following or an equal approved by Contracting Officer:

1. Gate Valves – High Temperature Heating System:

a. Crane Company; Valves and Fitting Division.
b. Hammond Valve.
c. Milwaukee Valve Company, Inc.
d. Newco
e. NIBCO Inc.
f. Powell: Wm. Powell Company (The).
g. Stockham Valves & Fittings, Inc.
h. Watt Industries, Inc.

2. Globe Valves-High Temperature Heating System:

a. Crane Company; Valves and Fitting Division.
b. Hammond Valve.
c. Milwaukee Valve Company, Inc.
d. Newco
e. NIBCO Inc.
f. Powell: Wm. Powell Company (The).
g. Stockham Valves & Fittings, Inc.

3. Ball Valves:

a. Conbraco Industries, Inc.; Apollo Division.
b. Milwaukee Valve Company, Inc.
c. Hammond Valve.
d. Stockham Valves & Fittings, Inc.
e. Victaulic Company of America.
f. NIBCO, Inc.
g. Watts Industries, Inc.

4. Globe Valves:

a. Crane Company; Valves and Fitting Division.
b. Hammond Valve.
c. Milwaukee Valve Company, Inc.
d. NIBCO Inc.

e. Powell: Wm. Powell Company (The).
f. Stockham Valves & Fittings, Inc.

5. Butterfly Valves:

a. Crane Company; Valves and Fitting Division.
b. General Signal; DeZurik Unit.
c. Grinnell Corp.
d. Hammond Valve.
e. Keystone Valve USA, Inc.
f. Line, Mark Controls Corporation.
g. Milwaukee Valve Company, Inc.
h. NIBCO Inc.
i. Stockham Valves & Fittings, Inc.
j. Victaulic Company of America.

6. Swing Check Valves:

a. Cla-Val Co.
b. Crane Company; Valves and Fitting Division.
c. Hammond Valve Corporation.
d. Kitz Corp. of America.
e. Lunkenheimer/Cincinnati Valve Co.
f. Milwaukee Valve Company, Inc.
g. NIBCO Inc.
h. Powell: Wm. Powell Company (The).
i. Red-White Valve Corp.
j. Stockham Valves & Fittings, Inc.
k. Victaulic Company of America.

7. Globe Style Check Valves

a. Conbraco Industries.
b. Metraflex Company.
c. Milwaukee Valve Co.
d. NIBCO, Inc.

2.2 BASIC, COMMON FEATURES

A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.

1. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.

B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Use specified operators and handwheels, except provide the following special operator features:

1. Handwheels: For valves other than quarter turn.
2. Lever Handles: For quarter-turn valves 6 inches and smaller, except for plug valves, which shall have square heads.
3. Chain-Wheel Operators: For valves 4 inches and larger, installed 96 inches or higher above finished floor elevation.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. Threads: ASME B1.20.1.

H. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves. Provide Class 600 flanges for high temperature valves.

2.3 GATE VALVES – HIGH TEMPERATURE HEATING SYSTEM

A. Gate Valves 3 Inches and Smaller: MSS-ASTM A 216; Class 600, 1200 psi pressure at 500 deg F. Cast steel body and bonnet and forged stem. Tested to comply with ANSI B16.34, API 800 and API 598. Class 600 flanged connections.

2.4 GLOBE VALVES – HIGH TEMPERATURE HEATING SYSTEM

A. Globe Valves 3 Inches and Smaller: MSS-ASTM A 216; Class 600, 1200 psi pressure at 500 deg F. Cast steel body and bonnet and forged stem. Tested to comply with ANSI B16.34, API 800 and API 598. Class 600 flanged connections.

2.5 BALL VALVES

A. Ball Valves, 2 Inches and Smaller: MSS SP-110, Class 150, 600 psi CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch valves and smaller and conventional port for 3/4-inch valves and larger; blowout proof; bronze or brass stem; Teflon seats and seals.

1. Operator: Vinyl-covered steel lever handle.
2. Stem Extension: For valves installed in insulated piping.

B. End Connection: Threaded.

2.6 GLOBE VALVES

A. Globe Valves, 2 Inches and Smaller: MSS SP-80; Class 125, 200 psi CWP, or Class 150, 300 psi CWP; ASTM B 62 cast-bronze body and screwed bonnet, rubber, bronze, or Teflon disc, silicon bronze-alloy stem, Teflon-impregnated packing with bronze nut, and with aluminum or malleable-iron handwheel. End Connection: Threaded.

B. Globe Valves, 3 Inches and Larger: MSS SP-85, Class 125, 200 psi CWP, ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, Teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

2.7 BUTTERFLY VALVES

A. Butterfly Valves: MSS SP-67, 200 psi CWP, 150 psi maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steel stem, EPDM sleeve and stem seals, wafer, lug, or grooved style:

1. Disc Type: Nickel-plated ductile iron for HVAC and plumbing.
2. Operator for Sizes 2 Inches to 6 Inches: Lever handle with latch lock.
3. Operator for Sizes 8 Inches to 24 Inches: Gear operator with position indicator.

B. Valves shall be capable of bubble-tight dead-end shut-off at full rated pressure without the need of a downstream blind flange.

2.8 CHECK VALVES

A. Swing Check Valves, 2 Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, or Class 150, 300-psi CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded end connections.

B. Globe Check Valves: Class 125, 200-psi CWP, ASTM A 126 cast-iron body, bronze seat and plug, stainless steel spring. Flanged connections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION

A. Install valves as indicated, according to manufacturer's written instructions.

B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.

D. Locate valves for easy access and provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. For chain-wheel operators, extend chains to 60 inches above finished floor elevation.

H. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.

3.3 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.4 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

3.5 VALVE END SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2 Inches and Smaller: Threaded ends.
2. Steel Pipe Sizes, 2-1/2 Inches and Larger: Grooved end or flanged.

3.6 APPLICATION SCHEDULE

A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements.

B. Domestic Water Systems: Use the following valve types.

1. Ball Valves: Class 150, 600 psi CWP, with stem extension.
2. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or elastomer-coated ductile iron disc; EPDM or Buna N sleeve and stem seals.
3. Check Valves: Class 125, swing or wafer type as indicated.

C. Chilled-Water Systems: Use the following valve types:

1. Ball Valves: Class 150, 600-psi CWP, with stem extension and memory stop.
2. Butterfly Valves: Nickel-plated ductile iron, disc; EPDM sleeve and stem seals.
3. Check Valves: Class 125, bronze body swing check with rubber seat; Class 125, cast-iron body swing check; Class 125.

D. Low Temperature Heating Water Systems: Use the following valve types.

1. Ball Valves: Class 150, 600 psi CWP, with stem extension and memory stop.
2. Globe Valves: Class 150, bronze or cast-iron body to suit piping system, and bronze disc.
3. Butterfly Valves: Nickel-plated ductile iron or aluminum bronze EPDM or Buna N sleeve and stem seals.
4. Check Valves: Swing check shall be Class 150 with bronze seat ring.
5. Provide globe style check valve on pump discharge.

E. High Temperature Heating Water System

1. Gate Valves: Class 600 cast steel.
2. Globe Valves: Class 600 cast steel.

3.7 ADJUSTING

A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION 15110

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15135 - METERS AND GAUGES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes meters and gauges used in mechanical systems.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of meter, gauge, and fitting specified. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit a meter and gauge schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gauge.

1.4 QUALITY ASSURANCE

A. Comply with applicable portions of American Society of Mechanical Engineers (ASME) and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide one of the following products or an equal approved by Contracting Officer:

1. Direct-Mounting Filled-System Dial Thermometers:

    a. Ashcroft Instrument Div. of Dresser Industries.
    b. Marsh Instrument Co.
    c. H.O. Trerice Co.
    d. Weiss Instruments, Inc.
    e. Weksler Instruments Corp.

2. Pressure Gauges:

    a. Ashcroft by Dresser Industries, Instrument Div.
    b. Marsh Instrument Co.
    c. Marshalltown Instruments, Inc.
    d. H.O. Trerice Co.
    e. Weiss Instruments, Inc.
    f. Weksler Instruments Corp.

3. Test Plugs:

    a. Peterson Equipment Co., Inc.
    b. Sisco Co., Spedco, Inc.
    c. H.O. Trerice Co.
    d. Watts Regulator Co.

2.2 THERMOMETERS, GENERAL

A. Scale Range: Temperature ranges for services listed as follows:

1. Domestic Hot Water: 30 to 240 deg F, with 2-degree scale divisions.
2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.
3. Hot Water: 30 to 300 deg F, with 2-degree scale divisions.
4. Chilled Water: 0 to 100 deg F, with 2-degree scale divisions.
5. High Temperature Heating System: 30 to 600 deg F with 10 degree scale divisions.

B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.3 DIRECT-MOUNTING FILLED-SYSTEM DIAL THERMOMETERS

A. Description: Vapor-actuated universal-angle dial thermometer.

B. Case: Drawn steel or cast aluminum, with 4-1/2 inch diameter glass lens.

C. Adjustable Joint: Finish to match case, 180 degree adjustment in vertical plane, 360-degree (6.3-rad) adjustment in horizontal plane, with locking device.

D. Thermal Bulb: Copper with phosphor-bronze Bourdon pressure tube.

E. Movement: Brass, precision geared.

F. Scale: Progressive satin-faced nonreflective aluminum with permanently etched markings.

G. Stem: Copper-plated steel, aluminum, or brass for a separable socket of length to suit installation.

2.4 THERMOMETER WELLS

A. Description: Brass or stainless-steel thermometer well.

B. Pressure Rating: Not less than piping system design pressure.

C. Stem Length: To extend 2 inches into fluid.

D. Extension for Insulated Piping: 2 inches nominal, but not less than thickness of insulation.

E. Threaded Cap Nut: With chain permanently fastened to well and cap.

2.5 PRESSURE GAUGES

A. Description: ASME B40.1, Grade A phosphor-bronze Bourdon-tube pressure gauge, with bottom connection.

B. Case: Drawn steel, brass, or aluminum with 4-1/2 inch diameter glass lens.

C. Connector: Brass, 1/4-inch (DN 8).

D. Scale: White-coated aluminum, with permanently etched markings.

E. Accuracy: Plus or minus 1 percent of range span.

F. Range: 2 times operating pressure.

2.6 PRESSURE-GAUGE ACCESSORIES

A. Snubbers: 1/4-inch brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.7 TEST PLUGS

A. Description: Nickel-plated brass-body test plug in 1/2-inch fitting.

B. Body: Length as required to extend beyond insulation.

C. Pressure Rating: 500 psig minimum.

D. Core Inserts: 2 self-sealing valve types, suitable for inserting a 1/8-inch outside-diameter probe from a dial thermometer or pressure gauge.

E. Core Material: According to the following for fluid and temperature range:

1. Air and Water: Minus 30 deg to 275 deg F, ethylene-propylene-diene-terpolymer (EPDM) rubber.

F. Test-Plug Cap: Gasketed and threaded cap, with retention chain.

G. Pressure Gauge and Thermometer Ranges: Approximately 2 times systems operating conditions.

PART 3 - EXECUTION

3.1 METER AND GAUGE APPLICATIONS

A. General: Where indicated, install meters and gauges of types, sizes, capacities, and with features indicated.

3.2 METER AND GAUGE INSTALLATION, GENERAL

A. Install meters, gauges, and accessories according to manufacturers' written instructions for applications where used.

3.3 THERMOMETER INSTALLATION

A. Install thermometers and adjust vertical and tilted positions so as to be able to read from floor level.

B. Thermometer Wells: Install in vertical position in piping tees where thermometers are indicated.

1. Install wells with stem extending minimum of 2 inches into fluid.
2. Fill wells with oil or graphite and secure caps.

3.4 PRESSURE GAUGE INSTALLATION

A. Install pressure gauges in piping tee with pressure gauge valve located on pipe at most readable position so as to be able to read from floor level.

B. Pressure Gauge Needle Valves: Install in piping tee with snubber.

3.5 TEST PLUG INSTALLATION

A. Install test plugs in piping tees where indicated, located on pipe at most readable position. Secure cap.

END OF SECTION 15135

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15145 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical systems piping and equipment.

1.3 DEFINITIONS

A. Terminology used in this Section is defined in MSS SP-90.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of hanger and support.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.

1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

B. Thermal-Hanger Shield Inserts: 100-psi average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

C. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

2.2 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36 , steel plates, shapes, and bars, black and galvanized.

B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

C. Washers: ASTM F 844, steel, plain, flat washers.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in the Section specifying the equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.

C. Install supports with maximum spacings complying with MSS SP-69.

D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

E. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

H. Support fire protection systems piping independent of other piping.

I. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.

L. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated and for pipes supported by rollers. Fill interior voids with segments of insulation that match adjoining pipe insulation.
3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees and have dimensions in inches not less than the following:

NPS (Inches)	LENGTH (Inches)	THICKNESS (Inches)
1/4 to 3-1/2	12	0.048

4. Insert Material: Install inserts under protective shield with length at least as long as the shield.

5. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

B. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:

1. Obtain fusion without undercut or overlap.
2. Remove welding flux immediately.
3. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field- painted surfaces. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.7 HANGER SCHEDULE

Pipe Size	Pipe Material	Hanger Make and Model
1/2" - 4"	bare steel	Grinnell Fig 65
5" - 14"	bare steel	Grinnell Fig 260
1/2" - 12"	insulated steel-hot	Grinnell Fig 300
1/2" - 12"	insulated steel-cold	Grinnell Fig 300 w/inserts & shields
1/2" - 4"	bare copper	Grinnell Fig CT-99
1/2" - 4"	insulated copper-hot	Grinnell Fig CT-99
1/2" - 4"	insulated copper-cold	Grinnell Fig 300 w/inserts & shields
2" - 8"	cast iron sewer	Grinnell Fig 260 & shields

Note: Insulated cold pipes include chilled water, domestic cold water, refrigerant suction and other pipes operating below 50 deg F.

END OF SECTION 15145

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15181 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping systems for hot-water heating, chilled-water cooling, and makeup water for these systems; blowdown drain lines; and condensate drain piping. Piping materials and equipment specified in this Section include the following:

1. Pipes, fittings, and specialties.
2. Special-duty valves.
3. Hydronic specialties.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data including rated capacities of selected models, weights (shipping, installed, and operating), maintenance and operational data, furnished specialties, accessories, and installation instructions for each hydronic specialty and special-duty valve specified.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with the following provisions:

1. Fabricate and stamp air separators and compression tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
2. Welding Standards: Qualify welding processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Grooved Mechanical-Joint Fittings and Couplings:

a. Central Sprinkler Company; Central Grooved Piping Products.
b. Grinnell Corporation.
c. Victaulic Company of America.

2. Calibrated Balancing Valves (Circuit Setters):

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. ITT Bell & Gossett.
d. Taco, Inc.
e. Wheatley.

3. Safety Relief Valves:

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. Conbraco Industries, Inc.
d. ITT Bell & Gossett.
e. ITT McDonnell & Miller.
f. Taco, Inc.
g. Watts Regulator Co.

4. Automatic Flow-Control Valves:

a. Flow Design, Inc.
b. Griswold Controls.

5. Pump Discharge Valves:

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. Bell & Gossett ITT; Fluid Handling Div.
d. Taco, Inc.
e. Wheatley.

6. Air Vents (Manual):

    a. Armstrong Machine Works.
    b. Bell & Gossett ITT; Fluid Handling Div.
    c. Hoffman Specialty ITT; Fluid Handling Div.
    d. Spirax Sarco.

7. Air Vents - Industrial:

    a. Amtrol, Inc., Model 706.
    b. Armstrong Machine Works.
    c. Bell & Gossett ITT, Model 107.
    d. Wheatley.

8. Diaphragm-Type Expansion Tanks:

    a. Amtrol, Inc.
    b. Armstrong Pumps, Inc.
    c. ITT Bell & Gossett.
    d. Taco, Inc.
    e. Wheatley.

9. Air Separators:

    a. Amtrol, Inc.
    b. Armstrong Pumps, Inc.
    c. ITT Bell & Gossett.
    d. Taco, Inc.
    e. Wheatley.

10. Chemical Feeder:

    a. A & F Machine Products.
    b. Dearborn.
    c. J.L. Wingert Co.
    d. Neptune.

11. Y-Pattern Strainers:

    a. Armstrong Machine Works.
    b. Central Grooved Piping Products.
    c. Hoffman Specialty ITT.
    d. Metraflex Co.
    e. Spirax Sarco.
    f. Victaulic Co. of America.

g. Watts Regulator Co.
h. Wheatley.

12. Solder Flux:

a. Dutton Nokorode No. 290.
b. Dutton Nokorode No. 292.
c. Kester No. 720.
d. LA-CO Flux-Rite 90.
e. Date Y No. 10.
f. Superior No. 146.
g. Superior No. 142.

13. Propylene Glycol:

a. Dow Chemical Co.
b. Union Carbide.

14. Glycol Feeder Assembly

a. J L Wingert.
b. Sage Industries, Inc.

15. Pre-insulated Above and Below Ground Piping Systems:

a. Perma-Pipe, Inc.

2.2 PIPING AND TUBING MATERIALS - LOW TEMPERATURE HEATING SYSTEM

A. General: Refer to Part 3 "Piping Applications" Article for IDENTIFYING where the following materials are used.

B. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

C. Steel Pipe, 2-1/2 to 3 Inch NPS: ASTM A 53, Type E (electric-resistance welded), Grade A, Schedule 40, plain ends.

1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, carbon steel; seamless for 2 inch NPS and smaller and electric-resistance welded for 2-1/2 NPS and larger.

2.3 FITTINGS

A. Wrought-Copper Fittings: ASME B16.22.

B. Wrought-Copper Unions: ASME B16.22.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.

E. Cast-Iron Threaded Flanges: ASME B16.1, Classes 125, 250 and 600; raised ground face, and bolt holes spot faced.

F. Wrought-Steel Fittings: ASTM A 234, Standard Weight.

G. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

H. Grooved Mechanical-Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47, Grade 32510 malleable iron; ASTM A 53, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings. Gasket shall be suitable for use with glycol solution and operating temperatures of up to 220 deg F.

I. Grooved Mechanical-Joint Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

J. Flexible Connectors: Stainless steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150 psig minimum working pressure and 250 deg F maximum operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4-inch misalignment.

2.4 STEEL PIPE AND FITTINGS - HIGH TEMPERATURE HEATING SYSTEM

A. Steel Pipe, NPS 1-1/2 and Smaller: ASTM A106, Type S (seamless), Grade B, Schedule 40 and Schedule 80, black steel, plain ends.

B. Steel Pipe, NPS 2 and Larger: ASTM A106, Type S (seamless), or ASTM A53 Type E (electric resistance welded) Grade B, Schedule 40, black steel pipe, plain ends.

C. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Class 600; raised ground face, and bolt holes spot faced.

2.5 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.

B. Welding Materials: Comply with Section II, Part C of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

C. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

2.6 Pre-insulated Piping Systems

A. Polyurethane insulated and fiberglass jacketed piping system suitable for use in above and below ground applications. Products shall be equivalent to Perma-Pipe Poly-Therm System.

B. Insulation shall be polyurethane foam with the following characteristics:

1. 2.0 pounds per cubic foot density.
2. 1-1/2-inch thickness
3. K-value of 0.14 BTU-inch/(hr-SF-deg F)
4. Compressive strength as per ASTM D-790 of 17 psi.

C. Jacketing shall be filament-wound fiberglass reinforced polyester resin. Jacketing shall have the following characteristics:

1. 0.055-inch thickness.
2. Izod impact test rating of 40-60 ft-lb/in-notch).
3. Provide ultra violet inhibitors to resin.

D. Carrier pipe shall be ASTM A53 Grade A, Sch-40 steel for above ground piping and PVC for below ground piping.

E. Field joints shall be made in strict accordance with manufacturer's written installation instructions.

2.7 VALVES

A. Gate, check, ball, and butterfly valves are specified in Division 15 Section "Valves."

B. Refer to Part 3 "Valve Applications" Article for specific uses and applications for each valve specified.

C. Calibrated Balancing Valves (Circuit Setters): 125 psig working pressure, 250 deg F maximum operating temperature, bronze body, plug valve and calibrated orifice. Valves shall have integral pointer and calibrated scale to register degree of valve opening. Valves 2 inch NPS and smaller shall have threaded connections and 2-1/2 inch NPS valves shall have flanged connections.

D. Safety Relief Valves: bronze or brass body with brass and rubber, wetted, internal working parts; shall suit system pressure and heat capacity; according to ASME Boiler and Pressure Vessel Code, Section IV.

E. Brass Automatic Flow-Control Valves: 150 psig cold working pressure (CWP), 250 deg F maximum operating temperature, brass housing, stainless-steel operating parts; for threaded connections. Factory set to automatically control flow rates within plus or minus 5 percent design, while compensating for system operating-pressure differential. Provide quick disconnect valves for flow measuring equipment. Provide replaceable cartridge for field adjustment of flow. Union body to allow removal and cleaning of the flow controlling orifice. Provide metal identification tag with chain for each valve, factory marked with the zone identification, valve model number, and flow rate. Flow Design, Inc. (Autoflow) Model AC or approved equal.

F. Pump Discharge Valves: 175 psig working pressure, 240 deg F maximum operation temperature, cast-iron body, bronze disc and seat, stainless steel stem and spring, and "Teflon" packing. Valves shall include non-slam check valve with spring-loaded weighted disc, and calibrated adjustment feature to permit regulation of pump discharge flow and shutoff.

2.8 HYDRONIC SPECIALTIES

A. Manual Air Vent: Bronze body and nonferrous internal parts; 150 psig working pressure; 225 deg F operating temperature; manually operated with screwdriver or thumbscrew; with 1/8-inch NPS discharge connection and 1/2-inch NPS inlet connection.

B. Industrial Air Vent: Float type air vent with cast-iron body for 125 psig working pressure. Float of solid material suitable for 240 deg F.

C. Diaphragm-Type Expansion Tanks: Welded carbon steel for 125 psig working pressure, 240 deg F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by a flexible diaphragm securely sealed into tank. Provide taps for pressure gage and air-charging fitting, and drain fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Fabricate and test tank with taps and supports, and label according to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

D. Air Separators: Welded black steel; ASME constructed and labeled for 125 psig minimum working pressure and 375 deg F maximum operating temperature; perforated stainless-steel air collector tube designed to direct released air into compression tank or air vent; tangential inlet and outlet connections; integral strainer; threaded connections for 2 inch NPS and smaller; flanged connections for 2-1/2 NPS and larger; threaded blow-down connection. Provide units in sizes for full-system flow capacity.

E. Chemical Feeder: Bypass-type chemical feeders of 2-1/2 gal. Capacity, welded steel construction; 125 psig working pressure; complete with fill funnel and inlet, outlet, and drain valves.

1. Chemicals: Specially formulated to prevent accumulation of scale and corrosion in piping system and connected equipment, and based on a water analysis of makeup water.

F. Y-Pattern Strainers: 125 psig working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for 2-1/2 inch NPS and larger, threaded connections for 2 inch NPS and smaller, bolted cover, perforated Type 304 stainless-steel basket, and bottom drain connection.

G. Propylene Glycol: Provide propylene glycol specifically designed for closed loop HVAC systems, phosphate based, inhibited, low toxicity, must pass ASTM D 1384 (less than 0.0127 mm penetration per year for all system metals), Dowfrost or approved equal.

H. Glycol Feeder Assembly: Provide a complete factory packaged automatically controlled antifreeze feeder assembly. System shall be capable of feeding two separate hydronic circuits. Package shall be factory assembled and tested including 50 gal clear polyethylene tank, two 115 volt, 1 phase positive displacement pumps, controls, pressure switches, pressure relief valves, pressure gauges, tank drain valve, interconnecting piping and supporting legs and pads. Controls shall include “pump run” and “low level” colored lights, “push to test” and “alarm silence” buttons and an audible alarm. Control enclosure shall be NEMA 4X. Assembly shall require only one 115V, 1 phase plug in power cord. The pressure switches shall detect a drop in hydronic system pressure which will activate respective pump to refill system from premixed glycol/water solution in tank.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Low Temperature Heating and Interior Chilled Water, 2 inch NPS and Smaller: Aboveground, use Type L drawn-temper copper tubing with soldered joints.

B. Low Temperature Heating and Chilled Water, 2-1/2 inch NPS and Larger: Steel pipe with welded and flanged joints or steel pipe and with grooved mechanical-joint fittings and couplings. If grooved fittings are used, mechanical room piping shall use rigid fittings to reduce piping movement and bracing requirements.

C. Condensate Drain Lines: Type L drawn-temper copper tubing with soldered joints.

D. High Temperature Heating System: NPS 2-inch and larger, Schedule 40 steel pipe with Class 600 flanged joints. Drain and vent lines NPS 1-1/2-inch and smaller to be Schedule 80 with welded or Class 600 flanged joints. Provide caps on drain/vent lines as indicated.

E. Exterior Chilled Water Systems: Pre-insulated piping system above ground shall be steel carrier pipe, below ground shall be PVC.

3.2 VALVE APPLICATIONS

A. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage. All drain valves to have threaded cap and chain.

B. Install safety relief valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Pipe discharge to floor without valves. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements.

3.3 PIPING INSTALLATIONS

A. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

B. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4 inch NPS ball valve, and short 3/4 inch NPS threaded nipple and cap.

C. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

D. Install branch connections to mains using tee fittings in main with takeoff out bottom of main, except for up-feed risers with takeoff out top of main line.

E. Install unions in pipes 2 inch NPS and smaller, adjacent to each valve, at final connections of each piece of equipment, and elsewhere as indicated. Unions are not required at flanged connections.

F. Install flanges on valves, apparatus, and equipment having 2-1/2 inch NPS and larger connections.

G. Anchor piping for proper direction of expansion and contraction.

H. Install pre-insulated piping in strict accordance with manufacturer's installation instructions.

3.4 HANGERS AND SUPPORTS

A. General: Hanger, support, and anchor devices are specified in Division 15 Section "Hangers and Supports." Conform to requirements below for maximum spacing of supports.

B. Install hangers for steel piping with the following minimum rod sizes and maximum spacing:

1. 2-1/2 Inch NPS: Maximum span, 11 feet; minimum rod size, 3/8 inch.
2. 3 Inch NPS: Maximum span, 12 feet; minimum rod size, 3/8 inch.

C. Install hangers for drawn-temper copper piping with the following minimum rod sizes and maximum spacing:

1. 3/4 Inch NPS: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1 Inch NPS: Maximum span, 7 feet; minimum rod size, 1/4 inch.
3. 1-1/2 Inch NPS: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 Inch NPS: Maximum span, 10 feet; minimum rod size, 3/8 inch.

D. Support vertical runs at each floor.

3.5 PIPE JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joint construction requirements for soldered joints in copper tubing; welded, and flanged joints in steel piping.

B. Mechanical Joints: Assemble joints according to fitting manufacturer’s written instructions.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install combination air separator in pump suction lines. Install blowdown piping with ball valve; extend to glycol tank.

C. Install bypass chemical feeders in each hydronic system where indicated, in upright position with top of funnel not more than 48 inches above floor. Install feeder in bypass line, off main, using globe valves on each side of feeder and in the main between bypass connections. Pipe drain, with ball valve to glycol tank.

D. Install diaphragm-type compression tanks as indicated. Vent and purge air from hydronic system, and charge tank with proper air charge to suit system design requirements.

E. Install a solution of propylene glycol and distilled or deionized water in the heating water and chilled water systems to provide a freeze protection of the system to minus 30 deg F.

3.7 FIELD QUALITY CONTROL

A. Testing Preparation: Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush system with clean water. Clean strainers.
4. Add 1.0 lb of Trisodium Phosphate per 50 gal of system volume and operate system at design temperature for 4 hours.
5. Drain, flush system with clean water, refill system.
6. Clean strainers.
7. Isolate equipment that is not subjected to test pressure from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Flanged joints where blinds are inserted to isolate equipment need not be tested.
8. Install relief valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Testing: Test hydronic piping as follows:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid may be used if it is safe for workers and compatible with piping system components. Use vents installed at the high points of system to release trapped air while filling system. Use drains installed at low points for complete removal of liquid.

2. Examine system to see that equipment and parts that cannot withstand test pressures are properly isolated. Examine test equipment to ensure that it is tight and that low-pressure filling lines are disconnected.
3. Subject piping system to hydrostatic test pressure that is not less than 1.5, times the operating pressure or 100 psi, whichever is greater. (500 psig maximum on high temperature lines). Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Check to verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, Code for Pressure Piping, "Building Services Piping."
4. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
5. After initial hydrostatic test, fill system with listed glycol solution and bring up to operating temperature. Check entire system for leaks. Perform this test prior to insulating system.
6. Prepare written report of testing.

3.8 ADJUSTING AND CLEANING

A. After completing system installation, including outlet fittings and devices, inspect finish. Remove burrs, dirt, and construction debris, and repair damaged finished including chips, scratches, and abrasions.

B. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.

C. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

D. Chemical Treatment: Provide a water analysis prepared by chemical treatment supplier to determine type and level of chemicals required to prevent scale and corrosion. Perform initial treatment after completing system testing.

END OF SECTION 15181

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15250 - MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes pipe, duct, and equipment insulation.

1.2 DEFINITIONS

A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.

B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.

C. Cold Surfaces: Normal operating temperatures less than 75 deg F.

D. Thermal Resistivity: "R-values" represent the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between two exposed faces required to cause one Btu to flow through one square foot of material, in one hour, at a given mean temperature.

E. Density: Is expressed in lb/cu.ft.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.

1.4 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following products or an equal approved by Contracting Officer:

1. Glass Fiber:

   a. CertainTeed Corporation.
   b. Knauf Fiberglass.
   c. Manville/Schuller.
   d. Owens-Corning Fiberglas Corporation.
   e. USG Interiors, Inc. - Thermafiber Division.

2. Flexible Elastomeric Cellular:

   a. Armstrong World Industries, Inc.
   b. IMCOA Corporation.
   c. Rubatex Corporation.

2.2 GLASS FIBER

A. Material: Inorganic glass fibers, bonded with a thermosetting resin.

B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.

C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

1. Thermal Conductivity: 0.22 average maximum, at 75 deg F mean temperature.
2. Density: 6.0 pcf average maximum.

D. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed with self seal jacket.

1. Thermal Conductivity: 0.26 average maximum at 75 deg F mean temperature.
2. Density: 5 lb./cu. ft average maximum.

E. Adhesive: Produced under the UL Classification and Follow-up service.

1. Type: Non-flammable, solvent-based.
2. Service Temperature Range: Minus 20 to 180 deg F.

F. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 FLEXIBLE ELASTOMERIC CELLULAR

A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.

1. Tubular Materials: ASTM C 534, Type I.
2. Sheet Materials: ASTM C 534, Type II.

B. Thermal Conductivity: 0.27 average maximum at 75 deg F.

2.4 INSULATING CEMENTS

A. Mineral Fiber: ASTM C 195.

1. Thermal Conductivity: 1.0 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 10 psi at 5 percent deformation.

B. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.

1. Thermal Conductivity: 1.2 average maximum at 400 deg F mean temperature.
2. Compressive Strength: 100 psi at 5 percent deformation.

2.5 ADHESIVES

A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.

B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:

1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.6 JACKETS

A. Foil and Paper Jacket: Laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.

B. PVC Jacketing: High-impact, ultra-violet-resistant PVC, 20-mils thick, roll stock ready for shop or field cutting and forming to indicated sizes.

1. Adhesive: As recommended by insulation manufacturer.

C. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil-thick, high-impact, ultra-violet-resistant PVC.

1. Adhesive: As recommended by insulation manufacturer.

2.7 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, 20 x 20 (8 thrds/cm x 8 thrds/cm) mesh, presized a minimum of 8 ounces per sq. yd.

1. Tape Width: 4 inches.
2. Cloth Standard: MIL-C-20079H, Type I.
3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4-inch wide, in one of the following materials compatible with jacket:

1. Aluminum: 0.007-inch thick.
2. Brass: 0.01-inch thick.

C. Wire: 14-gage nickel copper alloy, 16-gage, soft-annealed stainless steel, or 160-gage, soft-annealed galvanized steel.

D. Corner Angles: 28 gage, 1-inch by 1-inch aluminum, adhered to 2-inch by 2-inch kraft paper.

E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.8 SEALING COMPOUNDS

A. Vapor Barrier Compound: Water-based, fire-resistive composition.

1. Water Vapor Permeance: 0.08 perm maximum.
2. Temperature Range: Minus 20 to 180 deg F.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

3.2 INSTALLATION, GENERAL

A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.

B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg F.

D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

E. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

F. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

G. Keep insulation materials dry during application and finishing.

H. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment:

1. Metal ducts with duct liner.
2. Flexible connectors for ducts and pipes.
3. Testing laboratory labels and stamps.
4. Nameplates and data plates.

5. Access panels and doors in air distribution systems.
6. Chrome-plated pipes and fittings, except for plumbing fixtures for the disabled.
7. Piping specialties including air chambers, check valves, plug valves, and flow regulators.

3.3 PIPE INSULATION INSTALLATION, GENERAL

A. Tightly butt longitudinal seams and end joints.

B. Stagger joints on double layers of insulation.

C. Apply insulation continuously over fittings, valves, and specialties.

D. Apply insulation with a minimum number of joints.

E. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
2. Cover circumferential joints with butt strips, at least 3 inches wide, and of same material as insulation jacket.
3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap.
4. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.
5. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Extend patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.

F. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing. Seal with vapor barrier coating.

G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

H. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire-rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with firestopping or fire-resistant joint sealer.

I. Floor Penetrations: Terminate insulation underside of floor assembly and at floor support at top of floor.

J. Flanges, Fittings, and Valves - Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments

of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.
2. Overlap nesting insulation by 2-inches or 1-pipe diameter, which ever is greater.
3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
4. Insulate elbows and tees smaller than 3 inches pipe size with premolded insulation.
5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.

K. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified in Division 15 Section "Supports and Anchors." For cold surface piping, extend insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.

1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 GLASS FIBER PIPE INSULATION INSTALLATION

A. Seal exposed ends with lagging adhesive.

B. Seal seams and joints with vapor barrier compound.

3.5 EQUIPMENT INSULATION INSTALLATION, GENERAL

A. Install board and block materials with a minimum dimension of 12 inches and a maximum dimension of 48-inches.

B. Groove and score insulation materials as required to fit as closely as possible to the equipment and to fit contours of equipment. Stagger end joints.

C. Insulation Thicknesses Greater than 2-Inches: Install insulation in multiple layers with staggered joints.

D. Bevel insulation edges for cylindrical surfaces for tight joint.

E. Secure sections of insulation in place with wire or bands spaced at 9-inch centers, except for flexible elastomeric cellular insulation.

F. Protect exposed corners with corner angles under wires and bands.

G. Manholes, Handholes, and Information Plates: Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.

H. Removable Insulation: Install insulation on components that require periodic inspecting, cleaning, and repairing for easy removal and replacement without damage to adjacent insulation.

I. Finishing: Except for flexible elastomeric cellular insulation, apply 2 coats of vapor barrier compound to a minimum thickness of 1/16-inch. Install a layer of glass cloth embedded between layers.

3.6 GLASS FIBER EQUIPMENT INSULATION INSTALLATION

A. Secure insulation with anchor pins and speed washers.

B. Space anchors at maximum intervals of 18-inches in both directions and not more than 3-inches from edges and joints.

C. Apply a smoothing coat of insulating and finishing cement to finished insulation.

3.7 FLEXIBLE ELASTOMERIC EQUIPMENT INSULATION INSTALLATION

A. Install sheets of the largest manageable size.

B. Apply full coverage of adhesive to the surfaces of the equipment and to the insulation.

C. Butt insulation joints firmly together and apply adhesive to insulation edges at joints.

D. Coat exterior installations with water based latex enamel.

3.8 DUCT INSULATION

A. Install block and board insulation as follows:

1. Adhesive and Band Attachment: Secure block and board insulation tight and smooth with at least 50 percent coverage of adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound. Install metal corner angles on all outside corners to provide a neat finished appearance.

2. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18-inches apart each way and 3-inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.

3.9 JACKETS

A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2-inch laps at longitudinal joints and 3-inch wide butt strips at end joints. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.

B. Install the PVC jacket with 1-inch overlap at longitudinal and butt joints and seal with adhesive.

C. Install glass cloth jacket directly over insulation. On insulation with a factory applied jacket, install the glass cloth jacket over the factory applied jacket. Install jacket drawn smooth and tight with a 2-inch overlap at joints. Embed glass cloth between (2) 1/16-inch thick coats of lagging adhesive. Completely encapsulate the insulation with the jacket, leaving no exposed raw insulation.

3.10 INSULATION SCHEDULES

A. General: Abbreviations used in the following schedules include:

1. Field-Applied Jackets: PVC - PVC, Glass Cloth - GC.
2. Pipe Sizes: NPS - Nominal Pipe Size.
3. Materials: GF - Glass Fiber, FE - Flexible Elastomeric.

B. Pipe Insulation

APPLICATION	PIPE SIZE	MATERIAL	THICKNESS (INCHES)	FIELD-APPLIED JACKET
DOMESTIC CW	RUNOUTS TO 4	GF	1/2	NONE
CHILLED WATER SUPPLY AND RETURN INTERIOR	1/2 TO 4	GF	1	NONE
CHILLED WATER SUPPLY AND RETURN EXTERIOR	ALL	Pre-insulated piping system. See Section 15181.		
HEATING WATER SUPPLY AND RETURN	RUNOUTS TO 2 1/2 TO 2	GF GF	1 1-1/2	NONE NONE

	2-1/2 TO 6	GF	2	NONE
HIGH TEMPERATURE HEATING WATER SUPPLY AND RETURN	ALL	GF	2-1/2	NONE
DOMESTIC HOT WATER DOMESTIC HOT WATER CIRCULATION	1/2 TO 4	GF	1	NONE
CONCEALED CONDENSATE LINES	3/4 TO 1	GF	1/2	NONE
NOTE: RUNOUTS LIMITED TO 12 FT LENGTH.				

C. Equipment Insulation

APPLICATION	TYPE	MATERIAL	THICKNESS (INCHES)	FIELD-APPLIED JACKET
COLD EQUIPMENT, TANKS, AIR SEPARATORS	BOARD	GF	1	GC
CHILLED WATER PUMP BODY	SHEET	FE	1/2	NONE
HOT EQUIPMENT, TANKS, AIR SEPARATORS, HEAT EXCHANGERS	BOARD	GF	2	GC
DOMESTIC HOT WATER GENERATOR	BOARD	GF	2	GC

D. Duct Systems

APPLICATION	TYPE	MATERIAL	THICKNESS (INCHES)	FIELD-APPLIED JACKET
OUTSIDE AIR DUCT FROM INTAKE TO AIR HANDLING UNIT CONNECTION	BOARD	GF	2	GC
EXHAUST AIR DUCT FROM AIR HANDLING UNIT TO OUTLET	BOARD	GF	2	GC
FAN COIL SUPPLY DUCTS	BLANKET	GF	1	NONE

END OF SECTION 15250

DIVISION 15 - MECHANICAL

SECTION 15410 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes plumbing piping systems to a point 5 feet outside the building. Systems include the following:

1. Potable water distribution, including cold- and hot-water supply and hot-water circulation.
2. Drainage and vent systems, including sanitary and storm.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working pressure ratings, except where indicated otherwise:

1. Water Distribution Systems, Below Ground: 150 psig.
2. Water Distribution Systems, Above Ground: 125 psig.
3. Drain, Waste, and Vent Systems: 10-foot head of water.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for the plumbing piping products.

1.4 QUALITY ASSURANCE

A. Comply with the provisions of I.A.P.M.O. "Uniform Plumbing Code," 1997 edition for materials, products, and installation.

B. Provide listing/approval stamp, label, or other marking on piping made to specified standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Couplings for Grooved-End Steel Pipe and Grooved-End Ferrous Fittings:

a. Grinnell Supply Sales Co., Grinnell Corp.
b. Gustin-Bacon Div., Tyler Pipe.
c. Mech-Line Div., James Hardie Industries, Ltd.
d. Sprink, Inc., James Hardie Industries, Ltd.
e. Stockham Valves & Fittings, Inc.
f. Victaulic Co. of America.

2. Couplings for AWWA-Size, Grooved-End, Ductile-Iron Pipe and Fittings:

a. Gustin-Bacon Div., Tyler Pipe.
b. Victaulic Co. of America.

3. Couplings for Grooved-End Copper Tube and Grooved-End Copper Fittings:

a. Victaulic Co. of America.

2.2 PIPES AND TUBES

A. General: The application of the following pipe, tube, and fitting materials and joining methods required for plumbing piping systems are indicated in Part 3 Article "Pipe and Fittings Applications."

B. Hard Copper Tube: ASTM B 88, Types K and L, water tube, drawn temper.

C. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.

D. Steel Pipe: ASTM A 53, Type S, Grade A, Schedule 40, seamless, galvanized, plain ends.

1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 or ASTM A 106, Schedule 40, seamless, galvanized, carbon-steel pipe.

E. Hubless, Cast-Iron Soil Pipe: CISPI 301.

F. PolyVinyl Chloride (PVC) Plastic, DWV Pipe: ASTM D 2665, Schedule 40, plain ends.

G. PVC Plastic Fittings: UL 1285 and AWWA C907, Class 150. Include elastomeric seals according to ASTM F 477 for water service entrance piping.

2.3 PIPE FITTINGS AND TUBE FITTINGS

A. Wrought-Copper, Solder-Joint Pressure Fittings: ASME B16.22.

B. Wrought-Copper and Bronze, Grooved-End Fittings: ASTM B 75 Tube and ASTM B 584 Bronze Castings.

C. Copper Tube, Grooved-End Mechanical Fittings: ASTM B 75, copper tube and ASTM B 584 bronze castings.

D. Bronze Flanges: ASME B16.24, Classes 150 and 300.

E. Copper Unions: ASME B16.18, cast-copper-alloy body, hexagonal stock, with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends.

F. Ductile-Iron Fittings for PVC Pipe: AWWA C110, ductile-iron or cast-iron; or AWWA C153, ductile-iron, compact type; push-on-or mechanical-joint type. Include dimensions matching PVC pipe, cement-mortar lining and seal coat according to AWWA C104, and rubber compression gaskets according to AWWA C111.

G. Steel Pipe, Grooved-End Fittings: ASTM A 47 malleable-iron, ASTM A 106 steel, or ASTM A 536 ductile-iron, galvanized, grooved-end fittings designed to accept couplings for grooved or shouldered joints.

H. Steel Expansion Joints: Compound galvanized steel pipe fitting consisting of telescoping body and slip-pipe sections, packing ring, packing, limit rods, flanged ends, and chrome-plated finish on slip pipe telescoping section.

1. Interior Lining: FDA-approved epoxy coating.

I. Hubless, Cast-Iron Soil Pipe Fittings: CISPI 301.

J. PolyVinyl Chloride (PVC) Plastic, DWV Pipe Fittings: ASTM D 2665, made to ASTM D 3311; socket-type; drain, waste, and vent pipe patterns.

2.4 JOINING MATERIALS

A. Cast-Iron Soil Pipe and Fittings: ASTM C 564 neoprene rubber gaskets and lubricant.

B. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated for water service entrance piping.

C. CISPI Couplings for Hubless Cast-Iron Soil Pipe and Fittings: CISPI 310, having ASTM C 564 neoprene sealing sleeve, with 300 Series stainless-steel corrugated shield-and-clamp assembly.

D. Couplings for Grooved-End Steel or Copper Pipe and Grooved-End Ferrous Fittings: ASTM A 536 ductile-iron or ASTM A 47 malleable-iron housing having enamel finish, with synthetic-rubber gasket having central-cavity, pressure-responsive design, with ASTM A 183 carbon-steel bolts and nuts, locking pin or toggle, or lugs to secure grooved pipe and fittings and gasket suitable for hot water, except where otherwise indicated.

E. Couplings for Grooved-End Copper Tube and Grooved-End Copper Fittings: ASTM A 536 ductile-iron or ASTM A 47 malleable-iron housing having copper-colored enamel finish, with synthetic-rubber gasket having central-cavity, pressure-responsive design and suitable for hot water, with ASTM A 183 carbon-steel bolts and nuts.

PART 3 - EXECUTION

3.1 PIPE AND FITTINGS APPLICATIONS

A. General: Use pipe, tube, fittings, and joining methods for piping systems according to the following applications.

B. Water Distribution Piping Below Ground: Use the following:

1. 4 to 12 Inches: Polyvinyl chloride (PVC) pressure pipe, C900 Class 200.
2. 2 Inches and Smaller: Soft copper tube, Type K or L, wrought-copper solder-joint pressure fittings and brazed joints.

C. Water Distribution Piping Above Ground: Use the following:

1. Hard copper tube, Type L; wrought-copper and bronze grooved-end fittings and couplings; or wrought-copper solder joint pressure fittings and solder joints.

D. Drain, Waste, and Vent Piping: Use the following:

1. Hubless cast-iron soil pipe, hubless cast-iron soil pipe fittings, CISPI-type couplings for hubless cast-iron soil pipe and fittings, and hubless joints.
2. Polyvinyl chloride (PVC) plastic DWV pipe; PVC socket-type drain, waste, and vent pipe pattern fittings; and solvent-cemented joints.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use gate, ball, or butterfly valves.
2. Throttling Duty: Use globe or butterfly valves.

B. Exterior Water Main Valves, Nonrising Stem Gate Valves 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, bronze stem, cast-iron body or ductile-iron body and bonnet, stem nut, 200-psig working pressure, mechanical joint ends.

3.3 SERVICE ENTRANCE PIPING

A. Install backflow preventer assembly, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at water service entrance.

B. Install water meter.

C. Service Boxes for Curb Stops: Cast-iron box with telescoping top section of length required for depth of bury of valve. Include cover having lettering “WATER,” and bottom section with base of size to fit over curb stop and barrel approximately 3 inches in diameter.

1. Provide steel tee-handle shutoff rod with each service box. Shutoff rod shall have tee handle with 1 pointed end, stem of length to operate curb stop, and slotted end fitting curb stop head.

D. Extend building drainage piping and connect to sewer piping of size and in location indicated for service entrance to building. Install cleanout and extension to grade at connection of building drain and building sewer.

E. Install sleeve and mechanical sleeve seal at service penetrations through foundation wall for watertight installation.

3.4 WATER DISTRIBUTION PIPING INSTALLATION

A. Install piping level without pitch.

B. Install copper pipe according to UPC IS 21-89, IS 3-89, and the Copper Development Association "Copper Tube Handbook."

3.5 DRAINAGE AND VENT PIPING INSTALLATION

A. Install cast-iron soil pipe and cast-iron soil pipe fittings according to CISPI 1990 revised and edited edition of "Cast Iron Soil Pipe and Fittings Handbook, Volume I," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings" and UPC IS 6-89.

B. Make changes in direction for drainage and vent piping using appropriate fittings. Make no change in direction of flow greater than 90 degrees. Where different sizes of drainage pipes and fittings are connected, use proper size standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited. Double Y-branch fittings are permitted with the barrel in the vertical orientation only.

C. Lay buried building drains beginning at low point of each system, true to grades and alignment indicated, with unbroken continuity of invert. Place hub or bell ends of piping facing upstream. Install required gaskets according to manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in piping and pull past each joint as completed.

D. Install drainage and vent piping at the following minimum slopes, except where another slope is indicated:

1. Horizontal Drainage Piping: 1/4 inch per foot (S = .0208).
2. Vent Piping: 1/8 inch per foot (S = .0104).

E. Install engineered sanitary drainage and vent systems in locations indicated and as follows:

1. Combination Waste and Vent Systems: Comply with standards of authority having jurisdiction.

F. Install underground plastic drainage piping according to UPC IS 9-90.

G. Sleeves are not required for cast-iron soil pipes passing through concrete slab, without membrane waterproofing, on grade.

3.6 JOINT CONSTRUCTION

A. Grooved Pipe and Grooved-Pipe Fitting Joints: Assemble joints with coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

1. Steel Pipe: Bevel collar and weld branch pipe onto formed collar outlet.

B. Cast-Iron Soil Pipe and Cast-Iron Soil Pipe Fitting Joints: Make joints according to recommendations in CISPI 1990 revised and edited edition of "Cast Iron Soil Pipe and Fittings Handbook, Volume I," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings" and UPC IS 6-89.

1. Compression Joint: Make with neoprene gasket matching class of pipe and fittings.
2. Hubless Joint: Make with neoprene gasket and sleeve or clamp.

C. PVC DWV Pipe: Join PVC drainage pipe and fittings according to UPC IS 9-90.

3.7 INSTALLATION OF VALVES

A. Sectional Valves: Install sectional shutoff valves close to main on each branch and riser serving 2 or more plumbing fixtures or equipment connections and where indicated.

B. Shutoff Valves: Install shutoff valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.

C. Drain Valves: Install drain valves specified in Division 15 Section "Plumbing Specialties" on each plumbing equipment item located to drain equipment for service and repair. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.

1. Install hose-end drain valves at low points in water mains, risers, and branches.
2. Install stop and waste drain valves where indicated.

D. Check Valves: Install swing check valve on discharge side of each pump and elsewhere as indicated. Use MSS SP-80, Class 125, cast-bronze body for 2-inch and smaller piping and MSS SP-71, Class 125, cast-iron body for 2-1/2-inch and larger piping.

E. Balance Valves: Install valve in each hot-water circulating loop, discharge side of each pump, and elsewhere as indicated. Use butterfly valve unless calibrated or automatic balance valve is indicated.

3.8 CONNECTIONS

A. Supply Runouts to Fixtures: Install hot- and cold-water supply piping runouts of sizes indicated, but not smaller than required by plumbing code to fixtures.

B. Drainage Runouts to Fixtures: Provide drainage and vent piping runouts, with approved trap, of sizes indicated, but not smaller than required by plumbing code, to plumbing fixtures and drains.

C. Locate drainage piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

D. Mechanical Equipment Connections: Connect hot- and cold-water supply piping system to mechanical equipment as indicated. Provide shutoff valve and union for each connection; provide drain valve on drain connection. Use flanges instead of unions for connections 2-1/2 inches and larger.

E. Water-Main Connection: Tap water main with size and in location as indicated according to requirements of water utility.

1. Make connections larger than 2-inch NPS with tapping machine according to the following:

    a. Install tapping sleeve and tapping valve according to manufacturer's written instructions.
    b. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
    c. Install gate valve onto tapping sleeve. Comply with AWWA C600. Install valve with stem pointing up and with cast-iron valve box.
    d. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.

3.9 FIELD QUALITY CONTROL

A. Inspect plumbing piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the Contracting Officer.
2. During progress of the installation, notify the Contracting Officer having jurisdiction at least 24 hours prior to time inspection must be made.
3. Reinspections: When the Contracting Officer finds that piping system will not pass test or inspection, make required corrections and arrange for reinspection by the Contracting Officer.
4. N/A.

5. Test for leaks and defects in new piping systems and parts of existing systems that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of system tested.
6. Leave uncovered and unconcealed any new, altered, extended, or replaced piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved for testing.
7. Cut out joints directed by Contracting Officer for reaming inspection. Remake joints after inspection.

B. Test water distribution piping as follows:

1. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
2. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
3. Prepare reports for tests and required corrective action.

C. Drainage and Vent Piping System Tests: Test drainage and vent systems according to procedures of authority having jurisdiction or, in absence of published procedure, as follows:

1. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open-jointed drain tile, test piping of plumbing drainage and venting systems on completion of roughing-in piping installation. Tightly close all openings in piping system and fill with water to point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.
2. Repair leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
3. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge new potable water distribution piping systems and parts of existing potable water systems that have been altered, extended, or repaired prior to use.
2. Use purging and disinfecting procedure prescribed by authority having jurisdiction or, if a method is not prescribed by that authority, the procedure described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill system or part thereof with water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) and allow to stand for 24 hours.
c. Drain system or part thereof of previous solution and refill with water/chlorine solution containing at least 200 parts per million of chlorine. Isolate and allow to stand for 3 hours.
d. Flush system with clean, potable water until chlorine does not remain in water coming from system following allowed standing time.
e. Submit water samples in sterile bottles to state certified laboratory for examination. Provide Contracting Officer with laboratory test report. Repeat procedure if examination made by the laboratory shows evidence of contamination.
f. Place warning signs on all water outlets during test.

B. Prepare and submit reports for purging and disinfecting activities.

C. Clean interior of piping system. Remove dirt and debris as work progresses.

3.11 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or when work stops.

END OF SECTION 15410

DIVISION 15 - MECHANICAL

SECTION 15430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes plumbing specialties for the following:

1. Water distribution systems.
2. Soil, waste, and vent systems.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

1. Water Distribution Piping: 125 psig.
2. Soil, Waste, and Vent Piping: 10 foot head of water.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each plumbing specialty indicated. Include rated capacities of selected equipment and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:

1. Backflow preventers.
2. Balancing valves.

3. Strainers.
4. Thermostatic water mixing valves and water tempering valves.
5. Water hammer arresters.
6. Drain valves.
7. Hose bibbs and hydrants.
8. Outlet boxes and washer-supply outlets.
9. Cleanouts.
10. Floor drains, open receptors, and trench drains.
11. Vent caps and vent terminals.

C. Reports: Specified in "Field Quality Control" Article.

D. Maintenance Data: For specialties to include in the maintenance manuals specified in Division 1. Include the following:

1. Backflow preventers.
2. Thermostatic water mixing valves and water tempering valves.
3. Balancing valves.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, dimensional requirements, and characteristics of plumbing specialties and are based on the specific types and models indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

B. Provide listing/approval stamp, label, or other marking on plumbing specialties made to specified standards.

C. Listing and Labeling: Provide electrically operated plumbing specialties specified in this Section that are listed and labeled.

1. Terms "Listed" and "Labeled": As defined in National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

D. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

E. Comply with NFPA 70, "National Electrical Code," for electrical components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Backflow Preventers:

a. Ames Co., Inc.
b. B & K Industries, Inc.
c. Cla-Val Co.
d. CMB Industries; Febco Div.
e. Conbraco Industries, Inc.
f. FLOMATIC Corp.
g. Grinnell Corp.; Mueller Co. Marketing Group for Hersey Products Div.
h. IMI Cash Valve.
i. Sparco, Inc.
j. Watts Industries, Inc.; Water Products Div.
k. Zurn Industries, Inc.; Wilkins Div.

2. Calibrated Balancing Valves:

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. Flow Design, Inc.
d. ITT Fluid Technology Corp.; ITT Bell & Gossett Div.
e. Taco, Inc.
f. Tour & Andersson, Inc.; Valve Div.
g. Watts Industries, Inc.; Water Products Div.

3. Thermostatic Water Mixing Valves:

a. Lawler Manufacturing Co., Inc.
b. Leonard Valve Co.
c. Powers Process Controls.
d. Symmons Industries, Inc.
e. T & S Brass and Bronze Works, Inc.

4. Outlet Boxes:

a. Acorn Engineering Co.
b. Guy Gray Manufacturing Co., Inc.
c. IPS Corp.

d. LSP-Specialty Products Co.
e. Oatey Co.
f. Plastic Oddities, Inc.
g. Symmons Industries, Inc.

5. Hydrants:

a. Enpoco, Inc.
b. Josam Co.
c. Murdock, Inc.
d. Smith: Jay R. Smith Mfg. Co.
e. Tyler Pipe; Wade Div.
f. Watts Industries, Inc.; Ancon Drain Div.
g. Watts Industries, Inc.; Water Products Div.
h. Woodford Manufacturing Co.
i. Zurn Industries, Inc.; Hydromechanics Div.

6. Water Hammer Arresters:

a. Amtrol, Inc.
b. Enpoco, Inc.
c. Josam Co.
d. Precision Plumbing Products, Inc.
e. Sioux Chief Manufacturing Co., Inc.
f. Smith: Jay R. Smith Mfg. Co.
g. Sparco, Inc.
h. Tyler Pipe; Wade Div.
i. Watts Industries, Inc.; Ancon Drain Div.
j. Watts Industries, Inc.; Water Products Div.
k. Zurn Industries, Inc.; Hydromechanics Div.

7. Cleanouts, Drains and Receptors:

a. Enpoco, Inc.
b. Josam Co.
c. Smith: Jay R. Smith Mfg. Co.
d. Watts Industries, Inc.; Ancon Drain Div.
e. Zurn Industries, Inc.; Hydromechanics Div.

2.2 BACKFLOW PREVENTERS

A. General: ASSE standard, backflow preventers, of size indicated for maximum flow rate and maximum pressure loss indicated.

1. 2 Inch NPS and Smaller: Bronze body with threaded ends.
2. 2-1/2 Inch NPS and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.

    a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.

3. Interior Components: Corrosion-resistant materials.
4. Exterior Finish: Polished chrome-plate if used in chrome-plated piping system.
5. Strainer on inlet, if indicated.

B. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7 garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.

C. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves.

1. Pressure Loss: 12 psig maximum, through middle one-third of flow range.

D. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet; and test cocks with 2 positive-seating check valves.

1. Pressure Loss: 5 psig maximum, through middle one-third of flow range.

2.3 BALANCING VALVES

A. Calibrated Balancing Valves: Adjustable, with 2 readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.

1. 2 Inch NPS and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.
2. 2 Inch NPS and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.
3. 2-1/2 Inch NPS and Larger: Cast-iron, Y-pattern body with bronze disc and flanged or grooved ends.

2.4 THERMOSTATIC WATER MIXING VALVES

A. General: ASSE 1017, manually adjustable, thermostatic water mixing valve with bronze body. Include check stop and union on hot- and cold-water-supply inlets, adjustable temperature setting, and capacity at pressure loss as indicated.

1. Liquid-Filled Motor, Operation and Pressure Rating: 100 psig minimum.

B. Thermostatic Water Mixing Valves: Unit, with the following:

1. Piping, of sizes and in arrangement indicated. Include valves and unions.
2. Piping Component Finish: Satin spray.
3. Thermometer: Manufacturer's standard.

2.5 STRAINERS

A. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch round perforations, unless otherwise indicated.

1. Pressure Rating: 125 psig minimum steam working pressure, unless otherwise indicated.
2. 2 Inch NPS and Smaller: Bronze body, with female threaded ends.
3. 2-1/2 Inch NPS and Larger: Cast-iron body, with interior AWWA C550 or FDA-approved epoxy coating and flanged ends.
4. Y-Pattern Strainers: Screwed screen retainer with centered blowdown.

a. Drain: Pipe plug.
b. Drain: Factory- or field-installed, hose-end drain valve.

2.6 OUTLET BOXES

A. General: Recessed-mounting outlet boxes with fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.

B. Clothes Washer Outlet Boxes: With hose connections, drain, and the following:

1. Box and Faceplate: Enameled or epoxy-painted steel.
2. Shutoff Fittings: 2 hose bibbs.
3. Supply Fittings: Two 1/2-inch NPS gate, globe, or ball valves and 1/2-inch NPS copper, water tubing.
4. Drain Fitting: 2 inch NPS drainage piping P-trap with 2 inch NPS standpipe extending from floor to outlet box and 2 inch NPS waste.

C. Reinforcement: 2 by 4 inch or 2 by 6 inch, fire-retardant-treated-wood blocking between studs.

2.7 HYDRANTS

A. Wall Hydrants: ASME A112.21.3M, nonfreeze, key operation. Provide one operating key.

1. Inlet: 3/4 or 1 inch NPS threaded or solder joint.
2. Outlet: ASME B1.20.7 garden-hose threads, and integral or field-installed, nonremovable, drainable, hose-connection vacuum breaker with ASME B1.20.7 garden-hose threads on outlet.
3. Type: Projecting.
4. Finish: Polished bronze.

2.8 DRAIN VALVES

A. Hose-End Drain Valves: MSS SP-110, 3/4-inch NPS ball valve, rated for 400 psig minimum CWP. Include 2-piece, ASTM B 62 bronze body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

1. Inlet: Threaded or solder joint.
2. Outlet: Short-threaded nipple with ASME B1.20.7 garden-hose thread and cap.
3. Hose-End Drain Valve Option: MSS SP-80, gate valve, Class 125, ASTM B 62 body, with 3/4-inch NPS threaded or solder-joint inlet and ASME B1.20.7 garden-hose threads on outlet and cap. Hose bibbs are prohibited for this application.

B. Stop-and-Waste Drain Valves: MSS SP-110, ball valve, rated for 200 psig minimum CWP or MSS SP-80, Class 125, gate valve; ASTM B 62 bronze body, with 1/8-inch NPS side drain outlet and cap.

2.9 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASME A112.26.1M, ASSE 1010, or PDI-WH 201, bellows or piston type with pressurized cushioning chamber. Sizes are based on water-supply fixture units, ASME A112.26.1M sizes A through F and PDI-WH 201 sizes A through F.

B. Hose Bibbs: Bronze body, with renewable composition disc, 1/2- or 3/4-inch NPS threaded or solder-joint inlet. Provide ASME B1.20.7 garden-hose threads on outlet and integral or field-installed, nonremovable, drainable, hose-connection vacuum breaker.

1. Finish: Rough brass.
2. Operation: Wheel handle.

C. Deep-Seal Traps: Cast iron or bronze, with inlet and outlet matching connected piping, cleanout where indicated, and trap seal primer valve connection where indicated.

1. 2 Inch NPS: 4 inch minimum water seal.
2. 2-1/2 Inch NPS and Larger: 5 inch minimum water seal.

D. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

E. Air-Gap Fittings: ASME A112.1.2, cast iron or cast bronze, with fixed air gap, inlet for drain pipe or tube, and threaded or spigot outlet.

PART 3 - EXECUTION

3.1 PLUMBING SPECIALTY INSTALLATION

A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

B. Install backflow preventers of type, size, and capacity indicated, at each water-supply connection to mechanical equipment and systems, and to other equipment and water systems as indicated. Comply with authorities having jurisdiction. Locate backflow preventers in same room as connected equipment. Install air-gap fitting on units with atmospheric-vent connection and pipe relief outlet drain to nearest floor drain. Do not install bypass around backflow preventer.

C. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.

D. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve, and where indicated.

E. Install hose bibbs with integral or field-installed vacuum breaker.

F. Install wall hydrants with integral or field-installed vacuum breaker.

G. Install cleanouts in aboveground piping and building drain piping as indicated, and where not indicated, according to the following:

1. Size same as drainage piping up to 4 inch NPS. Use 4 inch NPS for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping 4 inch NPS and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

H. Install cleanout deck plates, of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.

I. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

J. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

K. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

L. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor or as indicated. Size outlets as indicated.

M. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

1. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.

N. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

O. Position floor drains for easy access and maintenance.

P. Position roof drains for easy access and maintenance.

Q. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

R. Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.

S. Secure supplies to supports or substrate.

T. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated.

U. Install water-supply stop valves in accessible locations.

V. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

W. Locate drainage piping as close as possible to bottom of floor slab supporting fixtures and drains.

X. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

Y. Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing specialties and piping specified in other Division 15 Sections.
2. Install piping connections indicated between appliances and equipment specified in other Sections; connect directly to plumbing piping systems.
3. Install piping connections indicated as indirect wastes from appliances and equipment specified in other Sections, to spill over receptors connected to plumbing piping systems.

B. Install hoses between plumbing specialties and appliances as required for connections.

C. Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power is specified in Division 16 Sections.

D. Supply Runouts to Plumbing Specialties: Install hot- and cold-water-supply piping of sizes indicated, but not smaller than required by authorities having jurisdiction.

E. Drainage Runouts to Plumbing Specialties: Install drainage and vent piping, with approved trap, of sizes indicated, but not smaller than required by authorities having jurisdiction.

F. Ground electric-powered plumbing specialties.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

G. Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power, wiring, and disconnect switches are specified in Division 16 Sections.

3.3 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to perform startup services and train Government's maintenance personnel as specified below:

1. Review data in the maintenance manuals. Refer to Division 1 Section 01000, 3.7 Operation and Maintenance Instructions.
2. Schedule training with Government with at least 7 days' advance notice.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 15430

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DIVISION 15 - MECHANICAL

SECTION 15440 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes plumbing fixtures and trim, faucets, other fittings, and related components.

1.3 DEFINITIONS

A. Accessible: Plumbing fixture, building, facility, or portion thereof that can be approached, entered, and used by physically handicapped, disabled, and elderly people.

B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, traps and waste pipes. Pipe fittings, tube fittings, and general-duty valves are included where indicated.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each plumbing fixture category and type specified. Include selected fixture, trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

D. Wiring diagrams from manufacturer for electrically operated units.

E. Maintenance data for plumbing fixtures and components to include in the operation and maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category from one source and by a single manufacturer.

1. Exception: Where fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for this category.

B. Regulatory Requirements: Comply with requirements of CABO A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; regarding plumbing fixtures for physically handicapped people.

C. Regulatory Requirements: Comply with requirements of Architectural and Transportation Barriers Compliance Board's (ATBCB) "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" regarding plumbing fixtures for physically handicapped people.

D. Energy Policy Act Requirements: Comply with requirements of Public Law 102-486, "Energy Policy Act," regarding water flow rate and water consumption of plumbing fixtures.

E. Listing and Labeling: Provide electrically operated fixtures and components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

G. Product Options: Drawings indicate size, profiles, dimensional requirements, and characteristics of plumbing fixtures and are based on specific types and models indicated. Other manufacturers' fixtures with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.

B. Store plumbing fixtures on elevated platforms in dry location.

1.7 PROJECT CONDITIONS

A. Field Measurements: Coordinate roughing-in and final fixture locations and verify that plumbing fixtures can be installed to comply with original design and referenced standards. Refer conflicts to Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Water Closets:

a. American Standard, Inc.
b. Kohler Co.

2. Lavatories:

a. American Standard, Inc.
b. Crane Plumbing/Fiat Products.
c. Kohler Co.

3. Sinks:

a. American Standard, Inc.
b. Crane Plumbing/Fiat Products.
c. Eljer; A Household International Co.
d. Elkay Manufacturing Co.
e. Just Manufacturing Co.
f. Kohler Co.
g. Moen Group; Stanadyne Corp.

4. Mop Sinks:

    a. Aqua Glass Corp.
    b. Crane Plumbing/Fiat Products.
    c. E.L. Mustee & Sons, Inc.
    d. Florestone Products Co., Inc.
    e. Stern-Williams Co., Inc.
    f. Swan Corp.

5. Showers:

    a. Acorn Engineering Co.
    b. American Standard, Inc.
    c. Aqua Glass Corp.
    d. Bradley Corp.
    e. Crane Plumbing/Fiat Products.
    f. Fiberglass Systems, Inc.
    g. Kohler Co.
    h. Maax, Inc.

6. Electric Water Coolers:

    a. Elkay Manufacturing Co.
    b. Halsey Taylor; A Household International Co.
    c. Haws Drinking Faucet Co.

7. Toilet Seats:

    a. Bemis Mfg. Co.
    b. Beneke Div.; Sanderson Plumbing Products, Inc.
    c. Church Seat Co.
    d. Kohler Co.
    e. Olsonite Corp.
    f. Sperzel Industries, Inc.

8. Cast-Brass and Cast-Brass Underbody Faucets:

    a. American Standard, Inc.
    b. Briggs Div.; Briggs Industries, Inc.
    c. Chicago Faucet Co.
    d. Crane Plumbing/Fiat Products
    e. Delta Faucet Co.; Div. of Masco Corp.
    f. Elkay Manufacturing Co.
    g. Grohe America, Inc.

h. Kohler Co.
i. Moen Group; Stanadyne Corp.
j. Price Pfister, Inc.
k. Royal Brass Mfg. Co.
l. Speakman Co.
m. Symmons Industries, Inc.
n. T & S Brass and Bronze Works, Inc.

9. Pressure Balance Bath/Shower Faucets:

a. Acorn Engineering Co.
b. American Standard, Inc.
c. Bradley Corp.
d. Chicago Faucet Co.
e. Crane Plumbing/Fiat Products.
f. Kohler Co.
g. Powers Process Controls; A Unit of Mark Controls Corp.
h. Symmons Industries, Inc.

10. Shower Receptors:

a. Aqua Glass Corp.
b. Crane Plumbing/Fiat Products.
c. Florestone Products Co., Inc.
d. Stern-Williams Co., Inc.
e. Swan Corp.

11. Supply Connector:

a. Brass Craft, Inc.
b. Fluidmaster, Inc.

2.2 PLUMBING FIXTURES, GENERAL

A. Provide plumbing fixtures and trim, fittings, other components, and supports as specified in Plumbing Fixture Schedule in the Drawings.

2.3 FITTINGS, EXCEPT FAUCETS

A. Fittings General: Unless otherwise specified, provide trim and fittings fabricated of brass, with a polished chrome plated finish.

2.4 FITTINGS

A. Fittings for Plumbing Fixtures: Refer to plumbing fixture schedules at the end of this Section for materials for supplies, supply stops, supply risers, traps, and other fittings.

B. Fittings for Equipment Specified in Other Sections: Fittings include the following:

1. Supply Stops: Chrome-plated brass, angle; compression, loose-key type; same size as supply inlet and with outlet matching supply riser.
2. Supply Stops: Chrome-plated brass, angle; compression, wheel-handle type; same size as supply inlet and with outlet matching supply riser.
3. Supply Risers: Chrome-plated 3/8-inch NPS flexible copper tube with knob end.
4. Traps: Chrome-plated tubular brass with 17 gage wall thickness, slip-joint inlet, wall flange, escutcheons, and size to match equipment.
5. Continuous Waste: Tubular plastic with slip-joint inlet and size to match equipment.
6. Indirect Waste: Tubular brass, 17 gage wall thickness, and size to match equipment.
7. Supply Connector: Braided stainless steel outer covering, .30 inch (.45 inch) inner core, 150 psi working pressure at 180 deg F. Union hex nut ends.
8. Gasket Seals: Wax ring or gasket seal as required. Optional seal, "Flo-Bowl leak-less toilet system".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for potable, hot- and cold-water supply piping systems; soil, waste, and vent piping systems; and supports. Verify that locations and sizes of piping and locations and types of supports match those indicated, before installing and connecting fixtures. Use manufacturer's roughing-in data when roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed. Notify Contracting Officer in writing of unsatisfactory conditions.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Include supports for plumbing fixtures according to the following:

1. Reinforcement: For floor-mounted lavatories and sinks that require securing to wall and recessed, box-mounted, electric water coolers.
2. Fabricate reinforcement from 2 by 4 inch or 2 by 6 inch fire-retardant-treated-wood blocking between studs or 1/4 by 6 inch steel plates attached to studs, in wall construction, to secure fixtures to wall. Include length that will extend beyond ends of fixture mounting bracket and attach to at least 2 studs.

B. Include fitting insulation kits for accessible fixtures according to the following:

1. Lavatories: Cover hot and cold-water supplies, stops and handles, drain, trap, and waste to wall.

3.3 PLUMBING FIXTURE INSTALLATION

A. Assemble plumbing fixtures and trim, fittings, faucets, and other components according to manufacturers' written instructions.

B. Install fixtures level and plumb according to manufacturers' written instructions, roughing-in drawings, and referenced standards.

C. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals. Option: Install floor outlet water closet with "Flo-Bowl leak-less toilet system".

D. Install toilet seats on water closets.

E. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

F. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

G. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

H. Fasten recessed, wall-mounted fittings to reinforcement built into walls.

I. Fasten wall-mounted fittings to reinforcement built into walls.

J. Fasten counter-mounting plumbing fixtures to casework.

K. Secure supplies to supports or substrate within pipe space behind fixture.

L. Set shower receptors and mop basins in leveling bed of cement grout.

M. Install individual stop valve in each water supply to fixture. Use gate or globe valve where specific stop valve is not specified.

N. Install water-supply stop valves in accessible locations.

O. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

P. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

Q. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes, except where otherwise indicated.

R. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

S. Seal joints between fixtures and walls, floors, and counters using sanitary-type, 1-part, mildew-resistant, silicone sealant according to sealing requirements specified in Division 7 Section "Joint Sealants." Match sealant color to fixture color.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other Division 15 Sections.

B. Supply and Waste Connections to Plumbing Fixtures: Refer to plumbing fixture schedules at the end of this Section for fitting sizes and connection requirements for each plumbing fixture.

C. Supply and Waste Connections to Equipment Specified in Other Sections: Connect equipment with supply inlets, supply stops, supply risers, and traps specified in this

Section. Use fitting sizes required to match connected equipment. Connect fittings to plumbing piping.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Arrange for electric-power connections to fixtures and devices that require power. Electric power is specified in Division 16 Sections.

3.5 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized and demonstrate proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.6 ADJUSTING AND CLEANING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposers, hot-water dispensers, and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at drinking fountains, electric water coolers, faucets, shower valves, and flushometer valves having controls, to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Include the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities, except when approved in writing by Government.

END OF SECTION 15440

DIVISION 15 - MECHANICAL

SECTION 15455 - WATER STORAGE TANKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes water storage tanks and related accessories.

1.3 PERFORMANCE REQUIREMENTS

A. Pressure Rating of Pressure-Type Water Tanks: At least equal to system operating pressure, but not less than 125 psig.

B. Pressure Rating of Accessories for Pressure Systems: At least equal to system operating pressure, but not less than 125 psig.

C. Pressure Rating of Piping for Pressure Systems: At least equal to system operating pressure, but not less than 125 psig.

D. Pressure Rating of Other Tanks and Piping Components: At least equal to system operating pressure.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories, and indicating dimensions, required clearances, and methods of assembly of components, and piping and wiring connections.

1.5 QUALITY ASSURANCE

A. American Society of Mechanical Engineers (ASME) Compliance: Fabricate and stamp water storage tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

B. National Sanitation Foundation (NSF) Compliance: NSF 14, "Standard for Plastics Piping Components and Related Materials," and NSF 61, "Standard for Drinking Water System Components--Health Effects." Include appropriate NSF-listing marks.

C. National Fire Protection Association (NFPA) Compliance: NFPA 22, "Standard for Water Tanks for Private Fire Protection," Chapter titled "Pressure Tanks" and ASME Boiler and Pressure Vessel Code, Section VIII for pressure tanks. Include 125-psig minimum working pressure rating, except where otherwise indicated, and appropriate ASME symbol.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Steel, Pressure Water Storage Tanks:

a. Adamson Co., Inc.
b. Ajax Boiler, Inc.; Ace Buehler Div.
c. Armstrong Pumps, Inc.
d. Cemline Corp.
e. Lochinvar Corp.
f. PVI Industries, Inc.
g. Raypak, Inc.
h. Smith: A.O. Smith Water Products Co.
i. State Industries, Inc.
j. Weben-Jarco, Inc.
k. Wood: John Wood Co.

2.2 STEEL, WATER STORAGE TANKS, GENERAL

A. Steel Tappings: Factory fabricated, welded to tank before testing and labeling. Include pipe connections according to the following:

1. 2 Inches and Smaller: ASME B1.20.1 female threads.

2. 2-1/2 Inches and Larger: ASME B16.5 flange.

B. Manholes: Watertight, for tanks over 36 inches in diameter, in locations indicated. Include same pressure rating as tanks.

C. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank before testing and labeling.

2.3 STEEL, PRESSURE WATER STORAGE TANKS

A. Description: Steel, vertical, pressure-rated water tanks.

B. Construction: ASME code, steel, constructed with nontoxic welded joints, for 125 psig working pressure.

C. Accessories: Include relief valves; pressure gage and thermometer; air-volume operated controls; air-charging connections; and gage glass, brass fittings, compression stops, and gage-glass guard.

2.4 STEEL, WATER STORAGE TANK FINISHES

A. Description: Finish for steel, water storage tank surfaces. Where finish or thickness is not indicated, manufacturer's standard finish or thickness is acceptable. Extend tank interior finish, of same material and thickness, into and through tank fittings and outlets.

B. Potable-Water Tank Interior Finish: Materials and thicknesses that meet requirements of applicable AWWA or FDA and EPA regulatory standards for tasteless and odorless, potable-water tank linings according to the following:

1. Lining Material: Cement.
2. Coating: Galvanized.

C. Exterior Finish: According to the following:

1. Coating: Manufacturer's standard enamel paint.

PART 3 - EXECUTION

3.1 WATER STORAGE TANK INSTALLATION

A. Install water storage tanks on concrete bases, level and plumb, firmly anchored, in locations indicated. Arrange so devices needing servicing are accessible.

B. Anchor tank supports and tanks to substrate.

C. Install tank seismic restraints as indicated.

3.2 CONNECTIONS

A. Install piping adjacent to water storage tanks to allow service and maintenance.

B. Install thermometers and pressure gages on water storage tanks and piping, where indicated. Thermometers and pressure gages are specified in Division 15 Section "Meters and Gages."

C. Connect water piping to water storage tanks with unions or flanges and valves. Connect tank drains with valves and discharge over closest floor drain.

1. General-duty valves are specified in Division 15 Section "Valves."
2. Valves 2 Inches and Smaller: Gate or ball.
3. Valves 2-1/2 Inches and Larger: Gate or butterfly.
4. Drain Valves: 3/4-inch gate or ball valve. Include outlet with, or nipple in outlet with, ASME B1.20.7, 3/4-11.5NH thread for garden-hose service, threaded cap, and chain.
5. Water Piping Connections: Make connections to dissimilar metals with dielectric fittings.

D. Install the following devices on tanks when and where indicated:

1. Pressure relief valves.
2. Temperature-and-pressure relief valves.
3. Vacuum relief valves. Include on tanks with copper interior lining, except when tank has no valve.
4. Connections to accessories.

3.3 FIELD QUALITY CONTROL

A. Pressure Testing: Hydrostatically test ASME code water storage tanks to ensure structural integrity and freedom from leaks. Fill tanks with water, vent air, plug tanks, pressurize to 1-1/2 times tank pressure rating, disconnect test equipment, hold pressure for 30 minutes, and check for leaks. Replace tanks that fail test with new tanks and repeat until test is satisfactory.

B. Repair leaks and defects with new materials and retest system until results are satisfactory.

C. Prepare written reports for specified tests.

3.4 CLEANING

A. Clean and disinfect potable-water storage tanks.

B. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C652 or as described below:

1. Purge water storage tanks with potable water.
2. Disinfect tanks by one of the following methods:

a. Fill tanks with water/chlorine solution containing at least 50 ppm of chlorine. Isolate (valve off) tanks and allow to stand for 24 hours.
b. Fill tanks with water/chlorine solution containing at least 200 ppm of chlorine. Isolate (valve off) tanks and allow to stand for 3 hours.

3. Flush tanks, after required standing time, with clean, potable water until chlorine is not present in water coming from tank.
4. Submit water samples in sterile bottles to Contracting Officer. Repeat procedure if biological examination made by Contracting Officer shows evidence of contamination.

C. Prepare written reports for purging and disinfecting activities.

END OF SECTION 15455

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DIVISION 15 - MECHANICAL

SECTION 15460 - WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial gas-fired water heaters.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories, and indicating dimensions, required clearances, and methods of assembly of components, and piping and wiring connections.

1.3 QUALITY ASSURANCE

A. Electrical Component Standard: Provide components complying with NFPA 70 "National Electrical Code."

B. Listing and Labeling: Provide water heaters that are listed and labeled.

1. The terms "listed" and "labeled" shall be as defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. AGA Standards: Provide water heaters that bear the label of the American Gas Association.

D. ASME Code Compliance: Provide water heaters and safety relief valves that comply with ASME Boiler and Pressure Vessel Code and that bear the appropriate code symbols.

E. ASHRAE Standards: Provide water heaters with performance efficiencies not less than prescribed in ASHRAE 90A, "Energy Conservation in New Building Design."

F. Design Concept: The drawings indicate types and capacities of water heaters and are based on specific descriptions and manufacturers indicated. Water heaters having equal performance characteristics by other manufacturers may be considered provided that deviations in capacities, dimensions, operation, or other characteristics are minor and do not change the design concept or intended performance as judged by the Contracting Officer. Burden of proof for equality of water heaters is on the proposer.

1.4 WARRANTY

A. Special Project Warranty: Submit a written warranty, executed by manufacturer, agreeing to repair or replace water heater units that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, tanks, coils, heat exchangers, and burners. This warranty shall be in addition to, and not a limitation of, other rights the Government may have against the Contractor under the Contract Documents.

1. Warranty period is 5 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Commercial Gas-Fired Copper Finned-Tube Water Heaters:

a. Ace Buehler, Inc.
b. Lochinvar Water Heater Corp.
c. Precision Parts Corp.
d. Raypak, Inc.
e. Rheem Mfg.
f. Ruud Mfg. Div.; Rheem Mfg.
g. A.O. Smith Water Products Co. Div.; A.O. Smith Corp.
h. Teledyne Laars.
i. Weben-Jarco, Inc.

2. Compression Tanks:

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. Expanflex, Inc.
d. Flexcon, Inc.
e. Smith: A.O. Smith; Aqua-Air Div.
f. State Industries, Inc.

2.2 WATER HEATERS, GENERAL

A. Specified manufacturer's standard components and features are acceptable where specific product requirements are not indicated.

B. Temperature Control: Adjustable thermostat, except for units where other arrangement is indicated or temperature is regulated by flow-control fitting.

C. Safety Control: Automatic, high-temperature-limit cutoff device or system on commercial units and where indicated. Include automatic low-water cutoff device or system on commercial units where indicated.

D. Interior Finish: Materials that comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.

E. Tappings: Factory fabricated of materials compatible with tank. Include tappings for piping connections, relief valves, pressure gage, thermometer, blow down, vent, and controls as required and others as indicated. Attach tappings to tank before testing and labeling. Include tappings and connections as follows:

1. 2-Inch NPS and Smaller: Threaded ends.
2. 2-1/2-Inch NPS and Larger: Flanged ends.

F. Insulation: Fiberglass, polyurethane foam, or manufacturer's standard that is suitable for operating temperature and required insulating value. Include insulation material that surrounds entire tank except connections and controls.

G. Jacket: Steel, with baked-on enamel finish, except where otherwise specified.

H. Anode Rods: Factory installed, magnesium.

2.3 GAS-FIRED COPPER FINNED-TUBE WATER HEATERS

A. Description: Packaged, automatic, commercial, gas-fired, ASME labeled, 160 psig rated, finned-tube heat exchanger; with integral controls, draft diverter, gas burner, gas train including gas regulator, ASME labeled storage tank, and circulating pump.

1. Heat Exchanger Headers: Bronze.

B. Water Heater Insulation: Manufacturer's standard insulation.

C. Water Heater: Steel, with baked-on enamel finish.

D. Intermittent electronic ignition.

E. Circulating Pump: All bronze, inline, centrifugal, single-stage, radially split case design, with mechanical seals, and rated for 125 psig working pressure and 225 deg F continuous water temperature.

F. Controls: Adjustable storage tank temperature control fitting and flow switch, interlocked with circulating pump and burner.

G. Safety Controls: Automatic gas shutoff device to shut off entire gas supply in event of excessive temperature.

H. Water Heater Pressure Relief Valve: ASME rated and labeled.

I. Vacuum Relief Valve: ANSI Z21.22.

J. Storage Tank Temperature and Pressure Relief Valve: ASME rated and labeled.

K. Water heater shall be separated combustion type, drawing combustion air directly from outdoors.

2.4 COMPRESSION TANKS

A. Description: Steel, pressured-rated tanks constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

B. Construction: ASME labeled with 125-psig working-pressure rating.

C. Construction: 150-psig working-pressure rating.

D. Interior Finish: Materials that comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.

E. Accessories: Include air-charging valve and pressure gage.

2.5 WATER HEATERS, GENERAL

A. Specified manufacturer’s standard components and features are acceptable where specific product requirements are not indicated.

B. Temperature Control: Adjustable thermostat, except for units where other arrangement is indicated or temperature is regulated by flow-control fitting.

C. Safety Control: Automatic

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

A. General: Install water heaters on concrete bases. Set and connect units according to manufacturer's written instructions. Install units plumb, level, and firmly anchored in locations indicated. Maintain manufacturer's recommended clearances. Install so controls and devices are accessible for service.

B. Anchor water heaters and storage tanks to substrate.

C. Install seismic restraints as indicated.

D. Install and connect gas water heaters according to NFPA 54.

1. Install gas pressure regulators on gas-burner inlets.
2. Install vent piping from gas-train pressure regulators and valves to outside of building where required. Terminate vent piping with brass-screened vent cap fitting. Do not combine vents except with approval of authorities having jurisdiction.

E. Install temperature and pressure relief valves in top portion of storage water heater tanks and hot-water storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge to closest floor drain.

F. Install pressure relief valves in hot-water-outlet piping for water heaters without storage. Extend relief valve outlet with water piping in continuous downward pitch and discharge to closest floor drain.

G. Install vacuum relief valves in cold-water-inlet piping.

H. Install vacuum relief valves in water heaters and hot-water storage tanks that have copper lining.

I. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for drain valves.

J. Install thermometers on water heater inlet and outlet piping. Thermometers are specified in Division 15 Section "Meters and Gages."

K. Install pressure gages on water heater piping when and as indicated. Pressure gages are specified in Division 15 Section "Meters and Gages."

L. Install inlet and outlet piping manifolds for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through water heaters. Include throttling valves in outlet manifolds and thermometers in inlet and outlet manifolds.

M. Install piping adjacent to water heaters to allow service and maintenance.

N. Arrange for field-applied insulation on equipment and piping not furnished with factory-applied insulation.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Connect hot- and cold-water piping to units with shutoff valves and unions. Connect hot-water circulating piping to unit with shutoff valve, check valve, and union.
2. Connect gas piping to gas burner with drip leg, tee, shutoff valve, and union; minimum size same as inlet connection. Gas piping is specified in Division 15 Section "Natural Gas Piping Systems."
3. Make connections with dielectric fittings where piping is made of dissimilar metals. Dielectric fittings are specified in Division 15 Section "Basic Mechanical Materials and Methods."

B. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit servicing.

C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

D. Gas, Water Heater Vent Connections: Connect to vent system. Include draft hoods and diverters where required. Use vents same size as or larger than water heater outlets, but not smaller than indicated, except when smaller vent size has been calculated according to National Fuel Gas Code. Comply with gas utility requirements for sizing. Gas vents are specified in Division 15 Section "Breechings, Chimneys, and Stacks."

END OF SECTION 15460

DIVISION 15 - MECHANICAL

SECTION 15496 - NATURAL GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping, specialties, and accessories for natural gas systems within building and to point indicated.

1. This Section also includes the cost of the gas service up to the meter.

1.3 DEFINITIONS

A. Low-Pressure Natural Gas Piping: Operating pressure of 2 psig or less.

B. Medium-Pressure Natural Gas Piping: Operating pressure greater than 2 psig, but not greater than 10 psig.

C. Gas Service: Operating pressure indicated.

D. Gas Service: Pipe from gas main or other source to gas point of delivery for building being served. Piping includes gas service piping, gas valve, service pressure regulator, meter bar or meter support, and gas meter.

E. Gas Delivery Point: Gas meter or service pressure regulator outlet, or gas service valve if gas meter is not provided.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Working-Pressure Ratings: Except where otherwise indicated, minimum pressure requirements are as follows:

1. Low-Pressure Natural Gas Piping: 2 psig.

2. Medium-Pressure Natural Gas Piping: 10 psig.

B. Approximate values of natural gas supplied for these systems are as follows:

1. Heating Value: 1000 Btu/cu. ft.
2. Specific Gravity: 0.6.
3. Service Line Pressure: 15 to 20 psig.

1.5 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data for each type of natural gas specialty and special-duty valve. Include pressure rating, rated capacity, and settings of selected models.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 54, "National Fuel Gas Code," for gas piping materials and components; installations; and inspecting, testing, and purging.

B. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated control devices.

C. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.

1.7 SEQUENCING AND SCHEDULING

A. Notification of Interruption of Service: Notify each affected user when gas supply will be turned off.

B. Work Interruptions: Leave gas piping systems in safe condition when interruptions in work occur during repairs or alterations to existing gas piping systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Gas Stops, 2 Inch NPS (DN50) and Smaller:

    a. Hammond Valve Corp.
    b. Jomar International, Ltd.
    c. Maxitrol Co.
    d. McDonald: A.Y. McDonald Mfg. Co.
    e. Milwaukee Valve Co., Inc.
    f. Mueller Co.
    g. National Meter.

2. Gas Valves, 2 Inch NPS and Smaller:

    a. Conbraco Industries, Inc.; Apollo Div.
    b. Core Industries, Inc.; Mueller Steam Specialty Div.
    c. Huber: J.M. Huber Corp.; Flow Control Div.
    d. McDonald: A.Y. McDonald Mfg. Co.
    e. Milliken Valve Co., Inc.
    f. Milwaukee Valve Co., Inc.
    g. Mueller Co.
    h. National Meter.
    i. Nordstrom Valves, Inc.
    j. Olson Technologies, Inc.

3. Gas Valves, 2-1/2 Inch NPS and Larger:

    a. Core Industries, Inc.; Mueller Steam Specialty Div.
    b. Huber: J.M. Huber Corp.; Flow Control Div.
    c. Milliken Valve Co., Inc.
    d. Nordstrom Valves, Inc.
    e. Olson Technologies, Inc.
    f. Xomox Corp.

4. Solenoid Valves:

    a. Atkomatic Valve Co., Inc.
    b. Automatic Switch Co.
    c. Goyen Valve Corp.
    d. Honeywell, Inc.; Skinner Valve Div.
    e. ITT Fluid Technology Corp.; ITT Controls.
    f. Magnatrol Valve Corp.

5. Gas Meters:

   a. American Meter Co.
   b. Badger Meter, Inc.; Utility Products Div.
   c. Equimeter, Inc.
   d. National Meter.
   e. Schlumberger Industries; Gas Div.

6. Gas Pressure Regulators:

   a. American Meter Co.
   b. Equimeter, Inc.
   c. Fisher Controls International, Inc.
   d. Maxitrol Co.
   e. National Meter.
   f. Richards Industries, Inc.; Jordan Valve Div.
   g. Schlumberger Industries; Gas Div.

2.2 PIPES AND TUBES

A. Steel Pipe: ASTM A 53; Type E, electric-resistance welded or Type S, seamless; Grade B; Schedule 40; black.

B. Poly Pipe PE: ASTM D-2513 medium density polyethylene (for underground use).

2.3 PIPE AND TUBE FITTINGS

A. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends conforming to ASME B1.20.1.

B. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends conforming to ASME B1.20.1.

C. Steel Fittings: ASME B16.9, wrought steel, butt-welding type; and ASME B16.11, forged steel.

D. Steel Flanges and Flanged Fittings: ASME B16.5.

E. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.

F. Transition Fittings: Type, material, and end connections to match piping being joined.

G. Polyethylene Fittings: Suitable for use with polyethylene pipe.

2.4 JOINING MATERIALS

A. Common Joining Materials: Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not included in this Section.

B. Brazing Filler Metals: AWS A5.8, Silver Classification BAg-1. Filler metal containing phosphorus is prohibited.

C. Joint Compound and Tape: Suitable for natural gas.

D. Gasket Material: Thickness, material, and type suitable for natural gas.

2.5 VALVES

A. Manual Valves: Conform to standards listed or, where appropriate, to ANSI Z21.15.

B. Gas Valves, 2 Inch NPS and Smaller: ASME B16.33, 125 psig WOG, cast-iron body, bronze plug, straightaway pattern, square head, tapered-plug type, with threaded ends conforming to ASME B1.20.1.

C. Gas Valves, 2 Inch NPS and Smaller: 125 psig WOG minimum, equivalent to ASME B16.33, lubricated, straightaway pattern, cast-iron or ductile-iron body. Include tapered plug, O-ring seals, square or flat head, and threaded ends conforming to ASME B1.20.1.

D. Gas Valves, 2 Inch NPS and Smaller: 125 psig WOG minimum, equivalent to ASME B16.33, nonlubricated-plug type with polytetrafluoroethylene (PTFE) lining or sleeve, straightaway pattern, cast-iron body. Include square or flat head and threaded ends conforming to ASME B1.20.1.

1. Locking Device: Include locking (tamperproof) feature.

E. Gas Valves, 2-1/2 Inch NPS and Larger: MSS SP-78, Class 125 or Class 175 WOG, lubricated-plug type, semisteel body, wrench operated, with flanged ends.

2.6 SPECIALTY VALVES

A. Automatic Shutoff Valves: ANSI Z21.21, for operation by appliance automatic shutoff device. 2 inch NPS and smaller with threaded ends conforming to ASME B1.20.1 and 2-1/2 inch NPS and larger with flanged ends.

1. Operation: Mechanical.
2. Operation: Electrical.

B. Solenoid Valves: Bronze, aluminum, or cast-iron body; 120 VAC, 60 Hz, Class B continuous-duty molded coil; UL labeled and FM approved. Include NEMA ISC 6, Type 4, coil enclosure and electrically opened and closed dual coils. Valve position is normally closed. Include threaded ends conforming to ASME B1.20.1 for 2 inch NPS and smaller and flanged ends for 2-1/2 inch NPS and larger.

2.7 PIPING SPECIALTIES

A. Gas Meters: Diaphragm-type, positive displacement, with aluminum cases, temperature compensated, with internal corrosion-resistant components. Include threaded ends conforming to ASME B1.20.1 for 2-inch NPS and smaller and flanged ends for 2-1/2 inch NPS and larger. Meter pressure ratings and flow volume in cubic feet per hour of natural gas at specific gravity are as indicated. Provide transmitter compatible with EMCS (HSQ). Coordinate requirements with Temperature Controls Contractor.

1. Capacity Greater than 500 cu. ft./h: ANSI B109.2.

B. Gas Pressure Regulators: ANSI Z21.18, single-stage, steel-jacketed, corrosion-resistant pressure regulators. Include atmospheric vent, elevation compensator, with threaded ends conforming to ASME B1.20.1 for 2 inch NPS and smaller and flanged ends for 2-1/2 inch NPS and larger. Regulator pressure ratings, inlet and outlet pressures, and flow volume in cubic feet per hour of natural gas at specific gravity are as indicated.

1. Service Pressure Regulators: Inlet pressure rating not less than natural gas distribution system service pressure.
2. Line Gas Pressure Regulators: Inlet pressure rating not less than system pressure.
3. Appliance Gas Pressure Regulators: Inlet pressure rating not less than system pressure, with capacity and pressure setting matching appliance.
4. Gas Pressure Regulator Vents: Factory- or field-installed corrosion-resistant screen in opening when not connected to vent piping.

C. Strainers: Y pattern, full size of connecting piping. Include stainless-steel screens with 3/64-inch perforations, except where other screens are indicated.

1. Pressure Rating: 125 psig minimum steam or 175 psig WOG working pressure, except where otherwise indicated.
2. 2 Inch NPS and Smaller: Bronze body, with threaded ends conforming to ASME B1.20.1.
3. 2-1/2 Inch NPS and Larger: Cast-iron body, with flanged ends.
4. Screwed screen retainer with centered blow-down and pipe plug.

PART 3 - EXECUTION

3.1 PREPARATION

A. Close equipment shutoff valves before turning off gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

B. Comply with NFPA 54 Paragraph "Prevention of Accidental Ignition."

3.2 PIPING APPLICATIONS

A. General: Flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating may be used in applications below, except where otherwise indicated.

B. Low-Pressure, 2 psig or Less, Natural Gas Systems: Use the following:

1. 1 Inch NPS or Smaller: Steel pipe, malleable-iron threaded fittings, and threaded joints.
2. 1-1/4 to 2 Inch NPS: Steel pipe, malleable-iron threaded fittings, and threaded joints.
3. 2-1/2 to 4 Inch NPS: Steel pipe, butt-welding fittings, and welded joints.

C. Medium-Pressure, 2 to 10 psig, Natural Gas Systems: Use the following:

1. 1 Inch NPS and Smaller: Steel pipe, butt-welding fittings, and welded joints.
2. 1-1/4 Inch NPS and Larger: Steel pipe, butt-welding fittings, and welded joints.

D. Gas Service, above 5 psig, Natural Gas Piping at Gas Meters and Regulators: Steel pipe, butt-welding fittings, and welded joints.

3.3 VALVE APPLICATIONS

A. Use gas stops for shutoff to appliances with 2 inch NPS or smaller low-pressure gas supply.

B. Use gas valves for shutoff to appliances with 2-1/2 inch NPS or larger low-pressure gas supply and all sizes for medium-pressure gas supply.

C. Use gas valves of sizes indicated for gas service piping, meters, mains, and where indicated.

3.4 PIPING INSTALLATIONS

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.

B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves in such spaces.
2. In Floors: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 maybe installed in floors, subject to approval of authorities having jurisdiction. Surround piping cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
3. In Floor Channels: Gas piping may be installed in floor channels, subject to approval of authorities having jurisdiction. Channels must have cover and be open to space above cover for ventilation.
4. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.

    a. Exception: Tubing passing through partitions or walls.

5. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 maybe installed in masonry walls, subject to approval of authorities having jurisdiction.
6. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.

    a. Exception: Accessible above-ceiling space specified above.

C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of gas meters. Locate where readily accessible to permit cleaning and emptying. Do not install where condensate would be subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, except where indicated to be exposed to view.

E. Install gas piping at uniform grade of 0.1 percent slope upward toward risers.

F. Eccentric reducers not available in malleable fittings.

G. Connect branch piping from top or side of horizontal piping.

H. Install unions in pipes 2 inch NPS and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

I. Install strainers on supply side of each control valve, gas pressure regulator, solenoid valve, and elsewhere as indicated.

J. Install dielectric fittings (unions and flanges) with ferrous and brass or bronze end connections, separated by insulating material, where piping of dissimilar metals is joined.

K. Install flanges on valves, specialties, and equipment having 2-1/2 inch NPS and larger connections.

L. Anchor piping to ensure proper direction of piping expansion and contraction. Install expansion joints, expansion loops, and pipe guides as indicated.

M. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

N. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches outside building, and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar epoxy-polyamide paint according to SSPC-Paint 16.

3.5 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Use materials suitable for natural gas service.

1. Brazed Joints: Make joints with brazing alloy having melting point greater than 1000 deg F. Brazing alloys containing phosphorus are prohibited.

3.6 VALVE INSTALLATION

A. Install valves in accessible locations, protected from damage. Tag valves with metal tag indicating piping supplied. Attach tag to valve with metal chain.

1. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for valve tags.
2. Refer to Division 15 Section "Mechanical Identification" for valve tags.

B. Install gas valve upstream from each gas pressure regulator. Where 2 gas pressure regulators are installed in series, valve is not required at second regulator.

C. Install pressure relief or pressure-limiting devices so they can be readily operated to determine if valve is free; test to determine pressure at which they will operate; and examine for leakage when in closed position.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

3.8 CONNECTIONS

A. Install gas piping next to equipment and appliances using gas to allow service and maintenance.

B. Connect gas piping to equipment and appliances using gas with shutoff valves and unions. Install gas valve upstream from and within 72 inches of each appliance using gas. Install union or flanged connection downstream from valve. Include flexible connectors when indicated.

C. Sediment Traps: Install tee fitting with capped nipple in bottom forming drip, as close as practical to inlet for appliance using gas.

D. Electrical Connections: Wiring is specified in Division 16 Sections.

3.9 ELECTRICAL BONDING AND GROUNDING

A. Install aboveground portions of natural gas piping systems that are upstream from equipment shutoff valves, electrically continuous, and bonded to grounding electrode according to NFPA 70.

B. Do not use gas piping as grounding electrode.

3.10 FIELD QUALITY CONTROL

A. Inspect, test, and purge piping according to NFPA 54, Part 4 "Gas Piping Inspection, Testing, and Purging" and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

C. Report test results promptly and in writing to Contracting Officer and authorities having jurisdiction.

D. Verify capacities and pressure ratings of gas meters, regulators, valves, and specialties.

E. Verify correct pressure settings for pressure regulators.

F. Verify that specified piping tests are complete.

3.11 ADJUSTING

A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

END OF SECTION 15496

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15540 - HVAC PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following categories of HVAC pumps for hydronic systems:

1. Vertical in-line pumps.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. The Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data including certified performance curves and rated capacities of selected models, weights (shipping, installed, and operating), maintenance data, wiring diagrams, furnished specialties, and accessories. Indicate pump's operating point on curves.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following:

1. Hydraulic Institute's "Standards for Centrifugal, Rotary & Reciprocating Pumps" for pump design, manufacture, testing, and installation.
2. UL 778 "Standard for Motor Operated Water Pumps" for construction requirements. Include UL listing and labeling.
3. NEMA MG 1 "Standard for Motors and Generators" for electric motors. Include NEMA listing and labeling.
4. NFPA 70 "National Electrical Code" for electrical components and installation.

B. Single-Source Responsibility: Obtain HVAC pumps from 1 source and by a single manufacturer. Include responsibility and accountability to answer questions and resolve problems regarding compatibility, installation, performance, and acceptance of pumps.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer.

1. Vertical In-Line Pumps:

a. Amtrol, Inc.
b. Armstrong Pumps, Inc.
c. Grundfos Pumps Corp.
d. Bell & Gossett Div.
e. Paco Pumps, Inc.
f. Taco, Inc.

2.2 PUMPS, GENERAL

A. General: Factory assembled and tested.

B. Types, Sizes, Capacities, and Characteristics: As indicated.

C. Motors Less Than 3 HP: NEMA MG 1, general purpose, continuous duty, Design B, except Design C where required for high starting torque. Furnish single-, multiple-, or variable-speed motors, with type of enclosures and electrical characteristics indicated. Include built-in thermal-overload protection and grease-lubricated ball bearings. Select each motor to be non-overloading over full range of pump performance curve.

D. Motors Greater Than 3 HP - "PREMIUM EFFICIENT MOTORS": Minimum efficiency as indicated according to IEEE 112, Test Method B. Include motors with higher efficiency than "average standard industry motors" according to IEEE 112, Test Method B, if efficiency is not indicated. Select each motor to be non-overloading over full range of pump performance curve.

E. Factory Finish: Manufacturer's standard paint applied to factory-assembled and - tested units before shipping.

2.3 VERTICAL IN-LINE PUMPS

A. Description: Vertical, in-line centrifugal, direct coupled, single-stage, radially split case design. Include vertical mounting, bronze fitted design and mechanical seals rated for 125 psig minimum working pressure and a continuous temperature water temperature rating of 225 deg F.

1. Casing: Cast iron, with threaded companion flanges for piping smaller than NPS 3, drain plug at low point of volute, and threaded gauge tapping at inlet and outlet connections.
2. Impeller: ASTM B 584, cast bronze, statically and dynamically balanced, closed overhang, single suction, and keyed to shaft.
3. Wear Rings: Replaceable, bronze casing ring.
4. Shaft: Stainless steel shaft close coupled to motor shaft.
5. Seals: Mechanical with carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible metal bellows and gasket. The secondary seal shall be EPT or EPDM and suitable for use with propylene glycol.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install pumps according to manufacturer's written installation and alignment instructions.

B. Install pumps in locations indicated and arranged to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Support pumps and piping separately so that piping is not supported by pumps.

D. Suspend in-line pumps using continuous-thread hanger rod of sufficient size to support weight of pump independent of piping system.

END OF SECTION 15540

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DIVISION 15 - MECHANICAL REQUIREMENTS

SECTION 15683 - AIR COOLED CHILLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of reciprocating chillers:

1. Outdoor air cooled chillers.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each chiller including the following:

1. Refrigerant.
2. Capacity.
3. Condenser pressure drop.
4. Cooler pressure drop.
5. Weights (shipping, installed, and operating).
6. Furnished accessories.
7. Installation and startup instructions.

C. Shop drawings detailing fabrication and installation of chiller, including plans, elevations, sections, component details, attachments, and other construction elements including dimensions, weight loadings and distribution, clearances for maintenance and operation, and size and location of field connections.

D. Wiring diagrams detailing power and control wiring. Differentiate clearly between manufacturer-installed wiring and field-installed wiring.

E. Maintenance data for each chiller to include in the operating and maintenance manual specified in Division 1.

F. Certification of performance from the factory.

G. Warranty certification from the manufacturer stating that the entire refrigerant circuit is warranted for not less than one year and the compressor is warranted for not less than 1 year.

1.4 QUALITY ASSURANCE

A. ARI Compliance: Conform to ARI 590 for chiller ratings.

B. ASHRAE Compliance: Conform to ASHRAE 15 for chiller design, construction, leak testing, and installation.

C. ASME Compliance: Comply with ASME "Boiler and Pressure Vessel Code," Section VIII, "Pressure Vessels," Division 1, "Basic Coverage" for constructing and testing cooler pressure vessel. Stamp cooler with ASME mark.

D. NEC Compliance: Comply with applicable NEC requirements pertaining to electrical power and control wiring.

1.5 WARRANTY

A. Written manufacturer's warranty covering parts and labor for compressor or motor failures within a period of 1 year. Warranty period shall begin on the date of issue for the "Substantial Completion Certificate."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide air cooled chillers by one of the following or an equal approved by the Contracting Officer’s Representative:

1. Outdoor Air-Cooled Chillers:

    a. Carrier Corporation, Subsidiary of United Technologies Corp.
    b. McQuay.
    c. The Trane Company.

2.2 OUTDOOR AIR-COOLED CHILLERS

A. Compressor Features: Serviceable hermetic, or scroll with the following options:

1. Multiple cylinders.
2. Stepped capacity control.
3. Vibration isolators to isolate compressors.
4. Crankcase heater.
5. Oil strainer and suction strainer.
6. Oil sight glass.
7. Oil filling connection.
8. Reversible, positive-displacement oil pump.
9. Oil filter with magnetic plug.
10. Suction and discharge line service valves.

B. Refrigerant: R-22 (HCFC-22); full operating charge of refrigerant and oil.

C. Evaporator: Direct-expansion shell and tube cooler with the following features:

1. Refrigerant totally enclosed in the tubes; water enclosed by the shell.
2. Seamless copper tubes expanded into tube sheets, with the following internal finish:

    a. Internal Finish: Smooth.

3. Removable carbon-steel heads.
4. Baffle to ensure oil return.
5. Refrigerant Working Pressure: 300 psig.
6. Water-Side Working Pressure: 350 psig.

D. Insulation: Factory-insulate cooler, suction lines, and other surfaces where condensation might occur with flexible elastomeric insulation of the following thickness:

1. Thickness: 1/2 inch.

E. Air-Cooled Condenser: Include the following features:

1. Coils: Seamless copper tubing mechanically jointed to aluminum fins.

a. Factory leak-test coils.
b. Minimum Test Pressure: 375 psig.

2. Fans: Direct drive, statically and dynamically balanced, with fan guards.
3. Fan Motor: 3-phase, inherent overload protection, permanently lubricated bearings.

F. Exterior Casing: Manufacturer's standard equipment casing with the following features:

1. Coated with corrosion-resistant exterior finish.
2. Removable doors or panels for service and inspection of components.
3. Hail guards over condenser coils.

G. Refrigerant Circuit Accessories: Include the following:

1. Solenoid valve in each liquid line.
2. Filter/dryer for each circuit with replaceable core.
3. Sight glass and moisture indicator in each liquid line.
4. Thermal-expansion valve for each circuit.
5. Manual shutoff in each liquid line.
6. Refrigerant charging connection for each circuit.
7. Dual circuits to be completely independent of each other.
8. Hot gas mufflers.
9. Purge valves.
10. 450 psig relief valve.

H. Temperature Panel: Provide manufacturer’s standard microprocessor based controls to stage the chiller based on a factory installed leaving chilled water sensor. House controls in weather proof control cabinet. The microprocessor based control system shall have a digital display that provides access to setpoints, operating states, and alarms with ability to log chiller operating conditions so that they can be viewed from a single keypad/display. At a minimum the user shall have access to the following setpoints and operating states through the control system:

1. Leaving chilled water temperature.
2. Chilled water setpoint temperature.
3. Refrigerant pressures/temperatures.
4. Alarm messages, time and date stamped.
5. Internal time clock with 365 days a year programming for time scheduling.
6. Auto/stop switch.

I. Safety Controls: Safeties controlled by the microprocessor include:

1. Oil differential pressure.
2. High refrigerant pressure.
3. Loss of refrigerant charge.
4. Loss of waterflow.
5. Freeze protection.
6. Low refrigerant pressure.
7. Anti-recycle function programmed to provide the least amount of time off line while providing the maximum in compressor motor protections.
8. Phase loss, phase reversal, and under or over voltage signal.

J. Accessories: Provide the following accessories:

1. Evaporator flow switch.
2. Hot gas bypass valve, factory-piped and wired.
3. Factory installed nonfused disconnect switch.
4. Provide chiller with factory installed contacts for connection by Temperature Control Contractor: generic alarm for chiller failure.
5. Control circuit transformer for single point power connection.
6. Auto restart after power failure.
7. Power terminal block.
8. External overload protection.
9. Condenser fan speed control.
10. Outdoor ambient lock-out.
11. Suction pressure discharge pressure, and oil pressure gauges with isolation valves.
12. Part winding start to reduce current in rush by providing two-step starting of each compressor.

K. Vibration Control: Direct isolation (no base) and the following vibration isolators as referenced in Chapter 42 of the 1991 ASHRAE "Handbook--Heating, Ventilating, and Air-Conditioning Applications":

1. Vibration Isolators: Rubber mounts (Type 2) suitable for exterior installation, minimum deflection of 0.25 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install chillers in accordance with manufacturers printed installation instructions.

B. Install and anchor chillers plumb and level.

C. Install vibration isolators according to isolator manufacturer's recommendations.

D. Maintain manufacturer's recommended clearances for service and maintenance.

E. Install piping connections, maintaining clearances for service and maintenance.

F. Install flanged or union connections at chillers.

G. Install flexible pipe connections for chillers mounted on vibration isolators.

H. Install shutoff valves at chiller inlet and outlet connections.

I. Electrical Wiring: Install electrical devices furnished loose by manufacturer, including remote flow switches and remote chiller control panel. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer.

3.2 DEMONSTRATION

A. Startup Services: Provide factory-authorized service representative to start chillers and to demonstrate and train Government’s maintenance personnel as specified below.

1. Test and adjust chiller controls and safeties. Lubricate rotating parts. Verify that motor amperage conforms to manufacturer's data.
2. Start chiller and verify performance. Demonstrate operation to Government.
3. Provide four (4) hours of training to train Government's maintenance personnel on procedures and schedules for startup, shutdown, trouble-shooting, servicing, and preventive maintenance.
4. Review data in operating and maintenance manuals. Refer to Division 1 Section General Requirements " Operations And Maintenance Manuals."
5. Schedule training with Government through Contracting Officer with at least 7 days notice.

END OF SECTION 15683

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15755 - HEAT EXCHANGERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes heat exchangers for HVAC applications.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each heat exchanger, including rated capacities, pressure drop, weights (shipping, installed, and operating), maintenance data, wiring diagrams, and installation and startup instructions.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Fabricate and stamp heat exchangers to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative.

1. Shell-and-Tube Heat Exchangers:

a. Amtrol Inc.
b. Armstrong Pumps, Inc.

c. ITT Fluid Technology Corporation.; ITT Bell & Gossett.
d. Taco, Inc.

2.2 RATINGS

A. Maximum Temperature: 450 deg F.

B. Maximum Shell Pressure: 150 psig.

C. Maximum Tube Pressure: 600 psig.

D. Heat Exchanger Type: Water to water/glycol.

E. Number of Passes: Multipass.

2.3 SHELL-AND-TUBE HEAT EXCHANGERS

A. Shell and Head Materials: Steel shell and cast-iron head and copper nickel (90-10 baffles).

B. Tube and Tube Sheet Materials: 90-10 cupro nickel tubes with steel tube sheets, 0.049 inch thickness.

C. Piping Connections: Flanged head ports, threaded or flanged shell connections..

D. Shell and tube gasket type shall be spiral flex.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive work for compliance with installation tolerances and for structural rigidity, strength, anchors, and other conditions affecting performance of the heat exchanger. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install heat exchangers according to manufacturer's written instructions.

B. Install heat exchangers plumb and level; anchor with supports.

C. Maintain manufacturer's recommended clearances for service and maintenance. Install piping connections maintaining clearances for service and maintenance of heat exchangers.

END OF SECTION 15755

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15766 - CABINET UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes cabinet unit heaters.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of product specified, wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring, Operating and Maintenance data, weights, dimension, metal gages, and data on ratings and capacities.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative.

1. Carrier Corp.
2. McQuay International.
3. Modine Manufacturing. Company.
4. Trane Company.
5. York International.

2.2 CABINET UNIT HEATERS

A. Description: An assembly including cabinet, filter, chassis, coil, fan, and motor in blow-through configuration with heating coil.

1. Cabinet: As indicated.

B. Cabinet: For one or more of the following configurations:

1. Surface, ceiling mounting.

a. Air Inlet: Bottom grille.
b. Air Outlet: Bottom grille.

2. Recessed, ceiling-mounting front grilles for air inlet and outlet.

2.3 MATERIALS

A. Chassis: Galvanized steel, with flanged edges and unit-leveling bolts.

B. Coil Section Insulation: 1 inch duct liner complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Fire-Hazard Classification: Duct liner and adhesive shall have a maximum flame-spread rating of 25 and smoke-developed rating of 50 when tested according to ASTM E 84.

C. Cabinet: Galvanized steel, with removable panels fastened with tamperproof fasteners.

D. Cabinet Finish: Baked-on, color selected by Contracting Officer.

2.4 COILS

A. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and with manual air vent. Coils shall be rated for a minimum working pressure of 300 psig and a maximum entering water temperature of 275 deg F, with manual air vent.

2.5 FAN

A. Centrifugal, with forward-curved, double-width wheels and fan scrolls made of galvanized steel or thermoplastic material; directly connected to motor.

2.6 FAN MOTORS

A. Comply with requirements in Division 15 Section “Motors.”

B. Multispeed motor with integral thermal-overload protection and resilient mounts. Connect motor to chassis wiring with plug connection.

2.7 ACCESSORIES

A. Steel subbase, height as indicated.

B. Plastic motor-oiler tubes extending to beneath top discharge grille.

C. Steel recessing flanges for recessing cabinet unit heaters into ceiling.

D. Filters: 1 inch thick, glass-fiber media in fiberboard frame.

E. Dampers: Steel damper blade**(s)** with polyurethane stop across entire blade length and having factory-mounted electric operators for proportioning amounts of outside air and return air.

2.8 CONTROL SYSTEMS

A. Control Devices: Unit-mounted fan-speed switch, thermostat by Temperature Control Contractor.

2.9 SOURCE QUALITY CONTROL

A. Test cabinet unit heater coils according to ASHRAE 33.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cabinet unit heaters level and plumb.

B. Install cabinet unit heaters to comply with NFPA 90A.

C. Suspend cabinet unit heaters from structure with rubber-in-shear vibration isolators (rubber hangers).

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing and report results in writing:

1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation, and compliance with requirements.
2. Test and adjust controls and safeties.

B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 CLEANING

A. Install new filters in each cabinet unit heater within two weeks after Substantial Completion.

END OF SECTION 15766

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2 to plus 10-inch wg.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Contracting Officer. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For duct liner and sealing materials.

1.5 QUALITY ASSURANCE

A. SMACNA Compliance: Comply with applicable standards of the Sheet Metal and Air Conditioning Contractors National Association, Inc. latest edition.

B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.

C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, exposed matte finish.

C. Aluminum Sheets: ASTM B 209, Alloy 3003, Temper H14, sheet form with standard, one-side bright finish for ducts exposed to view and with mill finish for concealed ducts.

D. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 DUCT LINER

A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."

B. Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.

1. Thickness: 1/2 inch.
2. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
3. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
4. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
5. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner

when applied as recommended by manufacturer and without causing leakage in duct.

a. Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.
b. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
c. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.3 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
3. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
4. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.

1. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.

2.5 RECTANGULAR DUCT FABRICATION

A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

B. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:

1. Supply Ducts: 2-inch wg.
2. Exhaust Ducts: 2-inch wg, negative pressure.

C. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.

D. Ductmate or W.D.C.I. proprietary duct connection systems will be accepted. Duct constructed using these systems will refer to the manufacturer’s guidelines for sheet gauge, intermediate reinforcement size and spacing, and joint reinforcements.

2.6 SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS

A. Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.

B. Apply adhesive to liner facing in direction of airflow not receiving metal nosing.

C. Butt transverse joints without gaps and coat joint with adhesive.

D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

E. Do not apply liners in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.

F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.

G. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely around perimeter; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.

H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profile or are integrally formed from duct wall. Fabricate edge facings at the following locations:

1. Fan discharge.
2. Intervals of lined duct preceding unlined duct.
3. Upstream edges of transverse joints in ducts.

I. Secure insulation liner with perforated sheet metal liner of same metal thickness as specified for duct, secured to ducts with mechanical fasteners that maintain metal liner distance from duct without compressing insulation.

1. Sheet Metal Liner Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

J. Terminate liner with duct buildouts installed in ducts to attach dampers, turning vane assemblies, and other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct wall with bolts, screws, rivets, or welds. Terminate liner at fire dampers at connection to fire-damper sleeve.

2.7 ROUND DUCT FABRICATION

A. Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer’s Representative.

1. Norlock.
2. Semco.
3. United McGill.

2.8 ROUND SUPPLY AND EXHAUST FITTING FABRICATION

A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.

B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.

C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows one and one-half times elbow diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg:

    a. Ducts 3 to 26 Inches in Diameter: 0.028 inch.

2.9 ROUND TAKEOFFS FROM RECTANGULAR DUCTS

A. Provide factory fabricated high efficiency fittings with a rectangular opening in the main duct, 45 deg square to round transition and a single blade damper with locking quadrant in the round connection.

B. Provide factory fabricated zero-rise duct takeoffs where shown on drawing and as required to suite field conditions.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.

B. Construct and install each duct system for the specific duct pressure classification indicated.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, changes in size and shape, and connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct.

F. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.

J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

K. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."

N. Provide temporary cover over duct openings during construction to keep duct interior clean.

O. Connect round ducts to rectangular ducts with high efficiency 45 deg tap fittings. Seal fitting connection to rectangular duct with duct sealer.

P. Turning Vanes: Install turning vanes in all square and rectangular elbows of supply, return, and exhaust air systems unless otherwise indicated.

Q. Provide custom rectangular "zero-rise" takeoffs where indicated on drawings and as required to suite field conditions.

3.2 SHOWER ROOM EXHAUST DUCTS

A. Install ducts from rooms containing showers pitched up in direction of air flow so moisture drains back to air inlet. Connect air inlet grille, or register so moisture drains out through openings in face.

3.3 SEAM AND JOINT SEALING

A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Pressure Classification Less Than 2-Inch wg Transverse joints.

C. Seal externally insulated ducts before insulation installation.

3.4 HANGING AND SUPPORTING

A. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Support vertical ducts at a maximum interval of 16 feet and at each floor.

D. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

E. Install concrete inserts before placing concrete.

F. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3.5 CONNECTIONS

A. Connect equipment with flexible connectors according to Division 15 Section "Duct Accessories."

B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Use 45 degree entry for branch connections, straight tap fittings are not acceptable.

3.6 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

3.7 DUCT SCHEDULE

A. General exhaust, ventilation air supply, rest room exhaust and other general use ductwork: Galvanized Z 90.

B. Range Hood: Aluminum

C. Dryer Exhaust: Aluminum.

END OF SECTION 15815

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15820 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Manual-volume dampers.
2. Fire dampers.
3. Combination fire and smoke dampers.
4. Turning vanes.
5. Duct-mounted access doors and panels.
6. Duct accessory hardware.
7. Louvers.
8. Roof mounted exhaust hood.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Submit manufacturer’s technical product data. Maintenance and operation data, including rated capacities of selected model clearly indicated, dimensions, required clearances, weights, furnished specialties, and accessories; and installation and startup instructions.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA standards:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

PART 2 - PRODUCTS

2.1 MANUAL-VOLUME DAMPERS

A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

B. Standard Volume Dampers: Single blade in round and rectangular ducts when dimensions are less than 12 inches. Larger sizes uses multiple blades. Parallel blade for mixing applications, otherwise, opposed-blade design, standard leakage rating, and suitable for horizontal or vertical applications. Galvanized steel materials except aluminum materials in aluminum ductwork.

1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch thick, galvanized, sheet steel.
3. Blade Axles: Galvanized steel.
4. Tie Bars and Brackets: Galvanized steel.

C. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.2 FIRE DAMPERS

A. General: Labeled to UL 555.

B. Fire Rating: One and one-half and three hours as required by wall type indicated on Architectural plans.

C. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

D. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.

1. Minimum Thickness: 0.052-inch or 0.138-inch thick as indicated, and length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 0.034-inch thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch thick, galvanized steel blade connectors.

G. Fusible Link: Replaceable, 165 deg F rated as indicated.

2.3 COMBINATION FIRE SMOKE DAMPERS

A. General: UL-labeled according to UL Standard 555S, “Standard for Leakage Rated Dampers for Use in Smoke Control Systems.” Combination fire and smoke dampers shall be UL-labeled for 1-1/2 hour rating according to UL Standard 555 “Standard for Fire Dampers.” Ruskin Model FSD35 for systems having 2.5 inch W.G. maximum pressure and velocities to 1500 FPM.

B. Fusible Link: Replaceable, 165 deg F.

C. Frame: 5 inches x 16-gage galvanized steel.

D. Blades: 6 inches wide, 16-gage galvanized steel with closure spring.

E. Mounting Sleeve: Factory of field-installed, as required by NFPA.

F. Leakage Class: Class III leakage rated smoke damper.

G. Size: In ducts less than 18 inches x 18 inches, damper sizes shall be increased to provide a free area equal to the attached ductwork.

H. Damper Motors: Provide motors for smooth modulating opening action and spring closing action.

1. Spring-Return Motors: Equip with an integral spiral-spring mechanism. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 inch-pounds and breakaway torque rating of 150 inch-pounds.
2. 120 Volt.

2.4 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Manufactured Turning Vanes: Fabricate of 1-1/2 inch wide, curved blades set 3/4-inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into side strips suitable for mounting in ducts.

2.5 DUCT-MOUNTED ACCESS DOORS AND PANELS

A. General: Fabricate doors and panels airtight and suitable for duct pressure class.

B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.

C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include 1-by-1-inch butt or piano hinge and cam latches.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1 inch thick, fibrous-glass or polystyrene-foam board when installed in ductwork to be insulated.

2.6 ACCESSORY HARDWARE

A. Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch, zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.7 LOUVERS

A. General: Provide manufacturer’s standard louvers of size, shape, capacity and type indicated and as required for complete installation.

B. Finishes: Provide louvers with a baked enamel finish with bronze color. See Architect's specifications for paint identification number.

C. Substrate Compatibility: Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction Drawings and Specifications for types of substrate which will contain each type of louver.

D. Materials: Extruded aluminum blades with 0.081-inch wall thickness.

E. Louver Screens: On inside face of exterior louvers, provide 1/2-inch square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

F. Sills: Provide formed metal sills of the same material and finish as the louver.

G. Mullions: Provide concealed horizontal and vertical mullions.

H. Manufacturers: Subject to compliance with requirements, manufacturers offering louvers which may be incorporated in the work include, but are not limited to, the following:

1. Airline Products Co.
2. Airolite Co.
3. American Warming & Ventilating, Inc.
4. Arrow United Industries, Inc.
5. Dowco Corp.
6. Louvers & Dampers, Inc.
7. Penn ventilator Co., Inc.
8. Ruskin Mfg. Co.
9. United Air.

2.8 EXHAUST HOOD

A. Construction: Provide exhaust hood for roof installation constructed of no less than .025 gage 35-alloy aluminum. Extruded aluminum base angle shall be .090 inch thick with continuous, welded, mitered corners. Provide the following accessories on each penthouse:

1. Anticondensate coating on underside of hood.

B. Manufacturers: Subject to compliance with requirements, manufacturers offering roof penthouses which may be incorporated in the work include, but are not limited to, the following:

1. Acme Engineering & Manufacturing Co.
2. Ammerman Co.
3. Carnes Co.
4. Greenheck Fan Corp.
5. Loren Cook Co.
6. Penn Ventilator Co.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.

B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.

C. Install fire and combination fire and smoke dampers according to manufacturer's UL-approved written instructions.

1. Install fusible links in fire dampers.

D. Install duct access panels for access to inlet side of duct coils. Install duct access panels downstream from fire dampers.

1. Install access panels on side of duct where adequate clearance is available.

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire and smoke dampers for proper action.

C. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

3.3 TURNING VANES

A. Install turning vanes in elbows in supply, return, exhaust, outside air, relief air and special system dusts.

3.4 DUCT-MOUNTED ACCESS DOORS

A. Install duct-mounted access doors as indicated and at fire dampers, combination fire and smoke dampers, motorized dampers, temperature control dampers, and as required for access to equipment needing maintenance.

3.5 ACCESS DOOR MATERIALS SCHEDULE

DUCT PRESSURE CLASS	DOOR SIZE INCHES	NUMBER OF HINGES	NUMBER OF LOCKS	FRAME	METAL GAGE DOOR	BACK
2 INCHES AND LESS	12 x 12	2	1-S	24	26	26
	16 x 20	2	2-S	24	24	26
	24 x 24	3	2-S	24	22	26
S: Side						

3.6 ACCESSORIES HARDWARE

A. Install accessories hardware as required to provide accurate positioning of splitter dampers and manual volume control dampers.

3.7 LOUVERS

A. Install louvers in accordance with manufacturer's instructions and details for a weatherpoof system. Caulk perimeter with color match, non-shrink and non-hardening caulk. Coordinate installation with general contractors and architectural installation details.

3.8 EXHAUST HOOD

A. Install on curbs in accordance with manufacturer's instructions and details as indicated. Lag bolt to curb with cadmium plated bolts.

END OF SECTION 15820

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15831 - FAN-COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fan-coil units with water coils for cooling and heating as indicated on drawings.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data for each type of product specified including capabilities, dimensions, weights, maintenance data, wiring diagrams, and installation instructions. Include manufacturer's sound data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Enviro-Tech.
2. McQuay.
3. Trane.

2.2 MATERIALS

A. General: Provide fan-coil units having cabinet sizes, and in locations indicated, and of capacities, style, and having accessories as scheduled. Include in basic unit chassis, coils, fanboard, drain pan assembly, fans, housing, motor, filter and insulation.

B. Chassis: Galvanized steel with flanged edges.

C. Coil Section Insulation: Faced, heavy-density, glass-fiber insulation over entire section.

D. Drain Pans: Galvanized steel, with connections for drain and auxiliary drain. Drain pan insulated with polystyrene or polyurethane insulation.

E. Cabinet: 18 gage minimum galvanized steel with removable panels.

1. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge. Powder coat finish in a color selected by the Contracting Officer.

F. Cabinet Finish: Powder coat.

2.3 WATER COILS

A. Fin-and-Tube Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch. Leak test to 300 psig underwater.

2.4 FAN

A. Centrifugal fan, with forward-curved, double-width wheels of reinforced fiberglass, in galvanized steel fan scrolls, directly connected to manufacturer's standard motor.

B. Provide three-speed fan motor.

2.5 ACCESSORIES

A. Discharge grille panels fabricated of galvanized steel with stamped integral grilles and access doors.

B. Wiring Terminations: Match conductor materials and sizes indicated. Connect motor to chassis wiring with plug connection.

C. Filters: 1-inch-thick, throwaway filters in fiberboard frames.

D. Factory installed disconnect switch.

E. Auxiliary drip pan for T.C. valve and accessories.

F. Integral outside air intake as configured on drawings.

G. Provide access panel where indicated on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fan-coil units as indicated, to comply with manufacturer's written instructions and NFPA 90A.

B. Connect fan-coil units and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.

C. Install valves and related devices within access panel perimeter to facilitate maintenance. Contractor is encouraged to use combination valve assemblies as indicated on drawings. Refer to automatic balancing devices in Section 15181 for listed manufacturers of combination valve assemblies.

END OF SECTION 15831

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15832 - FINNED-TUBE RADIATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes finned-tube radiation.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of product specified. Operating and Maintenance data, dimensions, metal gages and data on ratings and capacities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide finned-tube radiation by one of the following or an equal approved by the Contracting Officer's Representative:

1. Hydronic Finned-Tube Radiation Units:

a. Rittling.
b. Slant/Fin Corp.
c. Trane Co.
d. Vulcan Radiator Co.

2.2 HYDRONIC FINNED-TUBE RADIATION UNITS

A. Ratings based on design tests performed by The Hydronics Institute.

B. Finned Tubes: Copper with mechanically bonded aluminum fins, supported to eliminate thermal expansion noise.

C. Backplate: 18 gage steel, with flat black, heat-resisting enamel finish matching front enclosure. Provide full backplate where units are installed on window mullions. Provide partial backplate where units are mounted to solid walls.

D. Enclosure: Steel minimum 16 ga., enclosure style as indicated on schedule. Each enclosure section including filler and end pieces shall lock together on the front bottoms. Brace and reinforce front minimum of 4-feet o.c. without visible fasteners.

1. Finish: Manufacturer's standard finish, color selected by Contracting Officer.

E. Accessories:

1. End panels and enclosure extensions.
2. Access panels in front of valves.
3. Sill extensions.
4. Mullion channels.

2.3 SOURCE QUALITY CONTROL

A. Test steam and hydronic coils to 400 psig underwater.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine heating units for compliance with requirements for installation tolerances and other conditions affecting performance of units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install finned-tube radiation units level and plumb, according to manufacturer's written instructions, rough-in drawings, the original design, and referenced standards.

1. Use methods and accessories to accommodate thermal expansion.

2. Use manufacturer's standard wall trim. Wall to wall installations shall have end caps on wall trim assemblies.
3. Install manufacturer's access fitting for access to valves and other fittings.
4. Install air-seal gasketing between wall and enclosure mounting channel.
5. Terminate unit enclosures with manufacturer's end caps.

3.3 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris; repair damaged finishes, including chips, scratches, and abrasions.

END OF SECTION 15832

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DIVISIN 15 – MECHANICAL REQUIREMENTS

SECTION 15835 - PROPELLER UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes propeller unit heaters.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include specialties and accessories for each unit type and configuration.

C. Shop Drawings: Submit the following for each unit type and configuration:

1. Plans, elevations, sections, and details.
2. Details of anchorages and attachments to structure and to supported equipment.
3. Power, signal, and control wiring diagrams. Differentiate between manufacturer-installed and field-installed wiring.
4. Equipment schedules to include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

D. Maintenance Data: For propeller unit heaters to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide one of the following products or an equal approved by the Contracting Officer.

1. McQuay International.
2. Modine Manufacturing. Company
3. Reznor.
4. Trane Company (The); North American Commercial Group.

2.2 UNIT HEATERS

A. Description: An assembly including casing, coil, fan, and motor in horizontal discharge configuration with horizontal, adjustable louvers in blow-through configuration.

2.3 MATERIALS

A. Casing: Galvanized steel, with removable panels.

B. Cabinet Finish: Bonderize, phosphatize, and flow-coat with baked-on primer and manufacturer's standard paint applied to factory-assembled and tested propeller unit heater before shipping.

2.4 COILS

A. Hot-Water Coil: Copper tube, 0.031-inch wall thickness, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering water temperature of 325 deg F, with manual air vent. Test for leaks to 375 psig underwater.

2.5 FAN

A. Propeller with aluminum blades directly connected to motor.

2.6 FAN MOTORS

A. Comply with requirements in Division 15 Section “Motors.”

1. Multispeed motor with integral thermal-overload protection.

2.7 ACCESSORIES

A. Horizontal Configuration: Louver fin diffuser, four-way distribution.

2.8 SOURCE QUALITY CONTROL

A. Test propeller unit heater coils according to ASHRAE 33.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install propeller unit heaters level and plumb.

B. Install propeller unit heaters to comply with NFPA 90A.

C. Suspend propeller unit heaters from structure with rubber-in-shear vibration isolators (rubber hangers). Vibration isolators are specified in Division 15 Section "Mechanical Vibration Controls and Seismic Restraints."

D. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing and report results in writing:

1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation and compliance with requirements.
2. Test and adjust controls and safeties.

B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 CLEANING

A. Install new filters in each propeller unit heater within two weeks after Substantial Completion.

3.5 DEMONSTRATION

A. Train Government's maintenance personnel to adjust, operate, and maintain propeller unit heaters.

1. Train Government's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
2. Review data in maintenance manuals. Refer to Division 1 Section " Operations And Maintenance Manuals."
3. Schedule training with Government, through Contracting Officer, with at least seven days advance notice.

END OF SECTION 15835

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15838 - POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Ceiling-mounting ventilators.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on actual site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material gages and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

D. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. UL Standard: Power ventilators shall comply with UL 705.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements. Provide products by one of the following or an equal approved by Contracting Officer:

1. Ceiling-Mounting Ventilators:

a. ACME Engineering & Manufacturing Company
b. Broan Mfg. Co., Inc.
c. Cook, Loren Company.
d. Greenheck Fan Corp.
e. Penn Ventilation Companies, Inc.

2.2 CEILING-MOUNTING VENTILATORS

A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Plastic, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories: The following items are required as indicated:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 percent to less than 50 percent.
2. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.3 FACTORY FINISHES

A. Sheet Metal Parts: Prime coat before final assembly.

B. Exterior Surfaces: Baked-enamel finish coat after assembly.

C. Aluminum Parts: No finish required.

2.4 SOURCE QUALITY CONTROL

A. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

C. Install units with clearances for service and maintenance.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

B. Install ducts adjacent to power ventilators to allow service and maintenance.

END OF SECTION 15838

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15845 - AIR TERMINALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fan-powered air terminals.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide air terminals by one of the following or an equal approved by the Contracting Officer.

1. Anemostat Products Div.
2. Carnes Co., Inc.
3. Carrier Corp.
4. Enviro-Tech.
5. Krueger.
6. Titus.
7. Trane Co. (The).

2.2 FAN-POWERED AIR TERMINALS

A. Configuration: Volume-damper assembly and fan in parallel arrangement inside unit casing. Locate control components inside protective metal shroud.

B. Casings: Steel or aluminum sheet metal of the following minimum thicknesses:

1. Upstream Pressure Side: 0.0239-inch steel.
2. Downstream Pressure Side: 0.0179-inch steel.

C. Casing Lining: Minimum of 1/2-inch- thick, neoprene- or vinyl-coated, fibrous-glass insulation; 1.5-lb/cu. ft. density, complying with NFPA 90A requirements and UL 181 erosion requirements. Secure lining to prevent delamination, sagging, or settling.

1. Coat liner surfaces and edges with erosion-resistant coating or cover with perforated metal.

D. Plenum Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.

E. Plenum Air Outlets: S-slip and drive connections.

F. Access: Removable panels to permit access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.

G. Volume Damper: Construct of galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: 2 percent of nominal airflow at 1-inch wg inlet static pressure.
2. Damper Position: Normally closed.

H. Fan Section: Galvanized-steel plenum, acoustically lined, housing direct-drive, forward-curved fan with permanent split-capacitor motor, air filter, and backdraft damper.

1. Speed Control: Furnish with fan speed controller to facilitate system balancing.
2. Isolation: Fan-motor assembly on rubber isolators.

I. Attenuator Section: Line with 2-inch- thick, neoprene- or vinyl-coated, fibrous-glass insulation.

J. Hot-Water Heating Coil: 1/2-inch copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig. Factory or field mounted to discharge of fan powered box.

K. Factory-mounted and -wired controls: Mount electrical components in control box with removable cover. Incorporate single-point electrical connection to power source.

1. Factory-mounted transformer for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
2. Wiring Terminations: Fan and controls to terminal strip, and terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box sized according to NFPA 70.
3. Disconnect Switch: Factory-mounted, fused, disconnect switch.

L. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

M. Electric Controls: 24-V damper actuator with wall-mounted electric thermostat and appropriate mounting hardware. Coordinate with Temperature Controls Contractor.

2.3 SOURCE QUALITY CONTROL

A. Testing Requirements: Test and rate air terminals according to ARI 880, "Industry Standard for Air Terminals."

B. Identification: Label each air terminal with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air terminals level and plumb, according to manufacturer's written instructions, rough-in drawings, original design, and referenced standards; and maintain sufficient clearance for normal service and maintenance.

B. Connect ductwork to air terminals according to Division 15 ductwork Sections.

3.2 CONNECTIONS

A. Install piping adjacent to air terminals to allow service and maintenance.

B. Hot-Water Piping: In addition to requirements in Division 15 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

3.3 FIELD QUALITY CONTROL

A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

END OF SECTION 15845

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15846 - AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Packaged energy recovery units.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, accessories, and installation and startup instructions.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following codes:

1. ASHRAE Compliance: Provide capacity ratings for energy recovery devices according to ASHRAE 84, "Method of Testing Air-to-Air Heat Exchangers."

B. UL Standard: Provide units complying with UL 1812, "Ducted Heat Recovery Ventilators".

C. UL and NEMA Compliance: Provide ancillary electrical components required as part of energy recovery units that are listed and labeled by UL and that comply with applicable NEMA standards.

D. Comply with NFPA 70 for components and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide one of the following products or an equal approved by the Contracting Officer's Representative:

1. Packaged Energy Recovery Units:

a. Des Champs Laboratories Inc.
b. Heat-Ex.

2.2 PACKAGED ENERGY RECOVERY UNITS

A. Housing: Galvanized steel panels fastened to structural-steel or formed galvanized steel internal frame, gasketed and caulked weather tight; with waterproof floor, manufacturer's standard paint finish, and lifting lugs.

1. Insulation: 1-inch thick fiberglass, coated on airstream side.
2. Access Doors: Double-wall insulated, one side hinged with minimum of 2 cam latches operated from either side. Provide adequate access doors to clean coils, drain pans, fan blades, and service dampers.

B. Fixed-Plate Heat Exchangers: Construct with plates evenly spaced and sealed, arranged for counterflow airflow.

1. Plate Material: Embossed aluminum.
2. Traversing defrost system. Heat exchanger core shall be specifically designed to accommodate traversing defrost plate on the outside airstream. Provide all factory controls to accommodate defrost cycle.

C. Supply and Exhaust Fans: As scheduled, with spring isolation base and flexible duct connections, adjustable belt drives, and motors on adjustable motor bases. Provide access openings in fan guards for checking fan speed. Provide extended grease fittings for bearings where required for access.

D. Filters: Disposable, 2 inches thick, in galvanized steel frame, on supply (outside air) of unit. Washable wire mesh on exhaust air stream. Provide pressure gauge across filter sections.

E. Piping and Wiring: Fabricate units with space within housing for piping and electrical conduits. Wire motors and controls so only external connections are required during installation.

F. Coils: Heating coil shall be drainable and cleanable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive energy recovery units for compliance with requirements for installation tolerances and other conditions affecting performance of energy recovery units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install energy recovery units as indicated, according to manufacturer's written instructions.

B. Install fixed-plate heat exchangers so supply and exhaust flow in opposite directions.

1. Install duct access doors in both supply and exhaust ducts, both upstream and downstream, for access to heat exchanger.

C. Install floor-mounted units on 4-inch- high concrete housekeeping base. Pad to be 6 inches larger than unit on all sides.

D. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

3.3 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect and clean exposed finishes. Remove dirt and construction debris and repair damaged finishes.

3.4 DEMONSTRATION

A. Train Government's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

B. Review data in the operation and maintenance manuals. Refer to Division 1 Section " Operations And Maintenance Manuals."

C. Schedule training with Government, through Contracting Officer, with at least 7 days advance notice.

3.5 SEQUENCE OF OPERATION

A. General: Refer to Section 15985 for complete Sequence of Operation. Purpose of this part is to aid air-to-air heat recovery manufacturer in selecting system configuration and options in order to perform design sequence.

B. Unit shall be indexed on by EMCS. Discharge air control, including control of unit mounted coil shall be by EMCS. All safeties including smoke detectors and freeze protection by others.

C. Freeze Protection Control: Unit shall be furnished with defrost control consisting of traversing defrost plate, sensors, traversing plate actuator and related control devices. Upon exhaust air dropping below 37 deg F (field adjustable) the defrost plate shall energize.

END OF SECTION 15846

DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 DEFINITIONS

A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

C. Register: A combination grille and damper assembly over an air opening.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each model indicated, include the following:

1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered if submitted to and approved by the Contracting Officer.

B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer’s Representative.

1. Anemostat.
2. Carnes.
3. Hart & Coolie.
4. Krueger.
5. Titus.

B. Diffusers, registers, and grilles are scheduled on Drawings.

2.2 SOURCE QUALITY CONTROL

A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, original design, and referenced standards.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Contracting Officer for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 15855

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15915 – BASEWIDE ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS) --- HSQ SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work consists of the installation of all field devices, sensors, relays, controllers, enclosures, panels and wiring for connection to and interface with the existing Base Energy Management and Control System (EMCS). Included is all required datapoint setup, preparation, programming, testing and training to provide a complete and functional EMCS system. The work for this repair and upgrade addition to the EMCS shall be accomplished using only HSQ products for a complete and proper interface into the existing HSQ EMCS system. The HSQ products include but may not be limited to the RTU panel, and associated RTU components and all system software.

1. The project generally involves the installation of new EMCS in designated buildings as well as the expansion of existing EMCS in buildings that are already connected to the Base system.
2. The existing system is manufactured by HSQ Technology, 1435 Huntington Avenue, South San Francisco, CA 94083-2248, Telephone 800-486-6684. Software programming of the existing EMCS system and new upgrades for the EMCS and new additions to the EMCS shall be provided by HSQ Technology. The software will be provided to the extent that the graphics and the database can be done by the government personnel. HSQ shall provide the termination and point identificaton sheets. Fiber optic transmission system is specified in Division 16.

B. Applicable Publications: The publications listed below form a part of this specification to the extent referenced. The publications are referred in the text by the basic designation only.

1. Federal Specification (Fed. Sec.): ZZ-R-765B & Am-1 Rubber, Silicone

2. Military Standard (Mil. Std.): MIL-STD-461B Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.

3. American Society of Heating, Refrigeration, and Air Conditioning Engineering (ASHRAE) Publication: Handbook Fundamentals, 1981.

4. American National Standards Institute (ANSI) Publications:

   a. C2-1981 National Electrical Safety Code.
   b. C57.13-1978 Instrument Transformers.
   c. X3.64-1979 Additional Controls for Use with American National Standard Code for Information Interchange (ASCII).
   d. X3.9-1978 Programming Language, FORTRAN
   e. X4.14-1971 Alphanumeric Keyboard Arrangements Accommodating the Character Sets of ASCII and ASCSOCR

5. Electronic Industries Association (EIA) Publications:

   a. RS-232-C Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange (Oct. 1969).
   b. RS-422-A Electrical Characteristics of Balanced Voltage Digital Interface Circuits (Dec. 1978).
   c. RS-423-A Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits (Dec. 1978)

6. The Institute of Electrical and Electronics Engineers, Inc. (IEEE) Publications: No. 472-74 Guide for Surge Withstand Capability (SWC) (R 1979) Tests.

7. National Electrical Manufacturers Association (NEMA) Publications:

   a. 250-1979 Enclosure for Electrical Equipment Incl. Rev 1 (1000 Volts Maximum).
   b. ICS 1-1978 General Standards for Industrial Controls Incl Rev 1 thru 3 and Systems.

8. National Fire Protection Association (NFPA) Publications: No. 70-81 National Electrical Code.

1.2 SYSTEM DESCRIPTION

A. General: Configure the Energy Monitoring and Control Systems (EMCS) as a distributed processing network as described and shown. All computing devices, as defined in FCC Rules and Regulations, Part 15, shall be verified to comply with the requirements for Class A computing devices and labeled as set forth in FCC Rules and Regulations, Part 15. The existing Central Control Unit (CCU) shall perform data consolidation, control algorithms, predictions, and calculations. The system shall provide operator interaction and dynamic process manipulation, including overall system supervision, coordination, and control. Sensed data shall be obtained from the Remote Terminal Devices - RTU, which are located within their particular data

environments (DE). The RTU shall be as manufactured by HSQ Technologies, Model 25486 (most current version) and the system expansions shall be based on this equipment. The RTU shall manage all control functions within their DE. Every connected analog output (AO), analog input (AI), digital output (DO), and digital input (DI) represents a "point" where referred to in this specification.

B. Field Enclosures: Ferrous metal enclosures shall conform to the requirement of NEMA Pub. No. 250 for the enclosure types specified. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damage surfaces shall be repaired and refinished with original type finish. Indoor enclosures shall be NEMA 12 when installed in other than a clean dry environment, or as shown. Equipment installed outdoors shall be housed in a NEMA 4 enclosure, unless otherwise shown. Penetrations shall be sealed to preclude entry of water using a silicone material conforming to Fed. Spec. ZZ-R-765 for all enclosures.

C. Data Base Update: Under system normal heavy load, the CCU point data base shall be updated such that any change in analog value or digital status is no older than 15 seconds.

D. Nameplates: Provide laminated plastic nameplates for all equipment and monitoring and control devices furnished. Each nameplate shall identify the function, such as "mixed air controllers" or "cold deck temperature sensor". Laminated plastic shall be one-eighth inch thick, black with white center core. Nameplates shall be a minimum of 1 inch by 3 inch, with minimum one-quarter inch high engraved black lettering. Nameplates for devices smaller than 1 inch by 3 inch shall be attached by a non-ferrous metal chain.

E. Abbreviations, Symbols, and Definitions: All letter symbols and engineering unit abbreviations utilized in information displays and printouts shall conform to the ASHRAE Handbook, Fundamentals.

F. Environmental Conditions:

1. The RTU cards, and all other field equipment shall operate under ambient environmental conditions of 35 to 122 degrees F dry bulb and 10 to 95 percent relative humidity, non-condensing. Sensors and control elements shall operate under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered for the installed location.
2. Other equipment shall, unless designed otherwise, operate properly under ambient environmental conditions of 60 to 85 degrees F and a relative humidity of 20 to 80 percent.

G. Power Line Surge Protection: Protect all equipment power supplies from line surges. Equipment shall meet the spike susceptibility requirements of MIL-STD-461 Part 7, CSO6. Provide protection near equipment in a separate metallic enclosure at ground potential and as necessary at the power panel to insure protection against surges. Fuses shall not be used for surge protection.

H. Sensor and Control Wiring Surge Protection: Protect all equipment against surges induced on control or sensor wiring installed outdoors. Meet the IEEE 472 surge withstand capability test. Provide protection near equipment in a separate metallic enclosure at ground potential. Fuses shall not be used for surge protection.

I. Communications Links Surge Protection: Protect all communications equipment against surges induced on any communications link. All cables and conductors which serve as communications links between CCU, and RTUs shall have surge protection circuits installed at each end that meet the IEEE 472 surge withstand capability test. Provide protection near equipment in a separate metallic enclosure at ground potential. Fuses shall not be used for surge protection.

J. Communications Links Overvoltage Protection: Protect all communications equipment such as MODEMs, line drivers, and repeaters against overvoltage on any communications links conductors. All cables and conductors, which serve as communications links shall have overvoltage protection for voltages up to 480 Vac rms 60 Hz installed.

K. Control Diagram: Provide framed drawings under laminated plastic showing complete instrumentation and control diagrams for all equipment furnished, and interfaces to all existing equipment at each respective equipment location. Condensed operating instructions explaining preventive operation, and procedures for safely starting and stopping the system manually shall be prepared in typed form, framed as specified for the wiring and control diagrams and posted beside the diagrams. Proposed diagrams, instructions, and other sheets shall be submitted prior to posting. The framed instructions shall be posted before acceptance testing of the systems. Provide a reproducible copy of each revised diagram in addition to the framed copy.

1. Wiring Diagrams: Furnish a terminal strip wiring diagram for the "As-Built" condition of the final wiring to each Data Terminal Cabinet (DTC). The diagram shall indicate all new and existing points and shall be numbered and labeled to match the installed wiring. The diagram shall be placed in the pocket provided on the inside of the enclosure door and master copies shall be kept in the Operations and Maintenance Manuals.

1.3 SUBMITTALS:

A. Shop Drawings: Shop drawings shall be submitted in accordance with Section 01330 and shall consist of a complete list of equipment and materials, including manufacturer's catalog cuts, and installation instructions. Shop software descriptions, calculations, and any other details required to demonstrate that the system has been coordinated and will properly function as a system. Drawings shall show proposed layout and installation of all equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

B. Operation and Maintenance Manuals: Provide two copies of the manuals bound in hardback, loose-leaf binders, to the Government after acceptance. Provide a draft copy with the performance verification test procedures for use during site tests and update with any changes required prior to final acceptance. Identify each manual's contents on the cover. The manuals shall include the names, addresses, and telephone numbers of each subcontractor installing equipment and systems, and of the nearest service representatives for each item of equipment and each system. The manuals shall have a table of contents and tab sheets. Place the tab sheets at the beginning of each chapter or section and at the beginning of each appendix. Update all manuals to include modifications made during installation, checkout, and acceptance. Manuals provided shall include:

1. Functional Design Manual: The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. Hardware and software functions, interface, and requirements shall be provided for all system operating modes.
2. Hardware Manual: Furnish a hardware manual describing all equipment provided, including:

    a. General description and specifications.
    b. Installation and checkout procedures.
    c. Electrical schematics and layout drawings.
    d. Alignment and calibration procedures.
    e. Manufacturer's repair parts list indicating sources of supply. Include Federal Stock number where normally provided.
    f. Interface definition.
    g. Signal identification and timing diagrams.

3. Maintenance Manual: The maintenance manual shall provide descriptions of maintenance for all equipment including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.
4. Instrumentation and Control (ITC) Diagrams: Drawings shall be provided for all control equipment. Diagrams shall include interface points to HSQ system and arrangement/location on mechanical system.

1.4 EXISTING FIBER OPTICS DATA TRANSMISSION MEDIA (DTM):

A. General: The existing Fiber Optic Data Transmission Media shall be retained and reused for the modified Base-wide EMCS system. The Contractor shall be responsible for verifying the condition of the existing FO DTM and shall repair it or replace it as necessary to provide a complete and functional system.

1.5 CONTRACTOR FURNISHED FIBER OPTIC DTM:

A. General: Provide all new FO DTM as shown and as necessary. Provide all transmission equipment required.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Where two units of the same type of equipment are required, these units shall be products of a single manufacturer. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place.

2.2 FIELD EQUIPMENT

A. Remote Terminal Unit (RTU). The RTU shall be as manufactured by HSQ, model 25486 or the current updated version of that model. RTU is a microprocessor based control and data acquisition system and to be a fully compatible with the central host computer and other RTU's. Basic unit with 32 digital inputs and 2 high-speed counter inputs. Expansion modules to allow for additional analog and digital points. Unit to be U.L. listed and meeting requirements of FCC part 68 emission standards. Unit provided with circuit protector. Government to retain older version of RTU if present.

1. RTU's shall be microcomputer based with a minimum word size of eight bits. All chips or functional modules shall be second sourced. Provide in each RTU a minimum of 10 percent of its I-O functions as spare capacity. The type of spares shall to in the base proportion as the implemented I-0 functions on the RTU, but in no case shall there be less than two spare points of each I-O type. The RTU with local I-0 functions shall be furnished complete, with no changes or additions necessary to support implementation of spare functions. Output relays associated with digital signals shall be considered part of the I-0 function, whether physically mounted on the enclosure or separately mounted. Implementation of spare points shall necessitate only provision of the additional field sensor or control, necessary wiring, and connection to the system, and point definition assignment by the

operator. Construct the RTU so that all functions are implemented on replaceable circuit boards to permit field maintenance.

2. The RTU shall include the following controls:

   a. Main Power Switch.
   b. On-off line - enables and disables communications with CCU
   c. Self test - exercise RTU and communications link functions.
   d. Reset - initializes CPU operation.
   e. RTU outputs disable - forces DE to failure mode.

3. The RTU shall include the following indicators:

   a. Power on - includes one for each power supply voltage.
   b. On Line (CCU controlled).
   c. G0-NO GO for self test of RTU and all communications functions.
   d. RTU outputs disabled.

4. Provide a real time clock maintaining seconds, minutes, hours, and day of the week, accurate to plus or minus is 10 seconds per day.
5. Provide a minimum of 8K bytes of addressable RAM in addition to that required for RTU operation. Where PROMS are utilized for applications programs in the RTU, provide 4K bytes of RAM and 4K bytes of PROM in lieu of 8K bytes of RAM.
6. Provide one communications interface and associated drivers conforming to EIA RS-232-C for communications between the RTU and the CCU. Provide communication interfaces between RTUs and MUXs, conforming to EIA RS-422-A, RS-423-A or RS-232-C where no conflict exists with Government furnished DTM.
7. Provide a sealed battery backup for the real time clock and the RAM chip on the RTU for a period of 1 hour. Provide circuitry to eliminate erratic operation due to low battery charge, sensing battery performance to execute an orderly shutdown before the electronic minimum operating point is reached. Provide automatic charging of batteries and an alarm indication at the CCU that the RTU is operating under battery power.
8. Power fail automatic restart: Upon restoration of power, the RTU shall automatically begin program execution as specified.
9. Provide a 120 VAC, 15 A, 60 Hz duplex outlet either in the RTU enclosure or within 6 feet.
10. Provide locking type mounting cabinets with common padlock keying (per existing Base standard keying) and door switch wired to a RTU input for intrusion alarm in the MCR.

B. Data Terminal Cabinet (DTC)

1. Data Terminal Cabinet (DTC) shall be provided for each mechanical room as an interface between the RTU and the data environment (DE) instrumentation and controls. No instrumentation and control devices shall be located within the DTC.

   a. Enclosure: The DTC shall be a separate metallic enclosure. The DTC shall be sized to accommodate the number of functions required by the control and monitoring devices as shown plus 25 percent expansion for each type of function provided.
   b. Groupings: The DTC shall be divided into analog and digital groupings, each with separate sensor and control signal wiring raceways.
   c. Terminal Strips: The DTC shall be provided with double-sided screw type terminal strips. One side of the terminal strip shall be used for termination of field wiring from instrumentation and controls. The other side shall be used to connect the DTC to the RTU. Terminal strips shall have individual terminal identification numbers.
   d. Power: A 120-Vac, 15-A, 60 Hz duplex outlet shall be provided within 6 feet of each DTC.
   e. Provide locking type mounting cabinets with common padlock keying (per existing Base standard keying) and door switch wired to an input for intrusion alarm in the MCR. DTC keying shall be identical to RTU keying.

C. I-0 Functions:

1. Analog Inputs (AI): The AI function shall monitor each analog input, perform A-to-D conversion, and hold the digital value in a buffer for interrogation. The A-to-D conversion shall have a minimum resolution of 10 bits plus Sign. Provide signal conditioning for each analog input. Individually calibrate all analog inputs for zero and span, in hardware or in software. Provide common mode noise rejection of 60 dB from 0 to 120 Hz and normal mode noise rejection of 20 dB at 60 Hz from a source impedance of 10,000 ohms. Input ranges shall be within the range of 0-20 Vdc, plus to minus 10 Vdc, or 0-50 mAdc.
2. Analog Outputs (AO): The AO function shall accept digital data, perform D-to-A conversion, and output a signal within the range of 0-20 Vdc, plus to minus 10 Vdc, or 0-50 mAdc. D-to-A conversion shall have a minimum resolution of 8 bits plus sign. Individually calibrate all analog outputs for zero and span. Provide short circuit protection.
3. Digital Inputs (DI): The DI function shall accept DE on-off, open-close, or other two state data indications. Pulse accumulator inputs of up to 30 pulsed per second shall also be possible on standard DI inputs. Provide isolation and protection against input voltage up to 180 Vac peak.

4. Digital Outputs (DO): The DO function shall provide contact closures for momentary and maintained operation of field devices. Closures shall have a minimum duration of 0.1 second. Provide electromagnetic interference suppression an all output lines to limit transients to non-damaging levels. Provide isolation and protection against voltage up to 180 Vac peak. Provide contacts rated for 2A at 24 Vac.
5. Pulse Accumulator: The pulse accumulator function shall have the same characteristics as the DI, except that, in addition, a buffer shall be provided totalize pulsed between interrogations. The pulse accumulator shall accept rates up to 100 pulses per second.
6. Signal Conditioning: Provide all signal conditioning for sensors requiring separate excitation.

D. Instrumentation and Control:

1. Temperature Instruments:

a. Thermocouples: Thermocouples shall be factory assembled with series 300 stainless steel sheathing. Wiring insulation shall be magnesium oxide. Minimum insulation resistance wire-to-wire or wire-to-sheath shall be 1.5 megohm at 500 volts dc. Thermocouples shall be type E, type K, type N, type R, or type T. Thermocouple error shall not exceed that specified in ANSI MC96.1. Each thermocouple shall be furnished with a thermocouple transmitter as specified and mounted integrally with the thermocouple or as shown.
b. Thermocouple Transmitters: Thermocouple transmitter shall be selected to match the type of thermocouples used. Transmitter shall produce a linear 4 to 20 mAdc output corresponding to the required temperature span. Transmitter shall include automatic cold junction reference compensation with offset and span adjustments, and upscale open thermocouple detection.
c. Resistor Temperature Detector (RTDs): RTDs shall be platinum with an accuracy of plus or minus 0.1 percent at 32 degrees F. and shall be encapsulated in epoxy, series 300 stainless steel, anodized aluminum, or copper. Each RTD shall be furnished with an RTD transmitter as specified and mounted integrally or as shown.
d. RTD Transmitters: The RTD transmitters shall be selected to match the resistance range of the platinum RTD. The transmitter shall produce a linear 4 to 20 mAdc output corresponding to the required temperature span. The output error shall not exceed 0.1 percent of calibrated span. The transmitter shall include offset and span adjustments unless the RTD element is integral to the transmitter and system calibration is provided.
e. Averaging RTD: Averaging RTDs shall have an accuracy of plus or minus 1.0 degrees F at the reference temperature, and shall be of sufficient length to insure that the resistance represents an average over the cross-section in

which it is installed. The sensor shall have a bendable copper sheath. Each averaging RTD shall be furnished with an RTD transmitter selected to match the resistance range of the averaging RTD. The transmitter shall produce a linear 4 to 20 mAdc output corresponding to the required temperature span. The output error of the transmitter shall not exceed 0.1 percent of the calibrated span. The transmitter shall include offset and span adjustments.

f. Temperature Switches: Temperature switches shall have a repetitive accuracy of plus or minus 1 percent of the operating range shown. Switch actuation shall be adjustable over the operating temperature range. The switch shall have a snap-action Form C contact rated for the application in accordance with NEMA ICS 1.

g. Thermowells: Thermowells shall be monel, brass, or copper for use in copper water lines, wrought iron for measuring flue gases, and 316 stainless steel for all other applications. The thermowell shall include a connection box, sized to accommodate the temperature transmitter.

h. Sensor ranges:

1)	High Temperature Hot Water	250 to 450 Degrees F
2)	Low Temperature Hot Water	30 to 250 Degrees F
3)	Discharge Air Temperature	40 to 140 Degrees F
4)	Mixed Air Temperature	40 to 140 Degrees F
5)	Outside Air Temperature	-40 to 120 Degrees F
6)	Room Temperature	30 to 130 Degrees F

2. Pressure Instruments:

a. Pressure Transducers: Pressure transducers shall withstand up to 150 percent of rated pressure, with an accuracy of plus or minus 1 percent of full scale. The sensing element shall be either capsule, diaphragm, bellows, bourdon tube, or solid state. A transmitter located at the transducer shall be provided to convert the sensing element output to a linear 4 to 20 mAdc output corresponding to the required pressure span. The output error shall not exceed 0.1 percent of calibrated span. The transmitter shall include offset and span adjustments.

b. Pressure Switches: Pressure switches shall have a repetitive accuracy of plus or minus 1 percent of their operating range and shall withstand up to 150 percent of rated pressure. Sensors shall be diaphragm or bourdon tube. Switch actuation shall be adjustable over the operating pressure range in accordance with NEMA ICS 1. Switch shall have a snap-action Form C contact rated for the application and gage pressure switches shall have an adjustable differential setting.

3. Flow Instruments:

    a. Flow Switches: Flow switches shall have a repetitive accuracy of plus or minus 1 percent of its operating range. Switch actuation shall be adjustable over the operating flow range. The switch shall have a snap-action Form C contact rated for the application in accordance with NEMA ICS 1.

4. Electric Power Instruments: Electric Watthour meters, CT's, PT's and related electrical service modifications shall be installed in accordance with Division 16.
5. Output Devices: Application: Provide the appropriate type of control relays and the required number of digital output points to accomplish the digital output functions on the I/O Summary Point List in accordance with the control diagrams on the Drawings.

    a. Control Relays: Control relay contacts shall be rated for the application, with a minimum of 2 sets of Form C contacts, in accordance with NEMA ICS 1, enclosed in a dust-proof enclosure. Relays shall be rated for a minimum life of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression devices to limit transients to 150 percent of rated coil voltage.
    b. Time Delay Relays: Time delay relay contacts shall be rated for the application with a minimum of 2 sets of Form C contacts, in accordance with NEMA ICS 1, enclosed in a dust-proof enclosure. Relays shall be rated for a minimum life of one million operations. Relays shall be equipped with coil transient suppression devices to limit transients to 150 percent of rated coil voltage. Delayed contact opening or closing shall be adjustable from 1 to 60 seconds with a minimum accuracy of plus or minus 2 percent of setting.
    c. Latching Relays: Latching relay contacts shall be rated for the application with a minimum of 2 sets of Form C contacts, in accordance with NEMA ICS 1, enclosed in a dust-proof enclosure. Relays shall be rated for a minimum life of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression devices to limit transients to 150 percent of rated coil voltage.
    d. Reed Relays: Reed relays shall be encapsulated in a container housed in a plastic, epoxy, or metal case. Contacts shall be rated for the application in accordance with NEMA ICS 1. Operating and release times shall be 1 millisecond or less. Relays shall be rated for a minimum life of 10 million operations and shall be equipped with coil transient suppression devices to limit transients to 150 percent of rated coil voltage.

e. Contactors: Contactors shall be of the single coil, electrically operated, mechanically held type. Positive locking shall be obtained without the use of hooks, latches, or semipermanent magnets. Contacts shall be double break silver to silver type protected by arcing contacts where necessary. Number of contacts and ratings shall be selected for the application in accordance with NEMA ICS 1. Operating and release times shall be 100 milliseconds or less. Contactors shall be equipped with coil transient suppression devices to limit transients to 150 percent of rated coil voltage.

f. Solid State Relays: Input-output isolation shall be greater than 1000 megohms with a breakdown voltage of 1500 volt root mean square or greater at 60 Hz. Relays shall be rated for a minimum life of 10 million operations. The ambient temperature range shall be at least minus 20 to plus 140 degrees F. Input impedance shall not be less than 500 ohms. Relays shall be rated for the application in accordance with NEMA ICS 1. Operating and release times shall be 1 millisecond or less. Transients shall be limited to 150 percent of control voltage.

g. Single Input Control Point Adjustment (CPA) Controller: Single input CPA controllers shall permit changing of control points remotely by varying the CPA port value. CPA shall be plus or minus 10 percent of primary sensor span. Controllers shall operate from electronic or pneumatic sensors as shown. Controllers shall be complete with adjustable setpoint, adjustable gain (proportional band), and shall be field selectable for direct or reverse action. Pneumatic units provided shall be constructed to withstand a maximum pressure of 25 psig. All controller inputs and outputs shall be provided with internal or external gages for calibration of input and output signals.

h. Dual Input Controller: Dual input controllers shall permit changing of control points remotely by varying the second port input value. Controllers shall operate from electronic or pneumatic sensors as shown. Controllers shall be complete with adjustable setpoint, adjustable gain (proportional band), adjustable authority, and shall be field selectable for direct or reverse action. Authority effect of secondary sensor on setpoint shall be adjustable from 33 to 100 percent of primary sensor span. Pneumatic units provided shall be constructed to withstand a maximum pressure of 25 psig. All controller inputs and outputs shall be provided with internal or external gages for calibration of input and output signals.

6. Position Sensors:

a. End (Limit) Switches: Limit switches shall be of the sealed or enclosed type as required for the application. Contacts shall be snap-action Form C rated for the application in accordance with NEMA ICS 1.

b. Potentiometers: Potentiometers may be either rotary or linear, depending on application of each position indicator. Position potentiometers shall have a linearity of plus or minus 5 percent and shall indicate position on a percent open basis.

7. Gas Consumption Meters:

a. Natural gas consumption meters with pulse output to the EMCS shall be installed in accordance with SECTION 15496 - NATURAL GAS SYSTEMS.

2.3 SIGNAL TRANSMISSION

A. Signal Transmission: All data shall be transmitted from the RTU panel utilizing a digital data format such as ASCII or BCD. Systems which do not convert analog to digital as required at the RTU panel shall not be acceptable. Provide equipment to allow four-wire operation.

B. Interface: All interfaces between the CLT and CCU and RTUs and CLT shall be in accordance with EIA RS-232-C.

C. Restrictions: No single DTM shall service more than 20 percent of the total DE.

2.4 WIRE AND CABLE:

A. General: All wire and cable from the sensors and control devices in the DE to the DTCs shall be furnished.

B. Control Wiring

1. Control wiring for digital functions shall be 18 AWG minimum with 600 volt insulation.
2. Control wiring for analog functions shall be 18 AWG minimum with 600 volt insulation, twisted and shielded, 2 or 3 wire to match analog function hardware.

C. Sensor Wiring: Sensor wiring shall be 20 AWG minimum twisted and shielded, 2 or 3 wire to match analog function hardware.

D. Raceways

1. Wiring from sensors and control devices shall be installed in conduit. Installation of raceways shall be in accordance with Division 16 - Electrical.

2.5 DATA COMMUNICATION EQUIPMENT:

A. Provide data communication equipment required for the transmission of data over all DTM. The communication equipment shall be provided with surge protection as specified.

B. Fiber Optic Modem: MODEM shall be Lee's Data Communications, Inc., Model 1014 , full duplex, RS-232C interface level , asynchronous transmission fiber optic data bus modem.

2.6 UTILITY INTERFACE

A. Energy Monitoring Meter (BTU-1): System shall include flow sensing device, temperature transmitters and control computer.

1. Flow Sensing Element: Averaging type differential pressure type. Element shall consist of three parts; a fabricated sensing tube with two-integral chambers. Sensing ports shall be arranged in accordance with Chebychev Calculus. Sensing element shall be rated for 500 psi at 1200 deg F. Sensing element shall be constructed of 316 stainless steel. Sensor shall be manufactured by Dieterich Standard, Contrec, Verabar or approved equal.
2. Differential Pressure Transmitter: "Smart" differential pressure transmitter as manufactured by Rosemont or approved equal. Transmitter shall output 4-20 ma signal.
3. Flow Computer: Microprocessor based design capable of displaying energy rate in engineering units, totalized energy and with ability of being programmed for available options, compensating functions and diagnostics. The flow computure shall be Dietrich Standard, Contrec, Verabar or approved equal.

B. Electric Meter: Interface to the building electrical meter pulse contacts to provide electrical demand (KW) and electrical usage (KWH) inputs to the EMCS system. Coordinate with Electrical Contractor for pulse requirements.

C. Natural Gas Meter:

1. Provide a natural gas meter EMCS interface with a scaled electrical pulse signal (switch closure or solid state type) for each discrete unit of gas volume metered and/or an isolated 4-20 MA analog output. Meter shall have a self-averaging pitot tube with a multi-variable, microprocessor-based transmitter. Gas meter readings shall be temperature and pressure-compensated. Provide a 6-digit, non-reset, register which provides flow totalization in addition to the pulse output. Coordinate furnishing and installation with Mechanical Contractor.

a. Products: Dietrich – Standard Mass Probar or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation: Install all system components and appurtenances in accordance with the manufacturer's recommendations and as shown. Provide all necessary interconnections, services, and adjustments required for a complete operable system. All electrical here shall be in accordance with NFPA 70 and as specified. Provide instrumentation and communications grounding as necessary to preclude ground loops and noise free adversely affecting system operation.

B. I-O Summary Tables: Use the I-O Summary Tables in conjunction with the drawings to identify the hardware and software required for each building and system.

C. Housing: All equipment installed indoor shall be housed in a NEMA 12 enclosure, outdoor equipment shall be housed in a NEMA 4 enclosure, unless otherwise shown.

3.2 FIELD EQUIPMENT:

A. Enclosures: All penetrations shall be sealed to preclude the entry of water using a silicone material conforming to Fed. Spec. ZZ-R-765. Enclosures shall be NEMA 12 when installed in other than a clean dry indoor environment, or as shown.

B. Temperature

1. Thermocouples: Thermocouples installed in air streams shall be installed in protective tubes. Thermocouples installed in pipes or tanks shall be attached to solid surfaces by bonding to the surface with epoxy or ceramic cement, or installation in a thermowell. Thermocouples attached to surfaces shall be thoroughly cleaned, degreased, and after thermocouple installation, insulated from ambient temperature effects. Thermocouple wires shall not be installed in the same conduit as power wiring. Thermocouples shall not be used for measuring temperatures below 500 degrees F. Type T thermocouples may be used when the atmosphere contains moisture or is either chemically reducing or oxidizing. Type E thermocouples may be used when the atmosphere is a chemically reducing environment. Type K thermocouples may be used when the atmosphere is a chemically oxidizing environment.
2. RTDs: When the RTD is installed in pipes or is susceptible to corrosion and vibration, the RTD shall be installed in a thermowell. RTDs which are attached to surfaces shall be clamped or bonded in place. The surface shall be thoroughly cleaned, degreased, and after RTD installation, shall be insulated from ambient temperature effects. RTDs used for space temperature sensing shall include a housing suitable for wall mounting. RTDs used for OA sensing shall have an

instrument shelter to minimize solar effects, and shall be mounted to minimize building effects. RTD assemblies shall be readily accessible and installed in a manner as to allow easy replacement.

3. Temperature Switches: Temperature switches shall be installed as specified for RTDs. Temperature switches shall be adjusted to the proper setpoint and shall be verified by calibration. Switch contact ratings and duty shall be selected in accordance with NEMA ICS 1.
4. Unless otherwise instructed by manufacturer, install control devices on high temperature not water system at a 45 degree angle to prevent damage to device from excessive heat.

C. Pressure Instruments

1. Pressure Sensors: Pressure sensors (all types) installed on liquid lines shall have drains. Pressure sensors installed on steam lines shall have drains and siphons. All pressure sensors shall have valves for isolation, venting, and taps for calibration. Pressure sensors shall be verified by calibration. Differential pressure sensors shall have nulling valves.
2. Pressure Switches: Pressure switches (all types) installed on liquid lines shall have drains. Pressure switches installed on steam lines shall have drains and siphons. All pressure switches shall have valves for isolation, venting, and taps for calibration. Pressure switches shall be adjusted to the proper setpoint, and shall be verified by calibration. Pressure switches shall be mounted higher than the process connection. Differential pressure switches shall have nulling valves. Switch contact ratings and duty shall be selected in accordance with NEMA ICS 1.

D. Flow Instruments

1. Flow Switches: Flow switches shall be installed in such a manner as to minimize any disturbance in the flow of fluid while maintaining reliable operation of the switch.

E. Electric Power Devices

1. Watthour Meters: Watthour meters shall be installed in accordance with Division 16.

F. Output Devices

1. Relays and Contactors: Install relays and contactors in new cabinets. Contact ratings and duty shall be selected in accordance with NEMA ICS. Provide the appropriate type of control action, either momentary contact closure or maintained contact closure, as required to match the control wiring diagrams on the Drawings. The Contractor shall be responsible for providing the proper

number of physical Digital Output points to accomplish the 00 function on the I-O summary point list. For example, if a latching relay is used for a maintained contact, then two DO points shall be provided for that single DO function.

2. Electric Solenoid Operated Pneumatic Valve (EP): Install EPs in new cabinets.
3. Controller with CPA: Install CPA controllers in new or existing control cabinets.
4. Position Sensors:

    a. End (Limit) Switch: Limit switch type and mounting shall be properly suited for the application to provide reliable switch operation.

3.3 INSTALLATION - SYSTEM EQUIPMENT

A. Install all system equipment required for an operational EMCS.

3.4 INSTALLATION - DATA TRANSMISSION:

A. General: Install all data transmission components in accordance with Division 16.

3.5 SITE TESTING:

A. General: Provide field testing and adjustment of the complete and operational EMCS. The Government will witness all tests.

B. Contractor's Field Testing: When installation of the EMCS equipment is complete, calibrate field equipment and verify transmission media operation before the system is placed on line. All testing, calibrating, and adjusting, shall be completed by the Contractor prior to beginning the performance verification test. Perform a detailed cross check of each sensor within the EMCS by making a comparison between the reading at the Sensor, using a standard at least twice as accurate as the sensor accuracy traceable to the National Bureau of Standards, and the display at the MCR. Perform a cross check of each control point within the EMCS by making a comparison between the control command at the MCR and field controlled device. Verify that all systems are operable in the specified failure mode upon EMCS failure or loss of power. Verify that all systems return to EMCS control automatically upon resumption of diagnostic tests, and calibrations in accordance with approved test plans and procedures prior to initiation of performance verification test. Before scheduling the performance verification tests, the Contractor shall certify in writing that all materials and equipment have been installed, calibrated, tested, and are in conformance with the technical provisions of this contract.

END OF SECTION 15915

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15975 - CONTROL SYSTEMS EQUIPMENT (STAEFA CONTROL SYSTEMS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units that are not supplied with factory-wired controls.

1.3 SYSTEM DESCRIPTION

A. Control system consists of sensors, indicators, actuators, final control elements, interface equipment, interconnecting wiring, other apparatus, accessories, and software connected to distributed controllers operating in multitasking, multi-user environment on token-passing network and programmed to operate mechanical systems according to sequences of operation indicated or specified.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data for each type of product specified. Include manufacturer's technical Product Data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, installation instructions, and startup instructions.

C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly,

components, and location and size of each field connection. Submit damper leakage and flow characteristics, plus size schedule for controlled dampers.

D. Shop Drawings containing the following information for each control system:

1. Schematic flow diagram showing fans, coils, dampers, valves, and control devices.
2. Each control device labeled with setting or adjustable range of control.
3. Diagrams for all required electrical wiring. Clearly differentiate between factory-installed and field-installed wiring.
4. Written description of sequence of operation.
5. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
6. Listing of connected data points, including connected control unit and input device.
7. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
8. Software description and sequence of operation.

E. Wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

F. Maintenance data for control systems equipment to include in the operation and maintenance manual specified in Division 1.

G. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

H. Preliminary Review: Two copies of submittal data shall be hand carried to the engineers office for preliminary review by the engineer and the T.C. contractors system designer. One copy will be returned with required pickups noted.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Year-2000 Compliant: Computer hardware and software shall be capable of accurately processing, providing, and receiving date data from, into, and between the twentieth and twenty-first centuries, including leap-year calculations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following in accordance with sole source agreement by Malmstrom Air Force Base.

1. Direct Digital Control (DDC) Systems and Components:

a. Staefa Control System, Inc.

2.2 LOCAL AREA NETWORKS

A. The LAN shall utilize packetized transmissions, error checking, and distributed error recovery. Single or multiple SDC failures shall not cause loss of communication between other LAN-connected SDC's still active.

B. LAN-connected SDC's shall be provided with a communications watchdog to assure that an individual SDC cannot permanently occupy the LAN. If an SDC is determined to be monopolizing communications, it shall be automatically shutdown and an exception reported to annunciate this fact.

C. The Local Area network shall utilize industry standard data transmission formats such as IEEE 802.3 (peer to peer) or ANSI X3.28. The content of messages shall be the manufacturers standard. The Local Area Network components shall be manufacturers standard or available from 3rd party vendors which utilize the same chip implementation as used by the manufacturer.

D. RS-485 Network Communication System: Trunk Wiring Practices (General) -The distributed communication network system shall consist of a multi-drop RS-485 bus architecture connecting SDC's, UDC's and VAVDC's. The trunk shall consist of:

1. A twisted shielded pair of wires (24 awg) with the shield grounded in accordance with the manufacturer’s wiring practices.
2. There shall be no power wiring in excess of 40 Vac peak voltage run in conduit with communications trunk wiring. In cases where power or signal wiring is run in conduit with trunk wiring, all communication trunk wiring and power wiring shall be run using separate twisted shielded pairs (24 awg) with the shields grounded in accordance with the manufacturer’s wiring practices.

E. RS-485 Communication Transient Protection: The manufacturer's catalog data sheet shall provide evidence that the manufacturer's SDC, UDC and VAVDC products are tested and comply with IEEE-587 Categories A and B (ANSI C62.41) standard for Transient Surge withstand capabilities for electrical devices. Such testing shall have included power and communication trunk wiring. Compliance with IEEE-587 shall imply conformance with IEEE-472 transient standards as IEEE-587 is a higher energy level test.

F. RS-485 Trunk Distance and Topology: The manufacturer's RS-485 trunk shall provide operation over end to end linear distances of 3000 feet without repeaters at communication data rates of up to 64 kbps. Each end of the trunk shall be terminated with a 120 ohm end of line termination resistor.

2.3 GLOBAL DIGITAL CONTROLLER (GDC)

A. General: The global controller shall be a microprocessor based, multi-tasking, real-time, standalone digital control processor. To perform time-dependent, temperature compensated, event driven, and operational functions of the building mechanical systems, locate controller and enclosure in Mechanical Room 16A.

1. The GDC shall be wall mounted and capable of full system operation without use of the operators station.

B. The global controller shall provide the following essential capabilities:

1. Perform scheduled start/stop of mechanical system.
2. Perform night setback function and override of night setback mode.
3. Communicate with networked local controllers.
4. Gather historical data of any point on networked controllers.
5. Allow remote user access via modem.
6. Ability to program control sequences and alarm reports using Boolean, relational, and logic functions.
7. Ability to program control sequences, alarm reports, and historical trend reports, using floating point arithmetic and mathematical functions.

C. The global controller shall have characteristics equal to the following:

1. 16 bit word size microprocessor, 5 MHz clock frequency.
2. EPROM, EEPROM for program storage and RAM for data storage 512K Bytes total memory.
3. 72-hour battery backup of real time clock and static RAM.
4. 5 MHz Direct Memory Access (DMA) controller.
5. Key lock enclosure.

6. Two RS0232 ports for direct connection to printer and modems.

D. The global controller shall meet or exceed the following performance criteria:

1. Data rate to networked local controllers; 9600 baud.
2. Data rate to host; 9600 baud.
3. 3 second function execution time.
4. 3 second alarm response time.

E. Global controller operator interface shall as a minimum, consist of keypad and LCD or LED display, provide for varying levels of user access, and allow the user to:

1. Access and monitor values of equipment status, input variables, controller outputs, and loop setpoints.
2. Program local controllers, modify control parameters, adjust setpoints, modify schedules and sequences.
3. Access and monitoring at the global controller shall not require the use of the portable operators tool.

2.4 STAND-ALONE DIGITAL CONTROLLERS (SDC)

A. Stand-Alone Digital Controllers (SDC) shall be 8 or 16 bit microcomputer based.

B. The SDC controllers shall permit the simultaneous operation of all control, communication facilities management and operator interface software as programmed by the Contractor or User. Modification of the on-board SDC controller database shall be performed on-line using the portable POT. Systems which require the SDC to be removed from service while DDC control sequences are modified shall not be acceptable. Systems which require physical changing of components to change programming are not acceptable.

C. The SDC controllers shall be tested and approved by the manufacturer as conforming to the following standards:

1. 2.7.2.1 FCC Part 15, Subpart J; Class A compliance.
2. 2.7.2.2 Underwriters Laboratory listings.
3. All SDC's applied to mechanical systems shall be UL listed or recognized under UL916 or UL873 for control of mechanical systems or temperature regulating systems.

D. Database and Memory Back-Up: All programming defining the functions to be performed by the SDC, including but not limited to application programs and point database within each SDC, shall be protected from loss due to power failure for a

minimum of 48 hours. Systems providing nonvolatile memory shall provide Battery backup sufficient to provide protection for the specified period.

E. Service Ports: SDC controllers shall be equipped with a minimum of one operator service port for the connection of a Portable Operator Terminal (POT). The service port shall be either a built-in RS-232 data terminal port or RJ-11 type jack which connects to manufacturers standard POT. Connection of a service device to a service port shall not cause the SDC controller to lose communications with its peers or other network device controllers. The service port shall allow utilization of the same POT from any location. Systems which utilize more than one variety of POT shall be designed such that only one type is required. Other designs incorporating more than one type of POT shall not be acceptable.

F. Manual/Auto Control and Notification: The SDC controller shall provide commanded override capability from the POT or onboard display and keyboard. Such overrides shall be annunciated to the operators consoles. Such overrides shall be valid as long as power is continuously applied to the controller.

G. Adjustments: Every control panel shall provide adjustments for the functions specified. In general, adjustments shall be provided for all setpoints used by controllers within each control panel. In addition, adjustments shall be provided for throttling ranges, mixed air damper minimum positions, or other items as specified. Adjustments shall be integral to each control panel.

H. Spare Point Capacity: Digital controller based control panel bids shall include in every panel, additional capacity for future installation of desired equipment at the owners discretion. provide expansion capacity of at least 10% for every panel. Expansion capacity shall include equal quantities of every point type; Analog input, Digital input, Digital output, and Analog output. Systems providing modulating outputs via pulse width modulation techniques, shall provide within each panel all the components required to implement the functions equivalent to an analog output.

I. Sensing: All sensing inputs shall be provided via industry standard signals. Temperatures, differential pressure signals, and other signal inputs shall be one of the following types:

1. 0-20mA
2. 4-20mA
3. 0-10 VDC
4. 0-20 VDC
5. 1000 ohm platinum (at O degrees F, 1.46 ohms/degrees F)
6. 1000 ohm Balco (2.2 ohms/degrees F)
7. 10 k ohm thermistor (at 77 degrees F)

All signal inputs shall be compatible with the controllers used, and with the requirements for readout of variables in true scaled engineering units as specified.

J. On/Off Outputs: All relays or digital output modules shall provide a pilot light or LED display indicating status.

K. Modulating Outputs: Modulating outputs shall be industry standard 0-10 VDC or 0-20 VDC. 0-20 mA or 4-20 mA milliamp outputs are also acceptable. Drive open/Drive closed type modulating outputs are acceptable provided that they also comply with the following requirements. Modulating outputs shall provide within the control panel, a metric gauge, or display indication via on board display or portable operators terminal of the commanded position signal to the actuating device. This meter, gauge, or display must provide either a 0-100 percent position indication, or read out directly in the engineering units of the signal being used. Drive open/drive closed type controllers shall include sufficient components and control algorithms to comply with this requirement.

2.5 UNITARY DIGITAL CONTROLLERS (UDC'S)

A. Controls shall be microprocessor based, unitary Direct Digital Controllers (UDC's). UDC shall be based on a minimum 8 or 16 bit microprocessor working from software program memory which is physically located in the UDC. The software control "intelligence" shall be resident within the same enclosure as the circuitry which translates sensor signals into digital information. Contractor shall provide a minimum of one UDC controller per mechanical system as shown on the drawings. The EMCS contractor shall provide and field install all UDC's specified under this section.

1. All input/output signals shall be directly hardwired to the UDC. Trouble shooting of input/output signals shall be easily executed with a volt-ohm meter (VOM). As a result of this intent it is specified that power line carrier systems, or other systems which command multiple outputs over a single pair of wires shall not be used.
2. UDC shall be in continuous direct communication with the network which forms the facility-wide Energy Management Control System.

B. Non-Volatile Memory: All control sequences programmed into the UDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery to be retained. Power failures shall therefore not cause the UDC memory to be lost, nor shall there be any need for batteries to be recharged or replaced.

1. All control sequences shall be fully field programmable at the UDC controller to allow for the creation and change of a sequence.

C. Controller Location: To simplify controls and mechanical service and troubleshooting, the UDC shall be mounted directly in the equipment room for all air handling units, cooling and heating systems. This shall allow all controls maintenance and troubleshooting to be made while at the location. UDC shall be directly wired to staging relays or modulating valves for heating and cooling.

1. For compatibility to the environment of the equipment, UDC shall have wide ambient ratings for specified control sequences and performance.
2. Contractor shall submit description of location of all UDC's.

2.6 SYSTEM SOFTWARE REQUIREMENTS

A. General: Contractor shall provide all software for a complete and operational system as described herein. Software shall include manufacturer's standard operating system for operator consoles and controllers, network communication software for dial-up and hard trunk applications, operator man-machine interface software, control application software and all other software necessary to provide the functions specified herein.

2.7 CENTRALIZED HOST SYSTEM (CHS) SOFTWARE

A. HSQ System: Controls in this building shall use the full capabilities of the existing HFQ Centralized Host System. Refer to Section 15915 "EMCS".

2.8 LOCAL AREA NETWORK SOFTWARE AND OPERATIONS

A. Network Shared Data: The EMCS system local area networks shall provide for the sharing of calculated and control point variable values throughout the EMCS network. The contractor shall provide all network software links as necessary to provide a complete and functioning system in accordance with the sequences of operation.

B. Network Diagnostics: The CHS system shall provide software utilities to determine the on-line status of all network connected panels. If an SDC, VAV or UDC drops off-line, the network software shall detect and annunciate such conditions to the proper output devices.

C. Network performance: The EMCS communication networks shall provide end-to-end data transmission of all necessary control point values at a minimum rate of that established by standard NFPA-90A for smoke control operation.

1. The nominal network response speed for a data request entered at a man-machine interface for data contained in another panel shall not be greater than 5 seconds.
2. Network failures (i.e., device on/off line) shall be self-recovering and not require a manual initiation of the network.

D. Segregation of Information Reporting: The network shall support the segregation of messages by class of data to groups of output devices. The network control software shall provide a minimum of 5 classes of segregation. Any one class of information may be sent to a group of multiple input/output devices.

2.9 STAND-ALONE DIGITAL CONTROLLER (SDC) SOFTWARE

A. The SDC shall provide the capability to perform at least, but not limited to, the following functions:

1. Downloading of application program changes to the SDC without affecting the operation of existing operating application programming.
2. Printing of scheduled or on-demand reports without preempting operator functions.

B. All SDC's shall have as a standard feature of their system software, complete libraries of control algorithms for DDC, Energy Management, and Facilities Management functions. These resident libraries of algorithms shall be drawn from for the creation of the application programming of each individual SDC.

1. Controllers which provide custom application software via line-by-line programs shall not be acceptable unless all source and compiled program code is contained in totally non-volatile, but programmable EEPROM memory. Vendors providing line-by-line programmed controllers shall also provide program editors, compilers and de-bugging tools in each SDC panel's EEPROM firmware to facilitate the on-line modification of application control sequences.
2. The Contractor shall utilize these libraries to satisfy the sequences of operation specified in Division 15 - Section "Sequence of Operation." Systems which create these programs utilizing line-by-line programming methods and languages such as PASCAL, BASIC, "C" or similar shall provide the Government with fully annotated source code of all application software modules used, a 10 year escrow of such source code in a 3rd party location, escrow to be paid up at time of bid.

C. It is the intent of the specification to provide the Government with the ability to read out temperatures and other values, and to adjust specific items from localized, as well as centralized location. In order to provide this capability, control panels are specified to be placed in specific locations with readout gauges and adjustments to be mounted directly in the control panel or provide readout capabilities with the POT.

1. Every control panel shall provide readouts for the temperatures, or other information specified. Every control panel shall provide adjustments for the setpoints, parameters and other adjustment functions specified.
2. Items for read out shall be under polled, not continuous, display on the face of the panel with either a digital display or analog electronic meter. The contractor shall provide a minimum of 20 values per SDC panel with displays as indicated in the locations shown on the drawings. Read out of sensed variables used in control sequences shall be from the same sensors used for control. As an alternative provide either a duplicate sensor for the read out or provide a transducer for each sensed signal which can provide both a read out signal and a signal compatible with the controller.

    a. Each read out item shall be individually named and labeled. Name label shall be directly adjacent to the actual display value of that item including the applicable engineering units. Label shall be a part of the digital display of that value, or a Bakelite label mounted directly above the value display. Display readout requirements are in addition to capabilities provided by plug-in operator devices which are provided as part of digital controller based systems.

3. Every control panel shall provide adjustments for the functions specified. In general, adjustments shall be provided for all setpoints used by controllers within each control panel. In addition, adjustments shall be provided for throttling ranges, mixed air damper minimum positions, or other items as specified. Adjustments shall be made at each control panel with a dedicated adjustment pad, or individual adjustment potentiometers providing direct input to the affected loop controller or sequence controller, or POT.
4. The POT unit shall be used at all controller and wall sensor locations throughout the EMCS network. Systems which provide more than one type of POT shall not be acceptable.

2.10 TIME CLOCKS

A. System will use DDC computer clock for scheduling and time of day functions.

2.11 SENSORS

A. Electronic Sensors: Vibration and corrosion resistant, for wall, immersion, or duct mounting as required.

1. Resistance Temperature Detectors: Platinum.

    a. Accuracy: Plus or minus 0.2 percent at calibration point.
    b. Wire: Twisted, shielded-pair cable.
    c. Insertion Elements in Ducts: Use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft.
    d. Averaging Elements in Ducts: Use where ducts are larger than 9 sq. ft. or where prone to stratification, length as required.
    e. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches.
    f. Room Sensors: Phone jack, warmer/cooler slide bar or scaled set point adjustment. Provide locking cover in public spaces.
    g. Outside Air Sensors: Watertight inlet fitting, shielded from direct sunlight.

B. Equipment Operation Sensors: As follows:

1. Status Inputs for Fans: Differential-pressure switch with adjustable range of 0 to 5 inches wg.
2. Status Inputs for Pumps: Differential-pressure switch piped across pump with adjustable pressure-differential range of 8 to 60 psi.
3. Status Inputs for Electric Motors: Current-sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

C. Water-Flow Switches: Pressure-flow switches of bellows-actuated mercury or snap-acting type, with appropriate scale range and differential adjustment, with stainless steel or bronze paddle.

D. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, temperature compensated.

1. Accuracy: Two (2) percent of full scale with repeatability of 0.5 percent.
2. Output: 4 to 20 mA or 0-10 VDC.
3. Building Static-Pressure Range: -0.25 to 0.25 inch 2 wg.
4. Duct Static-Pressure Range: 0 to 5 inches wg.

2.12 THERMOSTATS

A. Line-Voltage, ON-OFF Thermostats: Bimetal-actuated, open contact or bellows actuated, enclosed, nap-switch type, or equivalent solid-state type, with heat anticipator, integral manual ON-OFF-AUTO selector switch; UL listed for electrical rating.

1. Equip thermostats with OFF position on dial wired to break ungrounded conductors.

2. Dead Band: Maximum 2 deg F.

B. Electric Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic-reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below set point.

1. Bulb Length: Minimum 20 feet.
2. Quantity: One (1) thermostat for every 20 sq. ft. of coil surface.

2.13 ACTUATORS

A. Electronic Valve Operators: Select operator for full shutoff at maximum pump differential pressure.

B. Damper Operators: Size to operate with sufficient reserve power to provide smooth modulating or two-position action.

1. Spring return motor to fail in position indicated on control drawings.
2. Provide steel channel structural supports for any actuator installed on less than 16 gauge sheet metal.

2.14 DAMPERS

A. Dampers: AMCA-rated, parallel or opposed blade design; form frames from not less than 0.1084-inch galvanized steel with mounting holes for duct mounting; damper blades not less than 0.0635-inch galvanized steel, with maximum blade width of 8 inches.

1. Blades secured to 1/2-inch diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass. Ends sealed against spring-stainless-steel blade bearings. Thrust bearings at each end of every blade.
2. Operating Temperature Range: From –40 to 200 deg F.
3. For standard applications as indicated, (as selected by manufacturer's sizing techniques) with optional closed-cell neoprene edging.
4. For low-leakage applications as indicated, provide parallel or opposed blade design (as selected by manufacturer's sizing techniques) with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm/sq. ft. of damper area, at differential pressure of 4 inches wg when damper is being held by torque of 50 inch-pounds; test in accordance with AMCA 500.

2.15 CONTROL VALVES – HIGH TEMPERATURE HEATING SYSTEM

A. Two-part, equal percentage control valve with flow and pressure drop characteristics as indicated on drawings. Rated for 450 deg F and 500 psig pressure. Provide Class 600 flanged connections. Provide 4-20 ma or 0-10 V modulating actuator. Valve/actuator shall be normally closed. Valve to be Siemans or approved equal.

2.16 CONTROL VALVES – LOW TEMPERATURE HEATING & COOLING

A. Control Valves: Factory fabricated, of type, body material, and pressure class indicated. Where type or body material is not indicated, make selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system.

B. Globe pattern valves use for heating water reset, domestic hot water heating and energy recovery unit heating coil:

1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
3. Hydronic Systems: As follows:

    a. Rating: Service at 125 psi WSP and 250 deg F.
    b. Internal Construction: Replaceable plugs and seats of stainless steel or brass.

        1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
        2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.

    c. Refer to drawing for sizing and flow characteristics.

C. Terminal Unit Control Valves: Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.

1. Rating: Service at 125 psi WSP and 250 deg F.
2. Sizing: 3-psi maximum pressure drop at design flow rate, to close against pump shutoff head.
3. Flow Characteristics: 2-way modulating valves shall have linear flow characteristics. 3-way modulating valves shall have linear or equal percentage. Some terminal units utilize 2- and 3-way two position valves. Refer to drawings.

4. Operators (Modulating): Self-contained, linear motor, actuator with 60-second full travel, with transformer and single-throw, double-pole contacts. Note: Provide two-position valves where indicated on drawings.

2.17 CONTROL CABLE

A. Plenum rated in supply, return or exhaust air plenums.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditioned power supply is available to control units and operator workstation. Verify that field end devices, wiring, and pneumatic tubing are installed before proceeding with installation.

3.2 INSTALLATION

A. Install equipment as indicated to comply with manufacturer's written instructions.

B. Install software in control units and operator workstation.

C. Provide customized programming to fully utilize the specified software. This includes, but is not limited to, things such as run time data on all equipment, maintenance scheduling, energy consumption tracking, energy conservation programming demand limiting, etc. It is the intent of this specification to provide the building users with an EMCS system that utilizes the full capabilities of the system with no programming by the user.

D. Programming and adjustments required during the building startup and warranty period shall be provided at no additional cost.

E. Verify location of thermostats and other exposed control sensors with plans and room details before installation. Locate 60 inches above floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

F. Install labels and nameplates to identify control components according to Division 15 Sections specifying mechanical identification.

G. The controls Contractor will be required to spend (8) hours assisting the test and balance (T&B) Contractor. Coordinate with T&B Contractor.

3.3 ELECTRICAL WIRING AND CONNECTIONS

A. Install raceways, boxes, building wire, cable, and cabinets as required and in accordance with N.E.C.

B. Install signal and communication cable as required.

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed low voltage cable in plenum. No EMT carrier required.
4. Bundle and harness multiconductor instrument cable in place of single cables where a number of cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, neatly along hinge side; protect against abrasion. Tie and support conductors neatly.
6. Number-code or color-code conductors, except local individual room controls, for future identification and servicing of control system.

C. Connect electrical components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.

D. Connect manual reset limit controls independent of manual control switch positions.

E. Connect HAND-OFF-AUTO selector switches to override automatic interlock controls when switch is in HAND position.

3.4 APPLICATION SOFTWARE DOCUMENTATION

A. Provide blueprint documentation of the software application program for each DDC. Documentation provided shall include block software flowchart showing the interconnection between each of the control algorithms and sequences. For systems utilizing program listings, a program listing shall be printed onto the same blueprint, along with the program flowchart, and description of the sequence of operation. This

blueprint shall be stored and maintained in each DDC device panel. System acceptance shall not be completed until this documentation is provided and located in each panel.

B. Provide a copy of all databases on floppy disk or tape backup. Provide a floppy disk copy of all graphic screens created for the project.

3.5 ACCEPTANCE TESTING

A. Point Verification:

1. To verify end-to-end operation of the system, provide a hard copy of All Points Summary Listing to the Government of each part or system to be placed in warranty by the Government.

B. Sequence Verification:

1. The Contractor shall notify the Government's representative when the systems are performing all specified sequences. The Contractor shall demonstrate to the Contracting Officer every specified feature of the DDC system, the Contracting Officer shall verify all sequences of operation and allow the system to be placed into warranty acceptance test.
2. The warranty acceptance test shall be of 7 days duration and the system shall perform as follows:

   a. During the 7 days, the EMCS system shall not report any system diagnostics from the subsystem under test.
   b. The subsystem shall be performance verified as operational using temporary trends of each control loop located in the SDC. During the occupied periods, EMCS control loops under test shall maintain control of the process variable within the following scales:

Duct Static Pressure	+/- 0.393 in WC.
Pump Head Pressure	+/- 10% of control range
Duct Temperature Loop	+/- 2 degrees F
Room Temperature Loops	+/- 1 degrees F
Pipe Temperature Loops	+/- 2 degrees F

   c. The Contractor shall provide a hard copy printout of the process variable, process variable setpoint and control loop output % for the period of 2 hours prior to occupancy to 2 hours after occupancy with samples taken every 15 minutes.

3.6 DEMONSTRATION

A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to demonstrate and train Government's maintenance personnel as specified below.

1. Train Government's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
2. Schedule training with Government with at least 7 days notice.
3. Provide operator training on data display, alarm and status descriptors, requesting data, execution of commands, and request of logs. Include a minimum of 20 hours dedicated instructor time on-site, 8 hours at project close out and 16 hours at end of 1-year warranty period.

END OF SECTION 15975

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15985 - SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Sequence of operation is hereby defined as the manner and method by which controls function. Requirements for each type of control system operation are specified in this Section.

B. All control setpoints described in the sequence of operation shall be adjustable by the facility operator.

C. Pump enables, fan enables and similar control points jointly controlled by HSQ and Staefa shall be configured to operate in parallel. One system shall not prevent other system from enabling device. Force Protection Control controlled by HSQ system shall override both systems and prevent operation of fans and close outside air dampers.

D. Devices equipped with hand-off-auto's shall allow full manual operation when indexed to hand. All safety controls shall be enabled when indexed to hand.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 HVAC SYSTEM CONTROL SEQUENCES

A. Finned Tube Radiation Control: Where finned tube is located with cooling only fan coil; provide a single dual-temperature room thermostat/sensor to sequence two-way, two-position heating valve and three-way modulating cooling valve to satisfy space conditioning needs. See 3.1.D.

B. Cabinet and Unit Heater Control: Provide line or low voltage, single-temperature, wall-mounted thermostat to cycle unit fan upon a call for heating. Provide strap-on aquastat to prevent fan operation when supply water temperature drops below 100 degrees F(field adjustable). Provide cast aluminum thermostat guard where indicated on plans. Heating setpoint shall be 68 deg F (field adjustable).

C. Cooling Fan Operation: Provide line or low voltage, single-temperature, wall mounted thermostat to cycle unit fan and open motorized damper (where used) upon a call for cooling.

1. Mechanical Room Unit: Upon a call for cooling, the exhaust fan shall energize. Cooling setpoint shall be 85 deg F (field adjustable). A dedicated HSQ temperature sensor shall report mechanical room temperature to base-wide EMCS.
2. Vending Area Unit: Unit shall provide cooling when chiller plant is shut down. Sequence fan coil and exhaust fan thermostats to prevent simultaneous operation, or provide single thermostat for both operations. Cooling setpoint shall be 80 deg F (field adjustable).
3. HSQ Interface, Force Protection Monitoring and Control: Provide differential pressure switch across exhaust fan to indicate status. Provide relays and related devices to de-energize exhaust fan and interrupt outside air damper power (where used) upon a command from base EMCS (HSQ) system.

D. Cooling-Only Fan Coil Units:

1. Controller: Provide DDC controller at each fan coil unit to perform the sequence of operation. Network each DDC controller to building EMCS (Staefa) global controller in first floor mechanical room. Allow rooms to be enabled for normal use or disabled when empty. Disabled will maintain 55 degree F for heating and no cooling.
2. Provide a single space temperature sensor to maintain space temperature. Fan shall run continuously on low speed to provide ventilation air to space. On a rise in space temperature above cooling setpoint (78 deg F, field adjustable), the three-way modulating cooling valve shall modulate open and the fan shall switch to high-speed operation. On a drop in space temperature below heating setpoint (72 deg F, field adjustable) the two-way, two-position finned tube valve shall open.
3. HSQ Interface: The building global controller (Staefa) shall send alarm to HSQ system whenever any space temperature drops below 50 deg F. Where indicated on drawings, provided dedicated HSQ temperature sensor to report building temperatures to base-wide EMCS.

E. Heating and Cooling Fan Coil Units:

1. Controller: Provide DDC controller at each fan coil unit to perform the sequence of operation. Network each DDC controller to building EMCS (Staefa) global controller in first floor mechanical room. Allow rooms to be enabled for normal use or disabled when empty. Disabled will maintain 55 degree F for heating and no cooling.
2. Provide a single space temperature sensor to maintain space temperature. Fan shall run continuously. On a rise in space temperature above cooling setpoint (78

deg F, field adjustable), the three-way modulating cooling valve shall modulate open. On a drop in space temperature below heating setpoint (72 deg F, field adjustable) the three-way modulating heating valve shall modulate open.

3. Where indicated on drawings, provide cast-aluminum or clear plastic locking cover.

F. Laundry Room(s) Makeup Air Control:

1. Parallel type fan powered, variable air volume unit shall provide room heating and pressurization. Provide DDC controller and network to main global controller in first floor mechanical room.
2. The variable air volume damper shall be modulated in response to space pressurization changes. Coordinate with Test and Balance Contractor to balance minimum air to provide 0.025" negative pressure in room when energy recovery unit is operating. Initial minimum air shall be 100 CFM. Heat recovery unit shall continually exhaust 160 CFM from laundry rooms. As dryers are energized and room pressurization falls, the variable air volume damper shall modulate open as required to maintain space pressurization setpoint.
3. Upon a call for heating, the secondary air fan shall energize and the three-way modulating control valve shall modulate open as required to satisfy space-heating requirements. Heating setpoint shall be 72 deg F during occupied hours and 65 Deg F during unoccupied hours.

G. Energy Recovery Ventilator Control:

1. Supply and exhaust fans shall run continuously to provide ventilation air to building. Provide DDC controller to perform sequence of operation and network to global controller in first floor mechanical room.
2. When indexed ON, the motorized two-position, normally closed exhaust and outside air damper shall open. Upon a loss in supply and/or exhaust fan status, the exhaust air and outside air dampers shall close.
3. The three-way modulating control valve shall maintain discharge air setpoint as required. Discharge air setpoint shall be 70 Deg F.
4. The heat recovery unit shall be provided with factory furnished, frost protection control devices consisting of modulating defrost plate and related control devices. Provide all necessary field wiring and devices. When the outside air temperature reaches 37 deg F, the modulating defrost plate shall begin cycling across heat exchanger core.
5. Upon the detection of the products of combustion in the supply or exhaust air streams, the supply and exhaust fans shall de-energize and both outside air dampers shall close.
6. When the discharge air temperature (downstream or heating coil) drops below 38 Deg F (field adjustable) the supply and exhaust air fans shall de-energize and both outside air dampers shall close.

7. Provide temperature sensors and devices as indicated on drawings and report to building global controller (Staefa) to facilitate system diagnostics.
8. HSQ Interface: Provide dedicated differential pressure switches and temperature sensors as indicated on drawing and report to base-wide EMCS (HSQ system). Provide alarm contacts to HSQ for low limit and smoke detector devices.
9. HSQ Interface, Force Protection Monitoring and Control: Provide relays and related to devices to de-energize both fans and interrupt power supply to outside air dampers upon a command from base EMCS (HSQ) system.

H. Heating Plant Control:

1. Primary loop and secondary heating water supply pumps shall operate in lead/lag manner. When the outside air temperature drops below 70 Deg F, the lead pump shall energize and run continuously. Once initiated, lead pump will not de-energize until outside air temperature exceeds 73 Deg F. In the event that the lead pump fails, the lag pump shall energize. Pump failure must be manually cleared before lead pump is re-energized.
2. When heating system is enabled, high temperature heating water valve (CV-1) shall modulate as required to maintain primary heating water temperature of 180 deg F. The primary loop temperature shall remain constant. Upon a loss in flow from primary loop heating pumps (HWP-1 & 2) CV-1 shall close.
3. The secondary heating water loop shall be reset based on the following schedule:

OUTSIDE AIR TEMPERATURE	HEATING WATER SUPPLY TEMPERATURE
70 Deg F	100 Deg F
0 Deg F	180 Deg F

Control valve CV-3 shall modulate as required to maintain secondary loop set point.

4. Provide temperature sensors and related devices as indicated on drawing and report to building global controller (Staefa) to facilitate system diagnostics.
5. HSQ Interface: Provide dedicated differential pressure switches, temperature sensors and related devices as indicated on drawings and report to base-wide EMCS (HSQ system).

I. Chiller Plant Control:

1. Chilled water pumps shall operate in lead/lag manner. When the outside air temperature rises above 50 Deg F, the lead pump shall energize and run continuously. Once initiated, the lead pump will not de-energize until outside air temperature drops below 47 Deg F. In the event that the lead pump fails, the lag

pump shall energize. Pump failure must be manually cleared before lead pump is re-energized.

2. Once initiated and chilled water flow proven, the chiller plant shall operate under its own controls to provide 45 deg F chilled water to the system.
3. Provide temperature sensors and related devices as indicated on drawings and report to building global controller (Staefa) to facilitate system diagnostics.
4. HSQ Interface: Provide current switches, differential pressure switches, temperature sensors and related devices as indicated on drawings and report to base-wide EMCS (HSQ) system.

J. Domestic Hot Water Plant Control:

1. Domestic hot water shall be provided by building heating plant when in operation and gas-fired water heater when plant is shutdown. Change over between gas heat and central plant heat will be manually controlled.
2. Provide aquastat on domestic hot water storage tank approximately 1/3 up from the bottom of the tank. Aquastat shall monitor tank temperature and modulate open 3-way control valve (CV-2) upon a call for heat. Domestic hot water temperature shall be set for 140 Deg F (field adjustable).
3. When the heating plant is off-line domestic hot water demand shall be met by gas-fired water heater plant. Upon a call for heating water, the water heating plant shall energize (pump and heater) as required to maintain demand. Upon tank temperature exceeding 150 Deg F, the water heater shall de-energize. Provide necessary field wire to interlock water heater and water heater pump feeding storage tank.
4. Provide necessary field wiring and devices to control hot water recirculating pump (CP-1). Refer to plumbing sheets for additional information.
5. HSQ Interface: Provide dedicated temperature sensor in tank and initiate alarm to base-wide EMCS (HSQ system) whenever the tank temperature drops below 110 Deg F or above 150 Deg F.

K. Utility Interface:

1. Heating Water Monitoring: Provide Btu (energy monitor) on high temperature heating system and report building energy use to base-wide EMCS (HSQ system).
2. Gas Meter Monitoring: Provide HSQ compatible gas meter and report natural gas usage to base-wide EMCS (HSQ system).
3. Electrical Monitoring: Provide necessary interface to main electrical panel to monitor both electrical demand (kW) and consumption (kWh). Report to base-wide EMCS (HSQ system).
4. Coordinate scale and output values of utility devices with EMCS shop. Provide manufacturer's data to EMCS shop.

END OF SECTION 15985

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DIVISION 15 – MECHANICAL REQUIREMENTS

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design Specifications, and recording and reporting the results.

1.2 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes the balance of air and water distribution, adjustment of total system to provide design quantities, electrical measurement, and verification of performance of all equipment and automatic controls.

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC or NEBB are proposed.

E. Certified Reports: Submit testing, adjusting, and balancing reports bearing the signature of the Test and Balance Engineer or technician. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

a. General Information and Summary
b. Air Systems
c. Hydronic Systems
d. Special Systems

4. Report Contents: Provide the following minimum information, forms and data:

   a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Government, Contracting Officer, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the name address, telephone number, and signature of the Test and Balance Engineer or technician. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
   b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system.

F. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.4 QUALITY ASSURANCE

A. Agency Qualifications:

1. Employ the services of an independent testing, adjusting, and balancing agency to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. Codes and Standards:

1. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

C. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Contracting Officer and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.5 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

B. Notify temperature control Contractor prior to test and balancing. Have temperature control Contractor on hand to resolve temperature control issues impacting balancing.

1.6 SEQUENCING AND SCHEDULING

A. Test, adjust, and balance the air systems before hydronic systems.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Lubricate all motors and bearings.
11. Check fan belt tension.
12. Check fan rotation.

B. Energy Recovery Ventilator Balancing:

1. Balance ERV at full design flow with VAV-1 at maximum CFM and with maximum dryers in operation.
2. Coordinate with temperature control contractor on setting of differential pressure transmitters. Adjust VAV minimum air as required. Minimum air shall be set with only ERV exhaust in operation. No dryers shall be on.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean all strainers.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation.
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.
9. Check operation of automatic bypass valves.
10. Check and set operating temperatures of chillers to design requirements.
11. Lubricate all motors and bearings.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. Then averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Make measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Match insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

END OF SECTION 15990

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16030 - DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes general requirements and methods of execution relating to the Demolition of portions of the electrical system for the project.

1.2 SCOPE

A Remove all electrical devices from walls and ceilings to be demolished or moved. This includes but is not limited to light fixtures, switches, outlets, horns, bells, intercom stations, clocks and motor connections.

B Remove conduit to a point where it no longer interferes with construction and is concealed. For conduit buried in concrete or CMU walls, cut conduit off flush with floor and plug conduit.

C Remove all conductors back to panelboard or last live electrical connection. Revise electrical connections as required to remove items listed herein or shown on plans.

D Contractor shall give the Government the option to keep electrical items of his choice. Contractor is responsible for disposal of all remaining electrical items.

E CONTRACTOR TO BE RESPONSIBLE FOR DISPOSAL OF ALL REMOVED LAMPS AND BALLASTS. BALLASTS MAY CONTAIN PCB AND MUST BE DISPOSED OF ACCORDING TO ENVIRONMENTAL REGULATIONS.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS

A Where additional conduit, fittings, conductors, etc., are required for reconnection or relocation, Contractor to refer to applicable sections in these specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

A Demolition to occur with a minimum of hinderance to other trades and shall be done quickly so as to not hinder the other trades demolition.

B Refer to demolition drawings, new drawings and site to coordinate demolition efforts. Notify engineer of any discrepancies.

END OF SECTION 16030

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete equipment bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For electricity-metering equipment, (meter, base, CTs). Provide information on current ratios and multipliers if any used.

C. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. All work shall be done in accordance to and comply with NFPA 70.

1.6 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 RACEWAYS

A. EMT: ANSI C80.3, zinc-coated steel, with set-screw or compression fittings.

B. FMC: Zinc-coated steel.

C. IMC: ANSI C80.6, zinc-coated steel, with threaded fittings.

D. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.

E. RNC: NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.

F. Raceway Fittings: Specifically designed for the raceway type with which used.

2.2 CONDUCTORS

A. Conductors, No. 10 AWG and Smaller: Solid copper.

B. Conductors, Larger Than No. 10 AWG: Stranded copper.

C. Insulation: Thermoplastic, rated at 75 deg C minimum.

D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.3 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch-diameter slotted holes at a maximum of 2 inches o.c., in webs.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser

conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

G. Expansion Anchors: Carbon-steel wedge or sleeve type.

H. Toggle Bolts: All-steel springhead type.

I. Powder-Driven Threaded Studs: Heat-treated steel.

2.4 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.

1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
2. Color: Black letters on orange background.
3. Legend: Indicates voltage.

C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.

D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend that indicates type of underground line.

E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.

H. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

I. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch, galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.

J. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.5 EQUIPMENT FOR ELECTRICITY METERING

A. Meter: Electronic kilowatt-hour/demand measuring to record electricity used and highest peak demand over a time period according to electric utility. Meter is designed for use on the type and rating of circuit indicated for its application. See Section 15915 for information regarding EMCS system. Meter is to be compatible with EMCS system.

1. Kilowatt-Hour Display: Digital liquid crystal.
2. Kilowatt-Demand Display: Digital, liquid-crystal type to register highest peak demand.
3. Enclosure: NEMA 250, Type 1, minimum, with hasp for padlocking or sealing.
4. Memory Backup: Self-contained to maintain memory throughout power outages of 72 hours, minimum.
5. Sensors: Current-sensing type, with current or voltage output, selected for optimum range and accuracy for the ratings of the circuits indicated for this application.

    a. Type: Split core.

6. Demand Signal Communication Interface: Match signal to building automation system input that conveys data on instantaneous/integrated demand level measured by meter used for load switching to control demand.

B. Available Metering Equipment Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. E-MON Corporation.
2. National Meter Industries, Inc.
3. General Electric.

2.6 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."

2.7 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.3 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts.
5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
6. Steel: Spring-tension clamps on steel.
7. Light Steel: Sheet-metal screws.
8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Identify raceways and cables with color banding as follows:

1. Bands: Colored adhesive marking tape. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
3. Colors: As follows:

    a. Fire Alarm System: Red.
    b. Security System: Blue and yellow.
    c. Telecommunication System: Green and yellow.

E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.

G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.
4. Neutral: White.
5. Ground: Green.

H. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

I. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.5 FIRESTOPPING/SOUND DAMPING

A. Apply firestopping/sound damping to all cable and raceway penetrations of fire-rated and non-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

3.6 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated.

3.7 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.8 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.

B. Test Government's electricity-metering installation for proper operation, accuracy, and usability of output data.

1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.
2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.
3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.
4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.
5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.9 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.

2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.10 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16060 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated.

C. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

B. Comply with NFPA 70; for medium-voltage underground construction, comply with IEEE C2.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Grounding Conductors, Cables, Connectors, and Rods:

a. Apache Grounding/Erico Inc.
b. Copperweld Corp.
c. Erico Inc.; Electrical Products Group.
d. Framatome Connectors/Burndy Electrical.
e. Ideal Industries, Inc.
f. ILSCO.
g. Raco, Inc.; Division of Hubbell.
h. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Assembly of Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4-inch in diameter.

2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16-inch thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16-inch thick.

H. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Sectional type; copper-clad steel.

1. Size: 3/4 by 120 inches in diameter.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

D. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

E. Water Heater, Heat-Tracing, and Cables: Install a separate equipment grounding conductor to each electric water heater, heat-tracing, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

F. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

G. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

H. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

    a. Equipment Rated 500 kVA and Less: 10 ohms.
    b. Equipment Rated 500 to 1000 kVA: 5 ohms.
    c. Equipment Rated More Than 1000 kVA: 3 ohms.
    d. Substations and Pad-Mounted Switching Equipment: 5 ohms.
    e. Manhole Grounds: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Contracting Officer promptly and include recommendations to reduce ground resistance.

3.6 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION 16060

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16110 - RACEWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways for electrical wiring. Types of raceways in this section include only the following:

1. Electrical metallic tubing (EMT).
2. Flexible metal conduit.
4. Liquidtight flexible conduit.
5. Rigid metal conduit.
6. Rigid nonmetallic conduit.
7. Wiremold.
8. Wireway.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers complying with the Quality Assurance requirements are acceptable.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

C. Electrical Metallic Tubing and Fittings: ANSI C80.3.

D. Electrical Nonmetallic Tubing: Is not allowed.

E. Flexible Metal Conduit: UL 1, zinc-coated steel.

F. Liquidtight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

2.3 NONMETALLIC CONDUIT AND DUCTS

A. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.

B. PVC Conduit and Tubing Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

C. Liquidtight Flexible Nonmetallic Conduit and Fittings: UL 1660. Fittings shall be specifically approved for use with this raceway.

D. Conduit, Tubing, and Duct Accessories: Types, sizes, and materials complying with manufacturer's published product information. Mate and match accessories with raceway.

E. Below grade rigid steel elbows shall be PVC coated factory elbows.

2.4 CONDUIT BODIES

A. General: Types, shapes, and sizes as required to suit individual applications and NEC requirements.

B. Provide matching gasketed covers secured with corrosion-resistant screws.

C. Metallic Conduit and Tubing: Use metallic conduit bodies. Use bodies with threaded hubs for threaded raceways.

D. Fittings: All EMT fittings shall be compression type up to 2 inches and steel set-screw type for 2 inches and above (cast fittings not allowed).

2.5 WIREWAYS

A. General: Electrical wireways shall be of types, sizes, and number of channels as indicated. Fittings and accessories including but not limited to couplings, offsets, elbows, expansion joints, adapters, hold-down straps, and end caps shall match and mate with wireway as required for complete system.

B. Where features are not indicated, select to fulfill wiring requirements and comply with applicable provisions of NEC.

2.6 SURFACE RACEWAYS

A. General: Sizes and channels as indicated. Provide fittings that match and mate with raceway.

B. Surface Metal Raceway: Construct of galvanized steel with snap-on covers, with 1/8-inch mounting screw knockouts in base approximately 8 inches o.c. Finish with manufacturer's standard prime coating suitable for painting. Provide raceways of types suitable for each application required.

PART 3 - EXECUTION

3.1 WIRING METHOD

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid metal conduit.
2. Concealed: Rigid metal conduit.
3. Underground: PVC coated rigid metallic conduit.
4. Indoors or Outdoors: Connection to vibrating equipment including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment in moist or humid location or corrosive atmosphere, or where subject to water spray or dripping oil, grease, or water: liquidtight flexible metal conduit.

B. Indoors: Use the following wiring methods:

1. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic or electric solenoid or motor-operated equipment: flexible metal conduit.
2. Exposed: Electrical metallic tubing, rigid metal conduit.
3. Concealed: Electrical metallic tubing.

3.2 INSTALLATION

A. General: Install electrical raceways in accordance with requirements of NEC, and as follows:

B. Conceal Conduit and EMT, unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install raceways level and square and at proper elevations.

C. Elevation of Raceway: Where possible, install horizontal raceway runs above water and steam piping.

D. Complete installation of electrical raceways before starting installation of conductors within raceways.

E. Provide supports for raceways as specified elsewhere in Division 16.

F. Prevent foreign matter from entering raceways by using temporary closure protection.

G. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.

I. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For rigid metal conduit use threaded rigid steel conduit fittings except as otherwise indicated. EMT set screw connectors and couplers are to be steel, not cast. Connectors to be insulated throat. (Patch all nicks and scrapes in PVC coating after installing conduits.)

J. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated. This does not apply to conduits in crawl spaces.

K. Raceways embedded in slabs: NOT ALLOWED.

L. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical.

M. Run exposed, parallel, or banked raceways together.

N. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.

O. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

P. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

Q. Install pull wires in empty raceways. Use monofilament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

R. Telephone and Signal System Raceways 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways 2-inch and smaller trade size in maximum lengths of 100 feet and with a maximum of two, 90-deg bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements.

S. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor.

T. Flexible Connections: Use short length (maximum of 6 ft.) of flexible conduit for recessed and semirecessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet locations. Install separate ground conductor across flexible connections.

U. Surface Metal Raceway: Install a separate green ground conductor in raceway from the junction box supplying the raceway to receptacle or fixture ground terminals.

V. Raceway Installed Above Accessible Ceilings: Raceway located above accessible ceilings shall be a minimum of 24 inches above finished ceiling or mounted direct to structure, whichever is less.

3.3 ADJUSTING AND CLEANING

A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

END OF SECTION 16110

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16120 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. All work shall be done in accordance to and comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Wires and Cables:

a. American Insulated Wire Corp.; Leviton Manufacturing Co.
b. BICC Brand-Rex Company.
c. Senator Wire & Cable Company.
d. Southwire Company.

2. Connectors for Wires and Cables:

a. AMP Incorporated.
b. General Signal; O-Z/Gedney Unit.
c. Square D Co.; Anderson.
d. 3M Company; Electrical Products Division.

2.2 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.

B. Rubber Insulation Material: Comply with NEMA WC 3.

C. Thermoplastic Insulation Material: Comply with NEMA WC 5.

D. Cross-Linked Polyethylene Insulation Material: Comply with NEMA WC 7.

E. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.

F. Conductor Material: Copper only.

G. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

2.3 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND INSULATION APPLICATIONS

A. Service Entrance: Type THHN, in raceway.

B. Feeders: Type THHN/THWN, in raceway.

C. Branch Circuits: Type THHN/THWN, in raceway.

D. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable, in raceway.

E. Class 1 Control Circuits: Type THHN/THWN, in raceway.

F. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

G. Class 2 Control Circuits: Type THHN/THWN, in raceway.

3.3 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Remove existing wires from raceway before pulling in new wires and cables.

C. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

G. Seal around cables penetrating fire-rated elements according to Division 7 Section "Firestopping."

H. Identify wires and cables according to Division 16 Section "Basic Electrical Materials and Methods."

I. Identify wires and cables according to Division 16 Section "Electrical Identification."

J. All 120 volt circuits are to have a dedicated neutral conductor. Shared neutrals are not allowed.

3.4 CONNECTIONS

A. Conductor Splices: Keep to minimum.

B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

C. Use splice and tap connectors compatible with conductor material.

D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.

F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.5 FIELD QUALITY CONTROL

A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 16120

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16135 - CABINETS, BOXES, AND FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other sections. Types of products specified in this Section include:

1. Outlet and device boxes.
2. Pull and junction boxes.
4. Cabinets.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers complying with the Quality Assurance requirements are acceptable.

2.2 CABINETS, BOXES, AND FITTINGS, GENERAL

A. Electrical Cabinets, Boxes, and Fittings: Of indicated types, sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet locations.

2.3 MATERIALS AND FINISHES

A. Sheet Steel: Flat-rolled, code-gage, galvanized steel.

B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

C. Fasteners for Damp or Wet Locations: Stainless steel screws and hardware.

D. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.

E. Painted Interior Finish: Where indicated, white baked enamel.

F. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Zinc plated steel for conduit hubs, bushings, box connectors and couplers. Set screw type. Use insulated throat connectors.

2.4 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES

A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application. Minimum size 4 inch square x 2-1/8 inch deep.

B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.

2.5 PULL AND JUNCTION BOXES

A. General: Comply with UL 50, "Electrical Cabinets and Boxes", for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.

B. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.

C. Hot-Dipped Galvanized Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.

2.6 CABINETS

A. Comply with UL 50, "Electrical Cabinets and Boxes."

B. Construction: Sheet steel, NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush

or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.

C. Doors: Double doors for cabinets wider than 24-inches. Telephone cabinets wider than 48-inches may have sliding or removable doors.

D. Locks: Combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locations: Install items where indicated and where required to suit code requirements and installation conditions.

B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.

C. Support and fasten items securely in accordance with Division 16 Section "Supporting Devices."

D. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.

E. Remove sharp edges where they may come in contact with wiring or personnel.

3.2 INSTALLATION OF OUTLET BOXES

A. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

B. Gasketed Boxes: At the following locations use cast metal, threaded hub type boxes with gasketed weatherproof covers:

1. Exterior locations.
2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry locations).
3. Where exposed to moisture laden atmosphere.
5. Where indicated.

C. Mounting: Mount outlet boxes for switches and receptacles with the long axis vertical or as indicated. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.

D. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 2-1/8-inches deep, minimum.

E. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.

F. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

G. Concrete Boxes: Use extra deep boxes to permit side conduit entrance without interfering with reinforcing, but do not use such boxes with over 6-inch depth.

H. Do not install boxes back-to-back.

3.3 INSTALLATION OF PULL AND JUNCTION BOXES

A. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling. No runs shall exceed 100 feet without pull boxes every 100 feet minimum.

B. Size: Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 370 of NEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

3.4 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES

A. Mount with fronts straight and plumb.

B. Install with tops 78-inches above floor.

C. Set cabinets in finished spaces flush with walls.

3.5 GROUNDING

A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

3.6 CLEANING AND FINISH REPAIR

A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.

B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the tray manufacturer.

C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

END OF SECTION 16135

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes receptacles, connectors, switches, and finish plates.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each product specified.

C. Shop Drawings: Legends for receptacles and switch plates.

D. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NEMA WD 1.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Government-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Wiring Devices:

a. Bryant Electric, Inc.
b. GE Company; GE Wiring Devices.
c. Hubbell, Inc.; Wiring Devices Div.
d. Leviton Manufacturing Co., Inc.
e. Pass & Seymour/Legrand; Wiring Devices Div.

2. Multioutlet Assemblies:

a. Airey-Thompson Co.
b. Wiremold.

2.2 RECEPTACLES

A. GFCI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle. Do not feed receptacle downstream. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter. Each receptacle shall have test and reset buttons.

2.3 SWITCHES

A. Snap Switches: Heavy-duty, quiet type.

B. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible and electromagnetic noise filters.

1. Control: Continuously adjustable slide, toggle, or rotary knob. Single-pole or three-way switch to suit connections.

2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable, toggle, or slide; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF, and TV interference; and 5-inch wire connecting leads.

2.4 WALL PLATES

A. Single and combination types match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Nylon. Standard color as selected by Contracting Officer.

2.5 FINISHES

A. Color: Standard color as selected by Contracting Officer, unless otherwise indicated or required by Code.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Install wall plates when painting is complete.

C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.

D. Do not share neutral conductor on load side of dimmers.

E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

F. Protect devices and assemblies during painting.

G. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Basic Electrical Materials and Methods."

1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
2. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.3 CONNECTIONS

A. Connect wiring device grounding terminal to outlet box with bonding jumper.

B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

C. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A.

3.4 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.

B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

C. Replace damaged or defective components.

3.5 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 16140

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16170 - CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes circuit and motor disconnects.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product data for each type of product specified.

C. Maintenance data for circuit and motor disconnects. Include service bulletin(s) and illustrated parts bulletin.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cutler-Hammer Inc.
2. General Electric Co.
3. Square D Company.

2.2 CIRCUIT AND MOTOR DISCONNECT SWITCHES

A. General: Provide circuit and motor disconnect switches in types, sizes, duties, features ratings, and enclosures as indicated. Provide NEMA 1 enclosure except for outdoor switches, and other indicated locations provide NEMA 3R enclosures with raintight hubs. For motor and motor starter disconnects, provide units with horsepower ratings suitable to the loads.

B. Fusible Switches: heavy duty switches, with fuses of classes and current ratings indicated. See Section "FUSES" for specifications. Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses.

C. Non-fusible Disconnects: heavy duty switches of classes and current ratings as indicated.

D. Service Switches: heavy duty fusible switches. UL listed for use as service equipment under UL Standard 98 or 869.

2.3 ACCESSORIES

A. Captive Fuse Pullers: Provide built-in fuse pullers arranged to facilitate fuse removal.

PART 3 - EXECUTION

3.1 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECTS

A. General: Provide circuit and motor disconnect switches as indicated and where required by the above Code. Comply with switch manufacturers' printed installation instructions.

3.2 FIELD QUALITY CONTROL

A. Testing: Subsequent to completion of installation of electrical disconnect switches, energize circuits and demonstrate capability and compliance with requirements. Except as otherwise indicated, do not test switches by operating them under load. However, demonstrate switch operation through six opening/closing cycles with circuit unloaded. Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

END OF SECTION 16170

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16190 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers complying with the Quality Assurance requirements are acceptable.

2.2 COATINGS

A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

2.3 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

B. Fasteners: Types, materials, and construction features as follows:

1. Expansion Anchors: Carbon steel wedge or sleeve type.
2. Toggle Bolts: All steel springhead type.
3. Powder-Driven Threaded Studs: Heat-treated steel, designed specifically for the intended service.

C. U-Channel Systems: 16-gage steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacturer.

2.4 FABRICATED SUPPORTING DEVICES

A. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gage metal for sleeve diameter noted:

a. 3-inch and smaller: 20-gage.
b. 4-inch to 6-inch: 16-gage.
c. Over 6-inch: 14-gage.

2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe. 3. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.
2. Strength of each support shall be adequate to carry the load plus a minimum of 200 lbs safety allowance.
3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
4. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
5. Space supports for raceways in accordance with Table I of this section. Space supports for raceway types not covered by the above in accordance with NEC.

6. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

D. In open overhead spaces, support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.

E. Sleeves: Install in concrete slabs and walls and all other fire-rated floors and walls for raceways and cable installations. For sleeves through fire rated-wall or floor construction, apply UL-listed firestopping sealant in gaps between sleeves and enclosed conduits and cables in accordance with "Fire Resistant Joint Sealers" requirement of Division 7 Section "Joint Sealers."

F. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with the following:

1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine or wood screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
2. All device boxes in sheetrock walls will be tight before, during and after installation of sheetrock.

G. Cutting and Patching: Obtain Contracting Officer's approval before cutting and patching on structural members of building surfaces.

END OF SECTION 16190

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16420 - SERVICE ENTRANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Extent of service-entrance work is indicated by drawings and schedules.

B. Types of service-entrance equipment in this section include the following:

1. CT cans.
2. Meter sockets.

1.2 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Submit manufacturer's data on service-entrance equipment and accessories.

1.3 QUALITY ASSURANCE

A. Listing and Labeling: Provide service entrance equipment, CT cans etc. specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. All work shall be done in accordance to and comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SERVICE-ENTRANCE EQUIPMENT

A. General: Provide service-entrance equipment and accessories; of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard

materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified.

B. Meter Sockets:

1. General: Provide meter sockets which comply with requirements of government supplying electrical power to service entrance equipment of building project.
2. Manufacturers: Subject to compliance with requirements, provide meter sockets of one of the following (for each type of meter):

a. Circle AW Products Co.
b. Square D Co.

C. All equipment, boxes, etc., shall be U.L. listed.

2.2 SERVICE-ENTRANCE ACCESSORIES

A. Service-Entrance Caps: Provide service-entrance cable caps.

B. Manufacturers: Subject to compliance with requirements, provide service-entrance caps of one of the following:

1. Burndy Corp.
2. Crouse-Hinds Co.
3. Killark Elect Mfg Co.
4. Midland-Ross Corp.
5. O-Z Gedney Co.
6. Raco Inc.
7. Thomas and Betts Corp.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which service-entrance equipment and components are to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF SERVICE-ENTRANCE EQUIPMENT

A. Install service-entrance equipment as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that service-entrance equipment fulfills requirements. Comply with applicable installation requirements of NEC and NEMA standards.

B. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A, and the National Electrical Code.

3.3 FIELD QUALITY CONTROL

A. Prior to energization of service-entrance equipment, check accessible connections for compliance to manufacturer's torque tightening specifications.

B. Prior to energization of service-entrance equipment, check with ground resistance tester, phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

C. Prior to energization, check circuitry for electrical continuity, and for short-circuits.

3.4 GROUNDING

A. Provide equipment grounding connections for service-entrance equipment as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounding.

3.5 ADJUSTING AND CLEANING

A. Adjust operating mechanisms for free mechanical movement.

B. Touch-up scratched or marred enclosure surfaces to match original finishes.

3.6 DEMONSTRATION

A. Upon completion of installation of service-entrance equipment and electrical circuitry, energized circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate

compliance; otherwise, remove and replace with new units, and retest to demonstrate compliance.

END OF SECTION 16420

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.
2. Distribution panelboards.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. RMS: Root mean square.

C. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of panelboard, overcurrent protective device, TVSS device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

E. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.7 EXTRA MATERIALS

A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer's Representative:

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. Eaton Corp.; Cutler-Hammer Products.
b. General Electric Co.; Electrical Distribution & Control Div.
c. Square D Co.

2.2 FABRICATION AND FEATURES

A. Enclosures: Flush- and surface- mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

D. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

E. Bus: Hard-drawn copper, 98 percent conductivity.

F. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.

G. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

H. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

I. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

J. Feed-through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.3 PANELBOARD SHORT-CIRCUIT RATING

A. All shall be fully rated to interrupt symmetrical short-circuit current available at terminals.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISTRIBUTION PANELBOARDS (TVSS SHALL BE PROVIDED)

A. Doors: Front mounted, secured with vault-type latch with tumbler lock; keyed alike.

B. Main Overcurrent Protective Devices: Circuit breaker.

C. Branch overcurrent protective devices shall be one of the following:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.6 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

a. Instantaneous trip.
b. Long- and short-time pickup levels.
c. Long- and short-time time adjustments.
d. Ground-fault pickup level, time delay, and I^2t response.

4. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.

B. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

2.7 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: To test functions of solid-state trip devices without removal from panelboard.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.

C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

E. Install filler plates in unused spaces.

F. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."

B. Panelboard Nameplates: Label each panelboard with engraved laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.6 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16442

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DIVISION 16 - ELECTRICAL REQUIREMENTS

SECTION 16460 - TRANSFORMERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of transformer work is indicated by drawings and schedules.

B. Types of transformers specified in this section include the following:

1. Oil-filled transformers.

1.2 QUALITY ASSURANCE

A. NEC Compliance: Comply with current NEC as applicable to installation and construction of electrical distribution transformers.

B. NEMA Compliance: Comply with the applicable portions of NEMA Std Pub, No.'s TR 1 and TR 27 pertaining to distribution transformers.

C. ANSI Compliance: Comply with applicable requirements of ANSI Standards C57-Series pertaining to distribution transformers.

D. UL Compliance: Comply with applicable requirements of ANSI/UL 506. "Safety Standard for Specialty Transformers". Provide distribution transformers and components which are UL listed and labeled.

E. NESC Compliance: Comply with applicable requirements of 1993 National Electrical Safety Code (ANSI Std C2) pertaining to outdoor installation of transformers.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Include transformers operations and maintenance information in the O&M manual.

C. Transformer oil analysis report for PCB's for each transformer.

D. Two pentahead sockets shall be supplied, with breaker bars, that fit the pentahead door-securing bolt on the pad-mount transformer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements. Provide products by one of the following or an equal approved by Contracting Officer**.**

1. GE

2.2 PAD MOUNT DISTRIBUTION TRANSFORMERS

A. General: Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation. All transformers shall contain no PCB's. A verification shall be made for each unit by taking a sample from it and having an analysis made of that sample for PCB. A sample analysis report, with that unit's serial number on it shall be given to the Contracting Officer via AF Form 3000 Submittal Form. The unit shall also be labeled "NON-PCB". Submit at least 10 days before the final inspection.

B. Oil-filled Pad Mounted Transformers: Provide factory assembled, oil-filled outdoor type, tamper-resistant, pan-mounted distribution transformers, where shown, of sizes, characteristics, and rated capacities indicated or specified.

1. Three-Phase Pad Mounted Transformers.

a. Supply the following transformers:

1) Building 737: KVA 500

b. Units shall be 12,470 VAC delta-connected primary, 95 KV BIL minimum, 120/208 VAC grounded wye secondary, externally operable two 2-1/2 percent taps above nominal and two 2-1/2 percent below nominal, and a maximum of 150 deg F rise. The transformers shall be GE Compad or approved equal.

c. The transformers shall be REA Designed, equipped with oil drain, filler and level plugs, automatic-pressure relief device, barriered high and low voltage compartments, grounding pads in each compartment, all copper windings, dial type thermometer, under oil high-voltage MOV lightning arresters, drywell CLE fuses (fusing at 150 percent), high voltage feedback elbow

bushings with bushing wells, loop feed features, 4-hole blade secondary bushings, and padlockable door operating handle with pentahead security bolt. All units shall be quipped with an external kilowatt hour demand meter with necessary CT's and wiring connections.

C. Finishes: Coat interior and exterior surfaces of transformers, including bolted joint, with manufacturer's standard color baked-on enamel. The exterior color shall be Federal Spec #23578, antique linen baked-on enamel. If this color is not available from the factory, this baked-on enamel color shall be applied locally.

D. Transformer KVA shall be stenciled on exterior of transformer.

2.3 INSTALLATION OF PAD-MOUNTED TRANSFORMERS

A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements on NEC, NESC, NEMA, ANSI, and IEEE standards, and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Transformers must be bolted to a concrete pad. Concrete pads shall be sized per manufacturer's recommendations, but shall also extend six inches beyond the base of the transformer on all four sides. The cutout for conduit entry shall be sized and conduits arranged such that the conduits do not touch concrete, there is room for an additional conduit in the future, and the ground rods and connections are exposed.

C. Coordinate transformer installation work with electrical raceway, grounding, and wire/cable work, as necessary for proper interface.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Connect transformer units to electrical wiring system, comply with requirements of other Division 16 sections.

B. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque-tightening values for equipment connector. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with lightning torques specified in UL 486A.

3.2 GROUNDING

A. Provide equipment grounding connections for distribution transformers as required. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounding. Ground rods shall be installed with each transformer per Section 16060.

3.3 TESTING

A. Prior to connecting secondary wiring, the transformer will be energized, it shall be verified that proper secondary voltages are present. If they are not, whatever necessary corrections shall be made. Nominal secondary service voltage shall fall within voltage range 'A' per ANSI C84.1-1989, Appendix B[2].

B. Prior to energization of transformers, check all accessible connections for compliance with manufacturer’s torque tightening specifications.

C. Prior to energization, check circuitry for electrical continuity and short-circuits.

D. Upon completion of installation of transformers, energize primary circuitry at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance, otherwise, remove and replace with new units or components, and proceed with retesting. Have Project Inspector present.

END OF SECTION 16460

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16478 - TRANSIENT VOLTAGE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes transient voltage surge suppressors for low-voltage circuits and equipment.

1.2 SYSTEM DESCRIPTION

A. Transient voltage suppression for low-voltage distribution systems, with suppressors located at each major bus, including service entrances, feeders, and branch-circuit distribution equipment.

B. System Exposure: IEEE C62.41, medium.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Maintenance Data: For transient voltage surge suppressors to include in the maintenance manuals specified in Division 1.

E. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide electrically operated equipment specified in this Section that is listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. Comply with NFPA 70.

C. UL 1449 and 1283 Listed.

1.5 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, executed by manufacturer, agreeing to repair or replace components of transient voltage surge suppressors that fail in materials or workmanship within the specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Advanced Protection Technologies, Inc.
2. Atlantic Scientific Corp.
3. Current Technology, Inc.
4. Innovative Technology, Inc.
5. LEA Dynatech, Inc.
6. Northern Technologies, Inc.
7. Transtector Systems, Inc.

2.2 TRANSIENT VOLTAGE SURGE SUPPRESSORS

A. Functional Description: Solid-state, 2-stage, transient voltage surge suppressors employing no series-connected suppression components.

1. Primary/Secondary Protection: Employs two lines of protection - if the primary lets through - or fails - secondary protection pickups up transient.
2. Inline fuses in each suppression-module circuit prevent damage to suppressor during failure of any module.
3. Maximum Surge Current (Per Phase): 80 ka per phase (8/20 microseconds current wave form).
4. Less than one nanosecond reaction time.
5. AC tracking filter.
6. Pulse Life: 2000, 8/20 microseconds Category C impulses without draft.

B. Overall Ratings: As indicated and as required to comply with location categories according to NEMA LS 1.

C. Maximum Continuous Operating Voltage: At least 115 percent of nominal system operating voltage.

D. Connection Means: Permanently wired.

E. Protection Modes: Include the following:

1. Line-to-neutral, where applied on grounded circuits.
2. Line-to-line.
3. Line-to-ground.
4. Neutral-to-ground, where applied on grounded circuits.

F. Service Conditions: Include the following:

1. Operating Temperature: 30 to 120 deg F.
2. Humidity: 0 to 85 percent, noncondensing.
3. Altitude: Less than 20,000 feet above sea level.

G. Enclosure: NEMA 250, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances, power characteristics, and other conditions affecting performance of transient voltage surge suppressors. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 CONNECTIONS

A. Connect transient voltage suppression circuit in line-to-neutral configuration if a neutral conductor is available.

B. Ground each transient voltage surge suppressor enclosure.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Supervision of the field assembly of components and installation of transient voltage surge suppressors, including electrical connections, by a factory-authorized service representative. Report results in writing.

END OF SECTION 16478

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16481 - MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ac motor-control devices rated 600 V and less that are supplied as enclosed units.

B. Related Sections include the following:

1. Division 16 Section "Basic Electrical Materials and Methods" for general materials and installation methods.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For products specified in this Section. Include dimensions, ratings, and data on features and components.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Maintenance Data: For products to include in the maintenance manuals specified in Division 1.

E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Source Limitations: Obtain similar motor-control devices through one source from a single manufacturer.

C. Comply with NFPA 70.

D. Listing and Labeling: Provide motor controllers specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

1.5 COORDINATION

A. Coordinate features of controllers and accessory devices with pilot devices and control circuits to which they connect.

B. Coordinate features, accessories, and functions of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, and the duty cycle of the motor and load.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Spare Fuses and Incandescent Indicating Lamps: Furnish 1 spare for every 5 installed units, but not less than 1 set of 3 of each kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an equal approved by the Contracting Officer:

1. Eaton Corp.; Westinghouse & Cutler-Hammer Products.
2. General Electric Co.; Electrical Distribution & Control Div.
3. Square D Co.

2.2 MANUAL MOTOR CONTROLLERS

A. Description: NEMA ICS 2, general purpose, Class A with toggle action and overload element.

2.3 MAGNETIC MOTOR CONTROLLERS

A. Description: NEMA ICS 2, Class A, full voltage, non-reversing, across the line, unless otherwise indicated.

B. Control Circuit: 120 V; obtained from integral control power transformer, unless otherwise indicated. Include a control power transformer with adequate capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Combination Controller: Factory-assembled combination controller and disconnect switch with or without overcurrent protection as indicated.

1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses indicated. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a Nationally Recognized Testing Laboratory.
2. Nonfusible Disconnect: NEMA KS 1, heavy-duty, nonfusible switch.

D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect, and with appropriate adjustment for duty cycle.

E. Overload Relay: NEMA ICS 2, Class 10 tripping characteristics selected to protect motor against voltage unbalance and single phasing.

F. All magnetic motor controllers are to be equipped with current-sensing, phase-failure relay. Solid-state sensing circuit with isolated contacts for hard-wired connection. Arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage. Provide adjustable response delay.

2.4 ENCLOSURES

A. Description: Flush or surface-mounted cabinets as indicated on plans and schedules. NEMA 250, Type 1, unless otherwise indicated to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.5 ACCESSORIES

A. Devices are factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Control Relays: Auxiliary and adjustable time-delay relays.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Select features of each motor controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

C. Use fractional-horsepower manual controllers for single-phase motors, unless otherwise indicated.

D. Push-Button Stations: In covers of magnetic controllers for manually started motors where indicated, start contact connected in parallel with sealing auxiliary contact for low-voltage protection.

E. Hand-Off-Automatic Selector Switches: In covers of manual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment.

3.2 INSTALLATION

A. Install independently mounted motor-control devices according to manufacturer's written instructions.

B. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components, including the pretesting and adjustment of solid-state controllers.

C. Location: Locate controllers within sight of motors controlled, unless otherwise indicated.

D. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks conforming to Division 16 Section "Basic Electrical Materials and Methods."

E. Motor-Controller Fuses: Install indicated fuses in each fusible switch.

3.3 IDENTIFICATION

A. Identify motor-control components and control wiring according to Division 16 Section "Basic Electrical Materials and Methods."

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between motor-control devices according to Division 16 Section "Wires and Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic control devices where available.

1. Connect selector switches to bypass only the manual and automatic control devices that have no safety functions when switch is in the hand position.
2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 CONNECTIONS

A. Tighten connectors, terminals, bus joints, and mountings. Tighten field-connected connectors and terminals, including screws and bolts, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 FIELD QUALITY CONTROL

A. Testing: After installing motor controllers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Sections 7.5, 7.6, and 7.16. Certify compliance with test parameters.
2. Remove and replace malfunctioning units with new units, and retest.

3.7 CLEANING

A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally, using methods and materials recommended by manufacturer.

3.8 DEMONSTRATION

A. Training: Engage a factory-authorized service representative to demonstrate solid-state and variable- speed controllers and train Government's maintenance personnel.

1. Conduct a minimum of 4 hours of training in operation and maintenance conforming to data required under Division 1 Section "Operations And Maintenance Manuals." Include training relating to equipment operation and maintenance procedures.
2. Schedule training with at least 7 days advance notice.

END OF SECTION 16481

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16511 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, lamps, ballasts, emergency lighting units, and accessories.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:

1. Dimensions of fixtures.
2. Certified results of independent laboratory tests for fixtures and lamps for electrical ratings and photometric data.
3. Certified results of laboratory tests for fixtures and lamps for photometric performance.
4. Emergency lighting unit battery and charger.
5. Fluorescent and high-intensity-discharge ballasts.
6. Types of lamps.

C. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, method of field assembly, components, features, and accessories.

1. Wiring Diagrams: Detail wiring for fixtures and differentiate between manufacturer-installed and field-installed wiring.

D. Maintenance Data: For lighting fixtures to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NFPA 70.

C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.5 COORDINATION

A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

1.6 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty for Batteries: Written warranty, executed by manufacturer agreeing to replace rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Special Warranty Period for Batteries: Manufacturer's standard, but not less than 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for last nine years.

C. Special Warranties for Fluorescent Ballasts: Written warranty, executed by manufacturer agreeing to replace fluorescent ballasts that fail in materials or workmanship within specified warranty period.

1. Special Warranty Period for All Electronic Ballasts: Five years from date of manufacture, but not less than four years from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
2. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
3. Battery and Charger Data: For emergency lighting units.
4. Ballasts: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
5. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Interior Lighting Fixture Schedule.

2.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL

A. Metal Parts: Free from burrs, sharp corners, and edges.

B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.

D. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.

1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
2. Lens Thickness: 0.125 inch minimum, unless greater thickness is indicated.

2.3 FLUORESCENT LAMP BALLASTS

A. General Requirements: Unless otherwise indicated, features include the following:

1. Designed for type and quantity of lamps indicated at full light output.
2. Total Harmonic Distortion Rating: Less than 10 percent.
3. Sound Rating: A.

B. Electronic Ballasts for Linear Lamps: Unless otherwise indicated, features include the following, besides those in "General Requirements" Paragraph above:

1. Certified Ballast Manufacturer Certification: Indicated by label.
2. Encapsulation: Without voids in potting compound.
3. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

C. Ballasts for Compact Lamps in Recessed Fixtures: Unless otherwise indicated, additional features include the following:

1. Type: Electronic, fully encapsulated in potting compound.
2. Power Factor: 90 percent, minimum.
3. Operating Frequency: 20 kHz or higher.
4. Flicker: Less than 5 percent.
5. Lamp Current Crest Factor: Less than 1.7.
6. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.
7. Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

D. Ballasts for Compact Lamps in Nonrecessed Fixtures: Unless otherwise indicated, additional features include the following:

1. Power Factor: 90 percent, minimum.
2. Ballast Coil Temperature: 65 deg C, maximum.
3. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.
4. Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

E. Ballasts for Low-Temperature Environments: As follows:

1. Temperatures 0 Deg F and Above: Electronic type rated for 0 deg F starting temperature.

F. Ballasts for Low Electromagnetic Interference Environments: Comply with 47 CFR, Chapter 1, Part 18, Subpart C for limitations on electromagnetic and radio-frequency interference for consumer equipment.

2.4 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

A. General: Comply with ANSI C82.4. Unless otherwise indicated, features include the following:

1. Type: Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.
2. Operating Voltage: Match system voltage.
3. Minimum Starting Temperature: Minus 22 deg F for single lamp ballasts.
4. Normal Ambient Operating Temperature: 104 deg F.
5. Open-circuit operation that will not reduce average life.

B. Encapsulation: Manufacturer's standard epoxy-encapsulated model designed to minimize audible fixture noise.

C. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 deg C.

2.5 EXIT SIGNS

A. General Requirements: Comply with UL 924 and the following:

1. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.

B. Internally Lighted Signs: As follows:

1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.
2. Additional Lamps for DC Operation: Two minimum, bayonet-base type, for connection to external dc source.

2.6 EMERGENCY FLUORESCENT POWER SUPPLY UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.

1. Test Switch and Light-Emitting Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
3. Charger: Fully automatic, solid-state, constant-current type.
4. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal

voltage is restored, relay disconnects lamp, and battery is automatically recharged and floated on charger.

2.7 LAMPS

A. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3500 K and 85 CRI, unless otherwise indicated. Low mercury content.

B. Noncompact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid-start circuits.

C. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

D. Plug-in Type CFL Lamp: Rated average life is 12,000 hours minimum.

E. Sefl-ballasted CFL Lamp: Rated average life is 12,000 hours minimum

2.8 FIXTURE SUPPORT COMPONENTS

A. Comply with Division 16 Section "Basic Electrical Materials and Methods," for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

F. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.

2.9 FINISHES

A. Fixtures: Manufacturer's standard, unless otherwise indicated.

1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.

2. Metallic Finish: Corrosion resistant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.

B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.

1. Install a minimum of two wires for each fixture. Locate not more than 6 inches from fixture corners secured to structure.
2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

C. Suspended Fixture Support: As follows:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Continuous Rows: Suspend from cable installed according to fixture manufacturer's written instructions and details on Drawings.

3.2 CONNECTIONS

A. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Advance Notice: Give dates and times for field tests.

C. Provide instruments to make and record test results.

D. Tests: As follows:

1. Verify normal operation of each fixture after installation.
2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.
3. Verify normal transfer to battery source and retransfer to normal.
4. Report results in writing.

E. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

F. Corrosive Fixtures: Replace during warranty period.

3.4 CLEANING AND ADJUSTING

A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.

END OF SECTION 16511

DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16720 - FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire alarm systems with manual stations, detectors, signal equipment, controls, and devices.

1.3 DEFINITIONS

A. FACP: Fire alarm control panel.

B. LED: Light-emitting diode.

C. Definitions in NFPA 72 1999 Edition apply to fire alarm terms used in this Section.

1.4 SYSTEM DESCRIPTION

A. General: Noncoded, addressable system with manual and automatic alarm initiation; and multiplexed signal transmission dedicated to fire alarm service only. Class A addressable fire alarm system. (IDC: Class 'A', Style 'D': SLC: Class 'A', Style '7'; NAC: Class 'A', Style 'Z'.)

1.5 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. Product Data: For each type of product indicated.

C. Shop Drawings:

1. Wiring Diagrams: Detail system wiring and differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for complete system (include device addresses and locate on prints) with all terminals and interconnections identified. Provide with initial shop drawings submittal.
2. Battery: Sizing calculations, provided with initial shop drawings.
3. Floor Plans: Indicate final outlet locations, routings of raceway connections, and conductor sizes and types. Provide with initial shop drawings.
4. Device Address List: Coordinate with final system programming.
5. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.

D. Product Certificates: Signed by manufacturers of system components certifying that products furnished comply with requirements.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements. Provide all installer qualifications as listed below under QUALITY ASSURANCE.

F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Comply with NFPA 72 1999 Edition.

G. Maintenance Data: For fire alarm systems to include in maintenance manuals specified in Division 1. Comply with NFPA 72 1999 Edition.

H. Certificate of Completion: Comply with NFPA 72 1999 Edition.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the FACP manufacturer for both installation and maintenance of units required for this Project.

1. Installation of fire alarm detection systems, fire protection suppression systems, and any of the components, all technician(s) installing this equipment, cabling, etc. shall be licensed in the State of Montana and hold the proper endorsement of such installation. The licensed and endorsements required are as follows:

a. SAF = Sell, service or install Fire Alarm Systems .
b. SEF = Sell, service or install Extinguishing Systems.
c. SAFS = Sell, service or install Special Agent Fire Suppression Systems.

2. A licensed journeyman electrician can install fire alarm systems and its components if the above endorsements are stamped on their license and factory trained, and NICET II certified and factory trained in the installation of the fire alarm devices being installed. The installer must be NICET II certified and licensed with the State of Montana licensing program to inspect, test, and certify the operational condition of the system. All licensees, endorsements and NICET certifications must be presented to the contracting officers and the fire prevention officers (341 CES/CEFT) and the company name and personnel name(s) installing the system before work is to begin.
3. All fire alarms, fire suppression, and special agent systems must be installed IAW the appropriate NFPA (National Fire Protection Association Code) 13, 13A, 17, 17A, 24, 25, 72, 101 and any other code reference mentioned in contract specifications, manufacturer's recommendations and construction drawings. Current licenses, endorsements, and NICET certification must be on file with the Department of Commerce, Professional and Occupational Licensing Bureau, 11 North Jackson, P.O. Box 200513, Helena, MT 59620-0513.
4. All fire alarm and detection systems, fire suppression systems, special hazard fire detection and suppression systems will come with a five-year warranty and an emergency recall service (manufacturers representative must be able to respond within 20 minutes) for repair and service when notified.

B. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain fire alarm system components through one source from a single manufacturer.

D. Compliance with Local Requirements: Comply with applicable building code, local ordinances and regulations, and requirements of authorities having jurisdiction.

E. Comply with NFPA 72 1999 Edition.

1.7 SEQUENCING AND SCHEDULING

A. Existing Fire Alarm Equipment: Remove all existing equipment during demolition. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. LEDs for Remote Indicating Units: Quantity equal to 10 percent of amount installed, but not less than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but not less than one unit.
3. Smoke Detectors: Quantity equal to 10 percent of amount of each type installed, but not less than one unit of each type.
4. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than one unit of each type.
5. Keys and Tools: One extra set for access to all locked and tamper-proofed components of the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements. Provide products by one of the following or an equal approved by Contracting Officer.

1. Secutron.
2. Monaco.
3. Harrington.

2.2 FUNCTIONAL DESCRIPTION OF SYSTEM

A. Control of System: By the FACP.

B. System Supervision: Automatically detect and report open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.

C. Priority of Signals: Automatic alarm response functions resulting from an alarm signal from one zone or device are not altered by subsequent alarm, supervisory, or trouble signals. An alarm signal is the highest priority. Supervisory and trouble signals have second- and third-level priority. Higher-priority signals take precedence over signals of lower priority, even when the lower-priority condition occurs first. Annunciate and display all alarm, supervisory, and trouble signals regardless of priority or order received.

D. Noninterference: A signal on one zone shall not prevent the receipt of signals from other zones.

E. System Reset: All zones are manually resettable from the FACP after initiating devices are restored to normal.

F. Transmission to Remote Alarm Receiving Station: Automatically route alarm, supervisory, and trouble signals to a remote alarm receiving station by means of a radio alarm transmitter.

G. System Alarm Capability during Circuit Fault Conditions: System wiring and circuit arrangement prevent alarm capability reduction when an open circuit, ground wire-to-wire short occurs, or an open circuit and a ground occur at the same time in an initiating device circuit, signal line circuit, or notification-appliance circuit, i.e. Class 'A' circuits.

H. Loss of primary power at the FACP initiates a trouble signal at the FACP. The FACP indicates when the fire alarm system is operating on the secondary power supply.

I. Basic Alarm Performance Requirements: Unless otherwise indicated, operation of a manual station, automatic alarm operation of a smoke detector, or operation of a sprinkler flow device initiates the following:

1. Notification-appliance operation.
2. Identification at the FACP of the device originating the alarm.
3. Transmission of an alarm signal to the remote alarm receiving station.
4. Shutdown of fans and other air-handling equipment serving area when alarm was initiated.
5. Closing of smoke dampers in air ducts of system serving area where alarm was initiated.
6. Recording of the event in the system memory.

J. Alarm Silencing, System Reset and Indication: Controlled by switches in the FACP.

1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is operated.

K. Remote Detector Sensitivity Adjustment: Manipulation of controls at the FACP causes the selection of specific addressable smoke detectors for adjustment, display of their current status and sensitivity settings, and control of changes in those settings. Same

controls can be used to program repetitive, scheduled, automated changes in sensitivity of specific detectors. Sensitivity adjustments and sensitivity-adjustment schedule changes are recorded in system memory.

L. Removal of an alarm-initiating device or a notification appliance initiates the following:

1. An alarm signal indication at the FACP and the annunciator for the device or zone involved.
2. Transmission of alarm signal to remote alarm receiving station.

M. FACP Alphanumeric Display: Plain-English-language descriptions of alarm, supervisory, and trouble events; and addresses and locations of alarm-initiating or supervisory devices originating the report. Display monitoring actions, system and component status, system commands, programming information, and data from the system's historical memory.

N. Provide the Government with all software required to reprogram system, add/delete/move devices. Provide all licensing, operations manuals, connection cables, etc. required to operate the software. Provide and also download all fire alarm data base information to a Government laptop computer. Software shall be Windows based.

2.3 MANUAL PULL STATIONS

A. Description: Fabricated of metal or plastic, and finished in red with molded, raised-letter operating instructions of contrasting color.

1. Single-action mechanism initiates an alarm.
2. Station Reset: Key operated; double pole, double throw; switch rated for the voltage and current at which it operates.
3. Integral Addressable Module: Arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
4. Provide the Government with 12 keys.

2.4 SMOKE DETECTORS

A. General: Shall meet the following minimum specifications:

1. Operating Voltage: 24-V dc, nominal.
2. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
3. Plug-in Arrangement: Detector and associated electronic components are mounted in a module that connects in a tamper-resistant manner to a fixed base

with a twist-locking plug connection. Terminals in the fixed base accept building wiring.

4. Integral Visual-Indicating Light: LED type. Indicates detector is operating.
5. Sensitivity: Can be tested and adjusted in-place after installation.
6. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
7. Remote Controllability: Unless otherwise indicated, detectors are analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.

B. Photoelectric Smoke Detectors: Include the following features:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
3. Integral Thermal Detector: Fixed-temperature type with 135 deg F setting.

C. Duct Smoke Detector: Photoelectric type.

1. Sampling Tube: Design and dimensions as recommended by the manufacturer for the specific duct size, air velocity, and installation conditions where applied.
2. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
3. Keyed Remote Test Switch: Provide for each duct smoke detector. Locate in wall or ceiling near detector location. Provide Government with 12 spare keys.

2.5 NOTIFICATION APPLIANCES

A. Description: Equip for mounting as indicated and have screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns produce a sound-pressure level of 90 dB, measured 10 feet from the horn.

C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971 with clear or nominal white polycarbonate lens. Mount lens on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Rated Light Output: 75 candela.
2. Rated Light Output: 110 candela.
3. Strobe Leads: Factory connected to screw terminals.

2.6 REMOTE DEVICE LOCATION-INDICATING LIGHTS AND IDENTIFICATION PLATES

A. Description: LED indicating light near each smoke detector that may not be readily visible, and each sprinkler water-flow switch and valve-tamper switch. Light is connected to latch on when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.7 CENTRAL FACP

A. Cabinet: Lockable steel enclosure. Arrange interior components so operations required for testing or for normal maintenance of the system are performed from the front of the enclosure. If more than one unit is required to form a complete control panel, fabricate with matching modular unit enclosure to accommodate components and to allow ample gutter space for field wiring and interconnecting panels.

1. Identify each enclosure with an engraved, red, laminated, phenolic-resin nameplate with lettering not less than 1 inch high. Identify individual components and modules within cabinets with permanent labels.
2. Mounting: Semi-Flush.

B. Alarm and Supervisory Systems: Separate and independent in the FACP. Construction requiring removal of field wiring for module replacement is unacceptable.

C. Control Modules: Include types and capacities required to perform all functions of fire alarm systems.

D. Indications: Local, visible, and audible signals announce alarm, supervisory, and trouble conditions.

E. Indicating Lights and System Controls: Individual LED devices identify zones transmitting signals. Zone lights distinguish between alarm and trouble signals, and indicate the type of device originating the signal. Manual switches and push-to-test buttons do not require a key to operate. Controls include the following:

1. Alarm acknowledge switch.
2. Alarm silence switch.
3. System reset switch.
4. LED test switch.

F. Resetting Controls: Prevent the resetting of alarm, supervisory, or trouble signals while the alarm or trouble condition still exists.

G. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components, including annunciation, supervision, and control.

1. Display: A minimum of 80 characters; alarm, supervisory, and component status messages; and indicate control commands to be entered into the system for control of smoke detector sensitivity and other parameters.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

H. Instructions: Printed or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

I. Provide all original software/manuals used or required for database creation and/or modifications and downloading to FACP. Include all manuals for installation, operation and maintenance.

2.8 EMERGENCY POWER SUPPLY

A. General: Components include nickel-cadmium battery, charger, and an automatic transfer switch.

1. Battery Nominal Life Expectancy: 20 years, minimum.

B. Battery Capacity: Comply with NFPA 72 1999 Edition.

C. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide capacity for 150 percent of the connected system load while maintaining batteries at full charge. If batteries are fully discharged, the charger recharges them completely within four hours. Charger output is supervised as part of system power supply supervision.

D. Integral Automatic Transfer Switch: Transfers the load to the battery without loss of signals or status indications when normal power fails.

2.9 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module listed for use in providing a multiplex system address for listed fire and sprinkler alarm-initiating devices with normally open contacts.

2.10 RADIO ALARM TRANSMITTER

A. New Monaco BT2-4 narrowband transmitter compatible with existing D-500 system. Provide new antenna compatible with existing D-500 system.

B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP, or from its own internal sensors or controls, and automatically transmits signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. The message transmitted corresponds to standard designations for the fire-reporting system to which the signal is being transmitted and includes separately designated messages in response to the following events or conditions:

1. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
2. System Test Message: Initiated by a manual test switch within the transmitter cabinet or automatically, at an optionally preselected time, once every 24 hours with transmission time controlled by a programmed timing device integral to transmitter controls.
3. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source or derangement of the wiring of the transmitter or any alarm input interface circuit or device connected to it.
4. Local Fire Alarm System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
5. Local Fire Alarm System Alarm Message: Actuated when the building system goes into an alarm state. Identifies zone or device that initiated the alarm.
6. Local Alarm System Supervisory Alarm Message: Actuated when the building alarm system indicates a supervisory alarm.

2.11 GUARDS FOR PHYSICAL PROTECTION

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

1. Factory fabricated and furnished by the manufacturer of the device.
2. Finish: Paint of color to match the protected device.

2.12 WIRE

A. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

B. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Manual Pull Stations: Mount semiflush in recessed back boxes.

B. Ceiling-Mounted Smoke Detectors: Not less than 4 inches from a side wall to the near edge. For exposed solid-joist construction, mount detectors on the bottom of joists. On smooth ceilings, install not more than 30 feet apart in any direction.

C. Smoke Detectors near Air Registers: Install no closer than 60 inches.

D. Duct Smoke Detectors: Comply with manufacturer's written instructions.

1. Verify that each unit is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
2. Install sampling tubes so they extend the full width of the duct.

E. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Combine audible and visible alarms at the same location into a single unit.

F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.

G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

H. FACP: Surface mount with tops of cabinets not more than 72 inches above the finished floor.

I. Antenna for Radio Alarm Transmitter: New.

J. All keyed devices and boxes shall be keyed alike where possible. Provide Government with 12 keys of each type.

3.2 WIRING INSTALLATION

A. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes." Conceal raceway except in unfinished spaces and as indicated.

B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Cable Taps: Use numbered terminal strips in junction, pull and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

D. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

E. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signal from other floors or zones.

F. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Basic Electrical Materials and Methods."

3.4 GROUNDING

A. Ground cable shields and equipment according to system manufacturer's written instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding.

C. Install grounding electrodes of type, size, location, and quantity as indicated. Comply with installation requirements in Division 16 Section "Grounding."

D. Ground radio alarm transmitter system and equipment as recommended by the manufacturer.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and connections and to supervise pretesting, testing, and adjustment of the system. Report results in writing.

B. Pretesting: After installation, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the compliance of the system with requirements of Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of witnesses to preliminary tests.

D. Final Test Notice: Provide a minimum of 10 days' notice in writing when the system is ready for final acceptance testing.

E. Minimum System Tests: Test the system according to procedures outlined in NFPA 72 1999 Edition. Minimum required tests are as follows:

1. Verify the absence of unwanted voltages between circuit conductors and ground.
2. Test all conductors for short circuits using an insulation-testing device.
3. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on record drawings.
4. Verify that the control unit is in the normal condition as detailed in the manufacturer's operation and maintenance manual.
5. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
6. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
7. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional

performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications.

8. Test Both Primary and Secondary Power: Verify by test that the secondary power system is capable of operating the system for the period and in the manner specified.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log on the satisfactory completion of tests.

H. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.

3.6 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Government's maintenance personnel as specified below:

1. Train Government's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting, and maintaining equipment and schedules. Provide a minimum of 8 hours' training.
2. Training Aid: Use the approved final version of the operation and maintenance manual as a training aid.
3. Schedule training with Government, through Contracting Officer, with at least seven days' advance notice.

3.8 ON-SITE ASSISTANCE

A. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, controls, and

sensitivities to suit actual occupied conditions. Provide up to three requested visits to Project site for this purpose.

END OF SECTION 16720

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16740 - VOICE AND DATA SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for high-speed data and voice transmission.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product Data for each component specified, including detailed manufacturer's specifications. Include data on features, ratings, and performance.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Provide evidence of applicable registration or certification.

E. Field test and observation reports from a qualified inspecting and testing agency indicating and interpreting test results relative to compliance with performance requirements of the installed systems.

F. Maintenance data for products to include in the operation and maintenance manual specified in Division 1.

G. Provide a diskette copy of final comprehensive schedules for the Project in the software and format selected by Government.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is a registered communications distribution designer (RCDD), certified by the Building Industry Consulting Service International (BICSI). Submit certificate to Government for record.

B. Manufacturer Qualifications: Engage firms experienced in manufacturing components listed and labeled under EIA/TIA-568 and who comply with these Specifications.

C. Comply with NFPA 70.

D. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

E. Work Coordination: Coordinate Work of this Section with Government's workstation and local area network (LAN) and telephone equipment suppliers.

1. Meet jointly with representatives of the above organizations and Government's representatives to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute record to other participants.
3. Adjust the arrangements and locations of distribution frames, patch panels, and cross connects in equipment rooms and wiring closets to accommodate and optimize the arrangement and space requirements of the LAN and telephone equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following, or an equal approved by Contracting Officer:

1. Cable:

a. Belden Wire & Cable Company.
b. Berk-Tek, Inc.
c. Brand-Rex Co.; Unit of BICC Cables Corp.
d. General Cable.
e. Optical Cable Corp.
f. Siecor Corp.

2. Terminal and Connector Components and Distribution Racks:

a. AMP, Inc.
b. AT&T Network Systems.
c. Leviton Mfg. Co., Inc.; Telcom Division.

2.2 SYSTEM REQUIREMENTS

A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

B. Expansion Capability: Unless otherwise indicated, quantity of spare conductor pairs in cables, positions in terminal strips, and space in wireways shall be adequate to accommodate a 20 percent future increase in active workstations and telephones.

2.3 WIRING PATHWAY AND EQUIPMENT MOUNTING ELEMENTS

A. Raceways, Boxes, and Cabinets: Comply with Division 16 Sections "Raceways", "Cabinets, Boxes, and Fittings."

2.4 TWISTED PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

A. Listed as Complying with Categories 5E of EIA/TIA-568: Provide evidence of listing for all products specified in this Article.

B. Conductors: Solid copper.

C. Unshielded Twisted Pair (UTP) Cable: Comply with EIA/TIA-568, TSB 36. Multipair, No. 24 AWG, color-coded, thermoplastic-insulated conductors in a polyvinyl chloride (PVC) jacket.

D. UTP Cable Connecting Hardware: Comply with EIA/TIA-568, TSB 40. Insulation displacement connector (IDC) type, using modules designed for use with punch-down caps or tools.

1. IDC Terminal Block Modules: Integral with connector bodies, including plugs and jacks where indicated.
2. IDC Connecting Hardware: Consistent throughout Project.
3. Number of Jacks per Field: 1 for each 4-pair UTP cable, or 1 for each 4-pair conductor group of indicated cables, plus spares and spare positions adequate to satisfy specified expansion criteria.

E. Jacks and Jack Assemblies for UTP Cable: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals. Use keyed jacks for data service.

2.5 IDENTIFICATION PRODUCTS

A. Comply with Division 16 Section "Basic Electrical Materials and Methods".

B. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations. Provide label at each cable termination and pull box.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements to receive cable. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable

installation, and other conditions affecting installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLICATION OF MEDIA

A. Horizontal Cables for Data and Voice Service: Use unshielded twisted pair cable conforming to Category 5E of EIA/TIA-568, TSB 36, for runs between wiring closets and workstation/phone outlets.

3.3 INSTALLATION

A. Wiring Method: Provide two 3/4 inch conduits (per outlet) with insulated throat bushing stubbed to ceiling space within gypsum board partitions. Cable wiring method may be used in accessible ceiling spaces. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal cable and raceway wiring except in unfinished spaces.

B. Install components as indicated, according to manufacturers' written instructions. Use techniques, practices, and methods that are consistent with the Category 5e rating of the components and that assure Category 5e performance of completed and linked signal paths, end-to-end.

C. Install cable without damaging conductors, shield, or jacket.

D. Do not bend cable in handling or installation to smaller radii than minimums recommended by manufacturers.

E. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

1. Pull cables simultaneously where more than one is being installed in the same raceway.
2. Use pulling compound or lubricant where necessary. Use compounds that will not damage conductor or insulation.
3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage media or raceway.

F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours where possible.

G. Secure and support cable at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

H. Wiring within Wiring Closet: Provide adequate length of conductors. Train the conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to radii smaller than allowed.

I. Separation of Wires: Comply with EIA/TIA-569 rules for separation of unshielded copper voice and data system cables from potential EMI sources, including electrical power lines and equipment.

J. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.

K. Use splice and tap connectors compatible with media types.

3.4 INSTALLATION AT WIRING CLOSET (INDICATED ON FLOOR PLANS)

A. Mount terminal strips, and other connecting hardware on plywood backboard.

B. Group connecting hardware for cables into separate logical fields.

3.5 IDENTIFICATION

A. Identify system components in compliance with the applicable requirements of Division 16 Section "Basic Electrical Materials and Methods" and the following specifications:

1. EIA/TIA 606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
2. CSOI 33-205, Communications Network Cabling, Malmstrom AFB, MT.

B. System: Clearly mark drop number on both faceplate and corresponding patch panel port. Number drops starting clockwise from the main entrance of the facility, and then clockwise from the main entrance of each room.

C. Outlet: Label cables within outlet boxes.

D. Terminal Blocks: Label each unit and field within that unit.

E. Within Connector Fields, in Wiring Closet: Label each connector and each discrete unit of cable-terminating and connecting hardware

F. Cables, Generally: Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

G. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.

H. Cable Schedule: Post at a prominent location in wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with a rigid frame and clear plastic cover. Provide a diskette copy of final comprehensive schedules for the Project in the software and format selected by Government.

3.6 FIELD QUALITY CONTROL

A. Testing: Upon installation of cable and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance. Remove temporary connections when tests have been satisfactorily completed.

1. Copper Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Test for faulty connectors, splices, and terminations. Link performance for UTP cables must meet minimum criteria of EIA/TIA-568, tested in accordance with TSB 67.

B. Correct malfunctioning units at site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

3.7 CLEANING

A. On completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 16740

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16775 -FIBER OPTIC CABLING SYSTEM

PART I - GENERAL

1.1 WORK INCLUDED

A. This section includes product and installation requirements for the following:

1. Fiber-Optic (FO) Cables.
2. Fiber-Optic connectors/terminations.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.3 SUBMITTALS

A. Shop Drawings: Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

1. Fiber-Optic (FO) Cables.
2. Fiber-Optic connectors.
3. Test results as per para 3.6. (In O & M Manuals).
4. Workman qualifications.

1.4 QUALITY ASSURANCE

A. Connected Equipment Manufacturer Certification: Fiber-Optic cables specified in this section are used to provide signal paths for the EMCS systems. The cable characteristics of the cable to be installed shall be compatible loose-tube gel-filled (LTGF) cable that is currently in place (Siecor Corp. #2N11-21407).

B. Electrical and Fiber Optic Component Standard: Provide work complying with applicable requirements of NFPA 70 ‘National Electric Code', 1999 edition.

C. DOD Compliance: Comply with applicable requirements of Department of Defense (DOD) standards pertaining to optical-fiber cabling construction and installation. Also comply with applicable MIL-STDS.

D. NESC Compliance: Provide work complying with applicable requirements of National Electrical Safety Code, 1993 ed., where clearances between conductors and above grade level are concerned.

E. Workman Qualifications: Fiber optic splices and connectors and testing shall only be performed by workers who are skilled in this practice. Workmen shall have a minimum of 3 years fiber optic cabling experience and shall be an industry certified technician (BISCI, Northern Telecom, Bell Labs, etc.). A submittal of workmen's names and qualifications/certification shall be made with shop drawing submittal before the work begins.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in factory containers or cable reels. Store in clean, dry space in original containers. Protect products from-fumes and construction traffic. Handle carefully to avoid damage.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate with installation of overhead wire/cables.

B. Sequence installation of optical-fiber cabling systems with other work to minimize possibility of damage during construction.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements. Provide products by one of the following or an equal approved by Contracting Officer:

1. FO Cables - Siecor, or approved equal.

2.2 OPTICAL-FIBER CABLING SYSTEMS

A. General: Fabricate system using manufacturer's standard materials, as indicated by published product information, and in sizes, types, and performance characteristics as indicated.

B. EMCS Fiber Optic Cable: Factory fabricated, multifiber, duct/aerial, kevlar central member, breakout type riser cable, each fiber shall be protected by a 900 micrometer (um) tight buffer tube, individual color coded blue and orange, one fiber per buffer tube, and a flame retardant indoor/outdoor (UV) rated PVC

exterior jacket. Fiber optic cable shall be rated for the temperature range of minus 40 degrees F. to plus 122 degrees F.

C. Fibers shall be multimode, graded index, solid low loss glass waveguides. Each fiber shall be continuous without factory or field installed splices from one modem to the next modem. Siecor Corp., model number 2N11 – 21407 for two fiber cable, or approved equal with the following operation and construction characteristics:

Number of fibers:	2, each fiber in separate buffer tube
Core diameter:	100 micrometer (um)
Cladding diameter:	140 micrometer (um)
Primary Buffer tube outside diameter:	250 micrometer (um)
Secondary Tight Buffer tube diameter:	900 micrometer (um)
Maximum attenuation:	4.0 dB/km at 850 micrometer (um)
Minimum bandwidth:	100 MHz/km
Numerical operature:	0.29
Maximum installation load:	1200 N (270lbs)
Maximum operational load:	500 N (110 lbs)
Minimum bending radius:	
during installation:	14 cm (5.6 in)
during operation:	7 cm (2.8 in)
Operating temperature range:	-40 to +70 deg. C

1. The fiber multimode cable shall be in a buffer tube steel strength member.

D. FO Splices: Field splices are not allowed. Terminations/Connectors shall only be allowed within each building that is connected to the EMCS and shall be contained in the RTU enclosure. Fiber Optic connectors shall be used, as specified in paragraph E below, with a coupling bushing inter-connector for SMA, part number 501049-1.

E. Fiber Optic Connectors: Stainless steel Type II FSMA 906 fiber optic cable connectors, capable of terminating multimode glass fiber, with outside cladding diameters of 140 um and back shell sleeve sized to fit over 250 um primary buffer tube. Fabricate connectors with optical fiber, self centering axial alignment mechanisms. Select resilient tip SMA type connectors with quick connect features and with typical insertion loss of 1.0 dB. Amp manufactured part number 501029-2 or approved equal connectors are used.

PART III - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions which the Fiber-Optic cable is to be installed. Field verify existing conditions and coordinate installation with existing aerial and underground utilities.

3.2 APPLICATIONS

A. Install optical-fiber cabling for project applications as follows:

1. For sustaining and extending the existing fiber optic EMCS data transmission media (DTM) systems which include data links as shown on the contract drawings.

3.3 INSTALLATION

A. General

1. Install fiber-optic cables and associated equipment and devices in accordance with industry standards and manufacturer's written instructions. Connections and splices must be performed by a certified craftsman, both by training and experience.

B. Install fiber-optic cables without damage to fibers, cladding, or jacket. Ensure that manufacturer's recommended pulling tensions are not exceeded. Do not at any time bend cables to smaller radii than minimums recommended by manufacturer.

C. Install fiber-optic cables simultaneously where more than one cable is being installed in same raceway. Use pulling lubricant where necessary; compound used must not deteriorate cable materials. Do not use soap. Use a pulling means, including fish tape, rope, and basket-weave grips, that will not damage media or raceway.

D. Terminations and/or connections shall only be allowed inside the RTU enclosures within the connected buildings. Field splices are not allowed.

3.4 GROUNDING

A. Provide grounding connections for FO cable and other system components as required by manufacturer's written instructions.

3.5 CLEANING

A. Clean optical-fiber cabling and components of dirt and construction debris upon completion of installation.

3.6 FIELD QUALITY CONTROL

A. The following Field Quality Control test shall be performed on all installed fiber optic cables: Prior to acceptance, all cable segments from modem to modem shall be tested for faulty connectors and for the integrity of newly installed cable. Each fiber shall be tested from both ends. The type of testing shall be an insertion loss test using an Optical Time Domain Reflectometer (OTDR) instrument.

Insertion loss testing measures end-to-end attenuation including all fiber and connectors. The test compares the optical power at the input of fiber to optical power at the output, measuring end to end attenuation in dB. The manufacturers written instructions for the test instrument shall be followed for the insertion loss test. A cable system attenuation test data sheet shall be provided with the maximum specified insertion loss values including fiber and connectors, and the measured test insertion loss values. The test data sheet shall clearly indicate which fibers and connectors are being tested, their location and other pertinent information. Replace malfunctioning or damaged fiber and connectors with new material, then retest until satisfactory performance is achieved with the measured test insertion loss values being less than or equal the maximum specified insertion loss values. For the EMCS fiber optic system, the light source is 850 nanometers from a LED source.

3.7 COMMISSIONING

A. Subsequent to rerouting of the fiber optic cabling systems, coordinate with the Government to ensure proper operation of the existing systems. If newly installed equipment causes malfunctioning, replace with new and retest until satisfactory performance is achieved.

END OF SECTION 16775

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DIVISION 16 – ELECTRICAL REQUIREMENTS

SECTION 16856 - ELECTRIC HEATING CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes heating cables for the following applications:

1. Ice stopping.

1.3 SUBMITTALS

A. Hi-lite all descriptive literature to accomplish identification of specific components/items which are proposed to be furnished. Government will not react to descriptive material/literature which has not been hi-lited, except to reject the Submittal.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product data for each type of heating cable and for each accessory specified. Include manufacturer's technical product data and installation instructions for electric heating cables.

D. Coordination drawings, including floor plans and sections drawn accurately to scale. Show heating cable layout and relationships between components and adjacent structural and mechanical elements. Indicate and certify field measurements. Submit with shop drawings.

E. Wiring diagrams for electric heating cables showing layout and connections. Include requirements for proper spacing between cables and show connections to electrical power feeders.

F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

G. Field test reports from a qualified independent inspecting and testing agency indicating and interpreting test results relative to compliance with performance requirements of electric heating cables.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer to install heating cables.

B. Manufacturer Qualifications: Firm experienced in manufacturing heating cables similar to those indicated for this Project and that have a record of successful in-service performance.

C. Comply with NFPA 70 "National Electrical Code" for components and installation.

D. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

E. Single-Source Responsibility: Obtain heating cables and accessories from one source and by a single manufacturer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify clearances and locate obstructions.

B. Coordinate layout and installation of heating cables.

1. Coordinate with roofing and sheet-metal installers.

2. Revise locations to suit field conditions and as approved by the Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide heating cables and accessories by one of the following, or an equal approved by Contracting Officer:

1. Raychem Corporation; Chemelex Div.
2. Thermon Manufacturing Co.

2.2 ROOF AND GUTTER DE-ICING HEATING CABLES

A. Parallel-resistance, thermoplastic-insulated heating cables suitable for use on roofs and in gutters for snow and ice melting as indicated.

1. Temperature, wattage, and voltage ratings as indicated.
2. Copper-nickel-alloy resistance wires spiraled on fiber-glass core, polyvinyl chloride (PVC) insulation, nylon sheath, and 16 strands of 30 AWG copper braid.
3. Cables terminated with factory-assembled nonheating leads with connectors.

B. Series-resistance, mineral-insulated (MI), copper-sheathed heating cables in 2-conductor configuration, suitable for use on roofs and in gutters for snow and ice melting as indicated. Temperature, wattage, and voltage ratings as indicated. Cables terminated with factory-assembled nonheating leads with connectors.

C. Outdoor Thermostat: Temperature range from 0 to 50 deg F.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and substrates to receive heating cables for compliance with requirements for installation tolerances and other conditions affecting performance of the heating cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.
2. Ensure pipe testing is complete.
3. Ensure surfaces and substrates are plumb and level.

B. Test cables for electrical continuity before installing.

C. Test cables for insulation resistance before installing.

3.2 INSTALLATION

A. Install heating cables and accessories as indicated, according to manufacturer's written instructions, rough-in drawings, the original design, and referenced standards.

B. Cut cable to length required.

C. Connect heating cables and other components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL 486A.

3.3 FIELD QUALITY CONTROL

A. Test installed electric heating cables after installation. Perform tests prior to application of coverings, such as insulation, plaster, or concrete.

1. Test cables for electrical continuity before energizing.
2. Test cables for insulation resistance before energizing. Remove cables if measured resistance is less than 10 megohms to ground.
3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

B. Repeat tests for continuity, insulation resistance, and input power after applying plaster.

C. Repeat tests for continuity, insulation resistance, and input power after applying concrete.

D. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation.

3.4 DEMONSTRATION

A. Train Government’s's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

B. Review data in the operation and maintenance manual. Refer to Division 1 Section " Operations And Maintenance Manuals."

3.5 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to Manufacturer and Installer to ensure that installed electric heating cables, including leads, are not damaged or crushed prior to Substantial Completion.

END OF SECTION 16856

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