RFP No. W912DW-05-R-0006

US Army Corps of Engineers®

Seattle District

Replace Family Housing, Phase V, Malmstrom AFB, Montana

Construction Solicitation and Specifications

UNRESTRICTED

December 2004

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THIS PROCUREMENT IS:

Open to both Large and Small Business

MALMSTROM AFB, Montana

SITE VISIT:

A one-time site visit will be conducted on 5 January 2005, 0900 Hours, Education Center building 1240, Room 101, Malmstrom Air Force Base, Montana. The meeting will begin with presentation of the solicitation to start promptly at 0900 Hours. Following the presentation a tour of the site will take place. Adjournment is expected by noon. Your arrival at the visitor's center on 2nd Avenue North and 63rd Street South should be by 0830 Hours to assure getting your base pass. You will need a picture ID. All visitors will be transported by government furnished bus to be boarded at the visitor center at 0845 Hours. You are requested to park privately owned vehicles across the street on 63rd Street South and the government will provide transportation to return to the visitor center immediately after the site tour. No special security measures are in force at this time. If you have an active base pass with a base registration for your vehicle you may elect to meet at the Education Center at 0900 Hours.

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. The bus will depart not later than 0900 AM

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.

BIDDING 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

FOR INQUIRIES, CONTACT THE FOLLOWING INDIVIDUAL Monday through Friday between the hours of 8:00 a.m. and 3:30 p.m.:

ADMINISTRATIVE MATTERS:

Nancy A. Gary (206)764-3266 FAX: (206)764-6817 nancy.a.gary@usace.army.mil

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TECHNICAL INQUIRIES are to be submitted via the Internet. A password is required. Bidders can obtain their password by going to www.projnet.org, clicking on **Bidder Inquiry**, filling out the form provided, and then clicking **Continue**.

Upon receipt of your password, login to www.projnet.org and click on **Bidder Inquiry**. Select **NWS Seattle District**, click **Continue**. Select project, click **Continue**. Select **Bidder Inquiry** phase, click **Continue**.

Enter your question and click **Submit Inquiry**. You will receive an acknowledgement of your question via email, followed by an answer to your question after it has been processed by our technical team.
(Mail) Seattle District Corps of Engineers, P.O. Box 3755, Seattle, WA 98124-3755
(Street) 4735 E. Marginal Way S., Seattle, WA 98134-2385

TABLE OF CONTENTS

CAUTION TO BIDDERS

SECTION TITLE

SF1442 - Pages 00010-1 thru 00010-6 (00010-3 is reserved for use at a later time)
& Subcontracting Plan if applicable, Pages 00010-7- thru 00010-15

00100 Instructions, Conditions and Notice to Bidders

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

00700 Contract Clauses

00800 Special Clauses, which include the following:

a) Special Clauses Pages 00800-i thru 00800-17

b) Davis-Bacon General Wage Decision No. MT20030026

01000 Technical Specifications:

01001 thru 16950

RETURN THE FOLLOWING WITH YOUR BID:

SF1442 - Pages 00010-1 thru 00010-6 (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 bid opening.

** 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 bids.

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

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

3. **AMENDMENTS: Have you acknowledged receipt of ALL** amendments? If in doubt as to the number of amendments issued, please contact the representative listed on the Information Page.

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

5. **BID GUARANTEE:** Sufficient bid guarantee in proper form must be furnished **with your offer**. (FOR JOBS EXCEEDING $25,000) See section 00700, FAR 52.228-1

6. **INDIVIDUAL SURETIES:** Please note requirements for Individual Sureties in Section 00100, FAR 52.228-4003.

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

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

9. **RFP RESULTS:** A Request for Proposal is a negotiated procurement. As such, offer results are not available on the web. Participants will be notified via letter as to the status of their offer.

10. **OFFER ACCEPTANCE PERIOD:** The minimum offer acceptance period is specified in block 13D of SF1442 (page 00010-1), Solicitation, Offer and Award. Please ensure that you allow at least the stated number of calendar days for the Government to accept your offer.

11. **RFP RESULTS:** A Request for Proposal is a negotiated procurement. As such, offer results are not available on the web. Participants will be notified via letter as to the status of their offer.

12. **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.

13. **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.

SOLICITATION, OFFER, AND AWARD (Construction, Alteration, or Repair)	1. SOLICITATION NUMBER	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE OF PAGES
	W912DW-05-R-0006	☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)	23 December 2004	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

7. ISSUED BY CODE W912DW

Seattle District, Corps of Engineers
ATTN: CENWS-CT-CB-MU
PO Box 3755
Seattle, WA 98124-3755

8. ADDRESS OFFER TO

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 Marignal Way South
Seattle, WA 98134-2329

9. FOR INFORMATION CALL ▶ A. NAME Nancy Gary | B. TELEPHONE NUMBER *(Include area code) (NO COLLECT CALLS)*

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 Replace Family Housing, Phase V, Malmstrom AFB, Montana in accordance with the attached Contract Clauses, Special Clauses, Technical Specifications and Drawings.

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.)
☒ YES ☐ NO

12B. CALENDAR DAYS

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 1 copies to perform the work required are due at the place specified in Item 8 by 2:00 p.m. *(hour)* local time 90 *(date)*. If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee ☒ is, ☐ is not required.

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

D. Offers providing less than 90 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER *(Must be fully completed by offeror)*

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

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

AMOUNTS ▶ See pare 0010-5

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 USACE - Seattle District Northwest Area Office PO Box 92146 Tillicum, WA 98492-0146	27. PAYMENT WILL BE MADE BY US Army Corps of Engineers Finance Center CEFC-AO-P 5722 Integrity Drive Millington, TN 38054-500

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.)* Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.
30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*	31A. NAME OF CONTRACTING OFFICER *(Type or print)* ROSE N.S. OLDS
30B. SIGNATURE / 30C. DATE	31B. UNITED STATES OF AMERICA BY / 31C. AWARD DATE

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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BID SCHEDULE

REPLACE FAMILY HOUSING, PHASE V

Item No.	Description of Item	Quantity	Unit	Unit Price	Amount
	BASE ITEMS				
0001	All Work for Construction of 50 Duplex Buildings (100 Units), Type 2J, as shown on Drawing A-100, within a line 5 feet outside of the building exterior walls (see Note 3)	1	JOB	L.S.	$_____
0002	All Work for Construction of 15 Duplex Buildings (30 Units), Type 4J, as shown on Drawing A-100, within a line 5 feet outside of the building exterior walls (see Note 3)	1	JOB	L.S.	$_____
0003	Additional Drilling and Installation of Piles for Items 0001 and 0002	1000	L.F.	$____	$_____
0004	Provide Sitework and Utilities for Base Items 0001 and 0002 outside a line 5 feet outside of the building exterior walls, except for Items 0011 through 0014 and 0016	1	JOB	L.S.	$_____
0005	All Work for As-Built Drawings as Specified in Section 01702 from Preparation to Final Approval for Base Items and any Optional Items exercised	1	JOB	L.S.	$15,000
0006	All Work for O&M Manuals as Specified in Section 01701 from Preparation to Final Approval for Base Items and any Optional Items exercised	1	JOB	L.S.	$10,000
0007	All Work for Form 1354 Checklist, Installed Building Equipment List and Equipment in Place List as Specified in Sections 01704 and 01705 from Preparation to Final Approval for Base Items and any Optional Items exercised	1	JOB	L.S.	$ 6,000
		TOTAL BASE ITEMS			$_____
	OPTION ITEMS				
0008	All Work for Construction of 10 Duplex Buildings (20 Units), Type 4J, as shown on Drawing A-100, within a line 5 feet outside of the building exterior walls (see Note 3)	1	JOB	L.S.	$_____
0009	Additional Drilling and Installation of Piles for Item 0008 (see Note 4)	150	L.F.	$____	$_____
0010	Provide Sitework and Utilities for Option Item 0008 from a line 5 feet outside of the building exterior walls, except for Items 0015, 0017 and 0019	1	JOB	L.S.	$_____

Item No.	Description of Item	Quantity	Unit	Unit Price	Amount
0011	All Work for Construction of Vinyl Fencing for Buildings 30-32, 34, 36-39, 48, 49, 51 and 53	1	JOB	L.S.	$_____
0012	All Work for Construction of Vinyl Fencing for Buildings 04, 06, 33, 35 and 42-47	1	JOB	L.S.	$_____
0013	All Work for Construction of Vinyl Fencing for Buildings 01-03, 05 and 07-15, 17, 19, 21 and 23-29	1	JOB	L.S.	$_____
0014	All Work for Construction of Vinyl Fencing for Buildings 65-67, 69, 71 and 73-75	1	JOB	L.S.	$_____
0015	All Work for Construction of Vinyl Fencing for Buildings 55-64	1	JOB	L.S.	$_____
0016	Installation of Irrigation System in Common Areas for Buildings Constructed in Items 0001 and 0002 (shown on Drawings L-101 and L-102)	1	JOB	L.S.	$_____
0017	Installation of Irrigation System in Common Areas for Buildings Constructed in Item 0008 (shown on Drawing L-104)	1	JOB	L.S.	$_____
0018	Place Sod and Plant Trees in Common Areas for Items 0001 and 0002 (shown on Drawings L-107 and L-108)	1	JOB	L.S.	$_____
0019	Place Sod and Plant Trees in Common Areas for Item 0008 (shown on Drawing L-110)	1	JOB	L.S.	$_____
0020	Provide Sitework and Equipment for Construction of the Playground, Totlot, Basketball Court and the Tennis Court Areas where indicated on the plans.	1	JOB	L.S.	$_____
				TOTAL OPTION ITEMS	$_____
				TOTAL BASE AND OPTION ITEMS	$_____

NOTES:

1. The dollar amounts established in Items No. 0005, 0006 and 0007 shall not be revised by bidders.

2. Reference Section 01025 PAYMENT for additional descriptive information regarding Bid Schedule Items.

3. Duplex Buildings (shown on Drawing A-100):
   - Base Items, Buildings Nos. 1 through 54 and 65 through 75
   - Option Items, Buildings Nos. 55 through 64

4. If Option Item 0008 is awarded, Option Item 0009 will also be awarded.

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

REPLY TO
ATTENTION OF

Contracting Division November 30, 2004

SUBJECT: W912DW-05-R-0006, Replace Family Housing Phase V, Malmstrom Air Force Base, 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) (52.219-9, Alt II), which are included in this solicitation. If you are a large business, and your offer is **$1,000,000** 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.

As described in the FEDBIZOPS notification, 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. 70% 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. 10% 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 b. (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 the Central Contractor Registration (CCR) Dynamic Small Business Search, 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 Mark N. Roush at (206) 764-6807. If you need TECHNICAL ASSISTANCE call Nancy Gary at (206) 764-3266.

Sincerely,

Susan K. Sherrell
Contracting Officer

Enclosure

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, Women-owned Business Concerns, HUB zone, Veteran-owned and Service Disabled Veteran.

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 (2g 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 (2h 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 (2d 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 (2e 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 CCR Dynamic Small Business Search (http://www.ccr.gov/), State Offices of Minority and Women-owned Business Enterprises, 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 the CCR Dynamic Small Business Search, 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 Veteran-owned 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 Veteran-owned Small Business	$_____	_____

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Section 00100 - Bidding Schedule/Instructions to Bidders

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CLAUSES INCORPORATED BY FULL TEXT

52.204-7 CENTRAL CONTRACTOR REGISTRATION (OCT 2003)

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

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

Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet, Inc. (D&B) to identify unique business entities.

Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by D&B plus a 4-character suffix that may be assigned by a business concern. (D&B has no affiliation with this 4-character suffix.) This 4-character suffix may be assigned at the discretion of the business concern to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see the FAR at Subpart 32.11) for the same parent concern.

Registered in the CCR database means that--

(1) The Contractor has entered all mandatory information, including the DUNS number or the DUNS+4 number, into the CCR database; and

(2) The Government has validated all mandatory data fields and has marked the record “Active”.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.

(2) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “DUNS” or “DUNS +4” followed by the DUNS or DUNS +4 number that identifies the offeror's name and address exactly as stated in the offer. The DUNS number will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(c) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at http://www.dnb.com; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company Physical Street Address, City, State, and Zip Code.

(iv) Company Mailing Address, City, State and Zip Code (if separate from physical).

(v) Company Telephone Number.

(vi) Date the company was started.

(vii) Number of employees at your location.

(viii) Chief executive officer/key manager.

(ix) Line of business (industry).

(x) Company Headquarters name and address (reporting relationship within your entity).

(d) If the Offeror does not become registered in the CCR database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.

(e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.

(f) The Contractor is responsible for the accuracy and completeness of the data within the CCR database, 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 review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(g)(1)(i) If a Contractor has legally changed its business name, “doing business as” name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of Subpart 42.12 of the FAR; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (g)(1)(i) of this clause, or fails to perform the agreement at paragraph (g)(1)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the “Suspension of Payment” paragraph of the electronic funds transfer (EFT) clause of this contract.

(2) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see FAR Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the “Suspension of payment” paragraph of the EFT clause of this contract.

(h) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at http://www.ccr.gov or by calling 1-888-227-2423, or 269-961-5757.

(End of clause)

52.211-3 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (JUN 1988)

The specifications cited in this solicitation may be obtained from:

(Activity) _____
(Complete address) _____
_____
_____
(Telephone number) _____
(Person to be contacted) _____

The request should identify the solicitation number and the specification requested by date, title, and number, as cited in the solicitation.

(End of clause)

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 2003)

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.dla.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) 697-2179, Facsimile (215) 697-1462.

(End of provision)

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)

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

(a) Amount of Construction for this solicitation is in the range of $25,000,000 to $100,000,000.

52.204-7 CENTRAL CONTRACTOR REGISTRATION (OCT 2003)

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

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

Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet, Inc. (D&B) to identify unique business entities.

Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by D&B plus a 4-character suffix that may be assigned by a business concern. (D&B has no affiliation with this 4-character suffix.) This 4-character suffix may be assigned at the discretion of the business concern to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see the FAR at Subpart 32.11) for the same parent concern.

Registered in the CCR database means that--

(1) The Contractor has entered all mandatory information, including the DUNS number or the DUNS+4 number, into the CCR database; and

(2) The Government has validated all mandatory data fields and has marked the record “Active”.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.

(2) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “DUNS” or “DUNS +4” followed by the DUNS or DUNS +4 number that identifies the offeror's name and address exactly as stated in the offer. The DUNS number will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(c) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at http://www.dnb.com; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company Physical Street Address, City, State, and Zip Code.

(iv) Company Mailing Address, City, State and Zip Code (if separate from physical).

(v) Company Telephone Number.

(vi) Date the company was started.

(vii) Number of employees at your location.

(viii) Chief executive officer/key manager.

(ix) Line of business (industry).

(x) Company Headquarters name and address (reporting relationship within your entity).

(d) If the Offeror does not become registered in the CCR database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.

(e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.

(f) The Contractor is responsible for the accuracy and completeness of the data within the CCR database, 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 review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(g)(1)(i) If a Contractor has legally changed its business name, “doing business as” name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of Subpart 42.12 of the FAR; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (g)(1)(i) of this clause, or fails to perform the agreement at paragraph (g)(1)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the “Suspension of Payment” paragraph of the electronic funds transfer (EFT) clause of this contract.

(2) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see FAR Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the “Suspension of payment” paragraph of the EFT clause of this contract.

(h) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at http://www.ccr.gov or by calling 1-888-227-2423, or 269-961-5757.

(End of clause)

52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (OCT 2003)

(a) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “DUNS” or “DUNS+4” followed by the DUNS number or “DUNS+4” that identifies the offeror's name and address exactly as stated in the offer. The DUNS number is a nine-digit number assigned by Dun and Bradstreet, Inc. The DUNS+4 is the DUNS number plus a 4-character suffix that may be assigned at the discretion of the offeror to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see Subpart 32.11) for the same parent concern.

(b) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at http://www.dnb.com; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business name.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company physical street address, city, state and Zip Code.

(iv) Company mailing address, city, state and Zip Code (if separate from physical).

(v) Company telephone number.

(vi) Date the company was started.

(vii) Number of employees at your location.

(viii) Chief executive officer/key manager.

(ix) Line of business (industry).

(x) Company Headquarters name and address (reporting relationship within your entity).

(End of provision)

52.215-1 INSTRUCTIONS TO OFFERORS--COMPETITIVE ACQUISITION (JAN 2004)

(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) If a post-award debriefing is given to requesting offerors, the Government shall disclose the following information, if applicable:

(i) The agency's evaluation of the significant weak or deficient factors in the debriefed offeror's offer.

(ii) The overall evaluated cost or price and technical rating of the successful and the debriefed offeror and past performance information on the debriefed offeror.

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

(iv) A summary of the rationale for award.

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

(vi) Reasonable responses to relevant questions posed by the debriefed offeror as to whether source-selection procedures set forth in the solicitation, applicable regulations, and other applicable authorities were followed by the agency.

(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)

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).

(End of provision)

52.225-12 NOTICE OF BUY AMERICAN ACT REQUIREMENT-- CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (JAN 2004)

(a) Definitions. Construction material, designated country construction material, domestic construction material, foreign construction material, and FTA country construction material, as used in this provision, are defined in the clause of this solicitation entitled “Buy American Act --Construction Materials under Trade Agreements” (Federal Acquisition Regulation (FAR) clause 52.225-11).

(b) Requests for determination 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 FAR clause 52.225-11 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 materials, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(4)(i) of FAR clause 52.225-11.

(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, other than designated country or FTA country construction material, that is not listed by the Government in this solicitation in paragraph (b)(3) of FAR clause 52.225-11, the offeror also may submit an alternate offer based on use of equivalent domestic, designated country, or FTA country 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 FAR clause 52.225-11 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 FAR clause 52.225-11 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic, designated country, or FTA country construction material, and the offeror shall be required to furnish such domestic, designated country, or FTA country 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, 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)

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 Cheryl Anderson, Contracting Division, United States Army Corps of Engineers, 4735 E Marginal Way S, Seattle, WA 98134-2329

(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)

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)

252.236-7008 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.

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INTRODUCTION TO SECTION 00110
INSTRUCTIONS, CONDITIONS, AND NOTICES TO OFFERORS

1. INTRODUCTION.

1.1. Your firm is invited to submit a proposal for the project entitled "Replace Family Housing Phase V, Malmstrom AFB, Montana". Prospective offerors are required to prepare and submit proposals that will be evaluated in accordance with this section of the solicitation.

1.2. Project Description. The project consists of removing site utilities and other work to clear for new construction. Construct 130 replacement housing units in a duplex configuration of two stories in several floor plan types and exterior architectural styles. Project will include site utilities, grading, landscaping, backyard fencing, and miscellaneous site development work. Other features include concrete pile and grade beam foundation, rough and finish carpentry, gypsum wallboard, interior painting, steel siding, composition roof, blanket and rigid building insulation, vinyl flooring, carpet, countertops, plumbing fixtures, and electrical wiring and lighting fixtures.

1.3. Evaluation and Award. A firm fixed-price contract will be awarded to one firm submitting the proposal that: a) conforms to this request for proposals (RFP), b) is considered to offer the best value to the Government in terms of the evaluation factors, including price, and c) is determined to be in the best interest of the Government. To be considered for award, proposals shall conform to the terms and conditions contained in the Request for Proposal. No proposal shall be accepted that does not address all criteria specified in this solicitation or which includes stipulations or qualifying conditions. The evaluation process used to determine the most advantageous offer for the technical criteria is described in the following paragraphs.

2. EVALUATION FACTORS. Proposals will be evaluated on the basis of two factors, TECHNICAL and PRICE.

2.1. Technical Evaluation Criteria. Criteria are listed in descending order of Importance and each criterion are considered relatively more important than the next, except for Small & Small Disadvantaged Business Participation, which is significantly less important than the previous criteria.

- Construction Experience (see para 5.1)
- Past Performance (see para 5.2)
- Qualifications (see para 5.3)
- Extent of Small and Small Disadvantaged Business Participation **(see para 5.4)**

2.2. Relative Importance Definitions. For this evaluation, the following terms will be used to establish the relative importance of the technical criteria:

- More Important: The criterion is one and 1/2 times more important in value to the Government than another criterion.
- Significantly Less Important: The criterion is three (3) times less important in value to the Government than another criterion.

2.3. Summary of Order of Importance. Criterion A is more important than B, B is more important than C, and D is significantly less important than C.

2.4, Price. Price is reviewed for reasonableness, but not rated. Financial capacity and bonding ability will be checked for responsibility during preaward survey, but not rated.

3. EVALUATION STANDARDS OF TECHNICAL CRITERIA. Technical evaluation criteria will be rated using the following adjectival descriptions. Evaluators will apply the appropriate adjective to each criterion rated.

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

ABOVE AVERAGE - Information submitted demonstrates offeror's potential to **meet** performance or capability standards in **most** all areas. The submittal contains excellent features that will likely produce results very beneficial to the Government. Fully **meets most** RFP primary design objectives. **No deficiencies and weaknesses are minimal**. **HIGH PROBABILITY OF SUCCESS.**

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

MARGINAL – The submittal is not adequately responsive or does not address the specific criterion, **although the submittal has a reasonable chance of becoming at least acceptable.** Proposal **does not meet some of the minimum requirements**. The assignment of a rating within the bounds of "Marginal" **indicates that mandatory corrective action would be required to prevent significant deficiencies from affecting the overall project. Contains weaknesses and no strengths**. The offeror's plans or approach will likely result in questionable quality of performance, which represents a moderate level of risk to the Government. **LOW PROBABILITY OF SUCCESS.**

UNSATISFACTORY – The offeror's interpretation of the Government's requirements is so superficial, incomplete, vague, incompatible, incomprehensible, or incorrect as to be considered deficient. **Fails to meet** performance or capability standards. Unacceptable. There is no reasonable expectation that acceptable performance would be achieved. The proposal contains **many deficiencies and/or gross omissions**; fails to provide a reasonable, logical approach to fulfilling much of the Government's requirements; and/or fails to meet most or all of the minimum requirements. **Very significant disadvantages/deficiencies. VERY LOW PROBABILITY OF SUCCESS**.

4. DEFINITIONS OF STRENGTH, WEAKNESS, AND DEFICIENCY.

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

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

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

5. TECHNICAL CRITERIA SUBMITTAL REQUIREMENTS.

Specific Submittal Requirements for Criteria:

5.1. Construction Experience. For Construction Experience, the Offeror must submit information on three separate areas: 1) Experience on Similar Housing Projects, 2) Military Construction Experience and 3) Similar Climate construction experience. Submittal Requirements: The Offeror should submit up to four (4) project examples for each experience area constructed within the past seven (7) years. Offerors should explain how the information provided is relevant to the proposed acquisition. (Relevant is defined as a project that has been started and /or completed within the last seven years and has a logical connection with the criteria in the RFP). Examples of relevant experience of the firm are multiple family housing projects; including townhouses, condominiums, apartments, or garden apartments. Only those projects for which the Offeror or a primary teaming partner was the Prime Contractor should be submitted. The projects selected should clearly demonstrate the construction capabilities of the Offeror. Project examples that show more than one area of experience may be listed as a qualified project under each applicable area of experience. The Offeror must clearly identify for which experience area(s) each project example pertains (e.g., Project A may qualify and be listed for similar housing project, and similar climate while Project B may qualify and be listed only for military housing project; etc.). Sample as follows:

CONSTRUCTION PROJECT EXPERIENCE MATRIX PROJECT TITLE	SIMILAR HOUSING PROJECTS	MILITARY CONSTRUCTION	SIMILAR CLIMATE
PROJECT A	●		●
PROJECT B		●	
PROJECT C	●		
PROJECT D	●	●	●

Using a format similar to that shown below, provide specific information on the projects listed.

Relevant Experience of Firm:

Project Title & Location
Project Construction Type (e.g., multiple family military housing)
Dollar Value (Construction)
Construction Start & Completion Dates (Month/Year)
Role of Firm(s) (e.g., prime, sub) (address type of work performed and percentage of work, as applicable); also include any proposed team members that were directly involved in this project, including work performed, roles and responsibilities.
Brief Description of Project (address how this relates to solicitation project)
Customer Point of Contact (i.e., name, relationship to project, agency/firm affiliation, city, state, current phone no, and email address if available)
Awards or recognition received (if applicable)

Evaluation Method for Construction Experience. The greater the relevancy of the offeror's prior construction project experience to the categories listed above (similar housing projects, MILCON, and similar climate), the higher the value assigned for the experience during evaluations. Demonstration of experience in completing projects that had the unique characteristics of the proposed project (Northern Tier climate) will be evaluated more favorably.

5.2. Past performance, including customer satisfaction, quality, and timely performance. A lack of past performance information will receive a neutral rating during evaluation. Government databases will be checked and previous customers may be contacted as references.

Submittal Requirements:
Past performance of the prime contractor will be evaluated using the Construction Contractor Administrative Support System (CCASS) database and customer satisfaction surveys. All performance ratings for the prime contractor in CCASS for the past 7 years shall be considered. If an offeror does not have past performance available in CCASS, the customer satisfaction surveys will be used exclusively. 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 telefax number: (503) 808-4596. All design build projects submitted on a customer satisfaction survey must have been completed within the last 7 years. Further instructions are found at the top of the customer satisfaction survey. Only relevant projects (of similar scope, cost and complexity as this solicitation) should be included on the surveys The Government reserves the right to contact the evaluator on previous government or private sector work to verify the offeror's construction experience.

Offerors shall submit a list of all customers (including current Point of Contact and phone number) to whom a Past Performance Survey was provided a reproducible customer satisfaction survey form is provided at the end of this Phase-One portion. NO MORE THAN FOUR (4) CUSTOMER SATISFACTION SURVEYS SHOULD BE SUBMITTED FOR THE PRIME FIRM To be considered, the surveys must be completed by the customers and mailed, emailed, hand-delivered, or faxed directly by the customer to the Seattle District Contracting Division for receipt no later than the time and date the Phase I submittals are due

Surveys submitted directly by offerors will not be considered. Please ensure envelopes containing surveys submitted to this office do not contain the offeror's return address.

Evaluation Method. The Government will evaluate the relative merits of each offeror's past performance. The Government reserves the right to consider all aspects of an offeror's performance history, but attribute more significance to work that was similar in nature, magnitude, and complexity to this project, and will attribute more significance in evaluating the performance of those projects listed in the first criterion, construction experience.

5.3. Qualifications of Proposed Team Members. (e.g., education, experience, etc.) It is expected that the team presented in your proposal will be exactly the same as the team that will perform on the project. If any change occurs after award, the offeror shall demonstrate to the Contracting Officer how any new individuals or firms are as qualified for this project as the originally proposed individuals. NOTE: The key members specified in this criterion may not have more than one role. The Project Manager and Project On-Site Superintendent must be employees of the proposed prime contractor.

Submittal Requirements: Provide the qualifications of the KEY individual construction team members proposed for this project in the form of resumes. As a minimum, provide resumes for the construction firm's project manager, project on-site superintendent), and Quality Control Systems Manager. Individual's qualifications will be measured against the following criteria:

Construction Project Manager: The construction project manager shall have managed two projects similar in complexity to the project in this solicitation.

Project Superintendent: The Project Superintendent shall have no less than seven years of experience as a project superintendent on construction projects of similar complexity. The experience must demonstrate construction knowledge, the ability to manage large subcontracting teams, complex projects, and multiple buildings, and be consistent with the type of construction required in this solicitation.

Quality Control System Manager: The Contractor shall identify as Contractor Quality Control System Manager (CQCSM) 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 CQCSM shall be a graduate engineer,

graduate architect, or a graduate of construction management with a minimum of five years construction experience on construction projects similar to this contract or a construction person able to demonstrate CQCSM experience on similar projects. This CQCSM shall be on the site at all times during construction, shall be assigned no other duties and shall be employed by the prime Contractor.

Resumes should be no more than two (2) pages per individual and submitted in a format similar to the one shown below.

Personnel Qualifications/Experience

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

Evaluation Method: The more recent and the greater the relevancy of the team members' qualifications, and prior project experience, the higher the value assigned for this criterion during evaluations. In addition, qualifications of key personnel that demonstrate construction experience in a climate similar to that of Montana will be considered favorably. Only one individual for each of the key personnel categories listed above will be evaluated.

5.4. Criterion D - Extent of Small Business Participation. No submittal is required for this criterion. The Government will utilize performance evaluations contained in CCASS to evaluate this criterion.

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

satisfactory. Firms that receive a rating below satisfactory for this item in one or more CCASS evaluations will receive a rating of marginal for this criterion.

6. PROPOSAL CONTENTS.

6.1. Proposals shall be submitted in two parts: a technical proposal and (b) a 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 proposal shall be 30 with font size no smaller than 10 point. 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 those criteria is available. 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 (8 ½ x 11-inches) 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. Photographs and organizational charts will not be considered a page. Proposals in excess of 30 pages may be discarded. Unnecessarily elaborate brochures or other presentation materials beyond those sufficient to present a complete and effective response are not desired and may be construed as an indication of the proposer's lack of cost-consciousness. Penalty for making false statements in proposals is prescribed in 18 U.S.C. 1001.

6.2. 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.

TECHNICAL PROPOSAL (6 SETS REQUIRED (ORGINAL + 5 COPIES)

- Technical Proposal Cover Letter, to include:
  - Solicitation Number
  - Name, address, and telephone and facsimile numbers of the Offeror (and electronic address, if available)
  - 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
  - Names, title, and signature of the person authorized to sign the proposal.
  - A statement specifying the extent of agreement to furnish any and all items upon which prices are offered at the prices set opposite each item.
  - A statement that the offer has an acceptance period of 120 calendar days from the date the offer is submitted.
- 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.
- Construction Experience
- Past Performance
- Qualifications
- Extent of Small and Small Disadvantaged Business Participation

6.3. **Price proposal** shall be submitted in ORIGINAL only, and must be signed by an official authorized to bind your firm. Note that SF 1442, Block 13D, provides the number of calendar days after the date of the offer which the proposal is firm. Provide the name, address, phone, and fax numbers for your bank and bonding company. The price proposal, to be submitted at the same time as technical proposal, should include:

Price Proposal (Original Only)

- SF 1442, Solicitation, Offer and Award and Award and Corporate
- 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
- Bid Bond
- Small and Small Disadvantaged Business Subcontracting Plan (if applicable). (NOTE: SUBCONTRACTING PLAN APPLIES TO LARGE BUSINESS ONLY).

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6.3.1. Bid Bonds must be accompanied by a **Power of Attorney containing an original signature from the surety**, which must be affixed to the Power of Attorney after the Power of Attorney has been generated. Computer generated and signed Powers of Attorney will only be accepted if accompanied by an original certification from a current officer of the surety attesting to its authenticity and continuing validity. Performance and payment bonds have the same requirement.

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

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

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

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

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

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

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

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

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

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

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

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

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

"The parties hereto expressly understand and agree as follows:

a. (name, title, and company) is the principal representative of the joint venture.

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

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

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

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

7. SELECTION AND AWARD WITHOUT DISCUSSIONS. It is the intent of the Government to make award based upon initial offers, without further discussions or additional information. Therefore, proposals should 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, discussions will be conducted as described below.

8. COMPETITIVE RANGE. After initial evaluation of proposals, if the Contracting Officer determines that discussions are to be conducted, the Contracting Officer will establish a competitive range comprised of all of the highest rated technical proposals, unless the range is further reduced for purposes of efficiency (i.e., the Contracting Officer may determine that the number of most highly rated proposals that might otherwise be included in the competitive range exceeds the number at which an efficient competition can be conducted). Discussions may be held with firms in the competitive range.

9. DISCUSSIONS. Written or oral (i.e., telephonic) discussions may be conducted by the Government with all offerors in the competitive range. As a result of discussions, offerors may make revisions to their initial offers. If an offeror's proposal is eliminated or otherwise removed from the competitive range during discussions, no further revisions to that offeror's proposal will be accepted or considered. Discussions will culminate in a request for Final Proposal Revision, the date and time of which will be common to all offerors.

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10. SELECTION AND AWARD. The Government intends to make award based on initial offers. If discussions are conducted, then after receipt of Final Proposal Revision, the Technical Evaluation Team will evaluate supplemental information provided by offerors, adjust technical ratings previously assigned, and provide a recommendation to the Contracting Officer. Subsequently, and after evaluation of any changes to proposed prices, the Contracting Officer will perform a best-value analysis. Selection will be made on the basis of the responsible offer, which conforms to the RFP and represents the most advantageous offer to the Government, subject to availability of funds. Technical proposals will be considered part of the awarded contract, and added to the contract by alterations

11. BEST-VALUE ANALYSIS

11.1. The Government is more concerned with obtaining superior experience, past performance, and qualifications, than with making award at the lowest overall cost to the Government. In determining the best value to the Government, the tradeoff process of evaluation will be utilized. The tradeoff process permits tradeoffs among cost or price and non-cost factors, and allows the Government to consider award to other than the lowest priced offeror or other than the highest technically rated offeror.

11.2. **You are advised that greater consideration will be given to the evaluation of technical proposals rather than price, with price being significantly less important**. The best-value offer will be selected using a tradeoff analysis of technical ratings and price. In making this determination, the Government is concerned with achieving a highly qualified firm with a reasonable price. It is pointed out, however, that should technical competence between offerors be considered approximately the same, the price could become more important in determining award.

12. DEBRIEFINGS. Upon written request to the Contracting Officer, unsuccessful offerors will be debriefed and furnished the basis for the selection decision and contract award. Debriefings will be in accordance with FAR Part 15. 505 and 15.506.

13. 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 for any other costs incurred prior to execution of a formal contract.

14. Release of Information: After receipt of proposals and until contract award, source selection information will not be furnished to any firm.

END OF SECTION 00110

Section 00600 - Representations & Certifications

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Section 00600 - Representations & Certifications

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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.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision, 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 paragraph (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 (MAY 2004) - ALTERNATE I (APR 2002)

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

(2) The small business size standard is ( ) (insert size standard).

(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 service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

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

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

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

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

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

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

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

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

(d) Notice.

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

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

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

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

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

(End of provision)

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

(a) Definition.

"Emerging small business" as used in this solicitation, means a small business concern whose size is no greater than 50 percent of the numerical size standard applicable to the North American Industry Classification System (NAICS) code assigned to a contracting opportunity.

(b) [Complete only if the Offeror has represented itself under the provision at 52.219-1 as a small business concern under the size standards of this solicitation.] The Offeror [ ] is, [ ] is not an emerging small business.

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

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

No. of Employees Avg. Annual Gross Revenues

____ 50 or fewer ____ $1 million or less

____ 51 - 100 ____ $1,000,001 - $2 million

____ 101 - 250 ____ $2,000,001 - $3.5 million

____ 251 - 500 ____ $3,500,001 - $5 million

____ 501 - 750 ____ $5,000,001 - $10 million

____ 751 - 1,000 ____ $10,000,001 - $17 million

____ Over 1,000 ____ Over $17 million

(End of provision)

52.219-22 SMALL DISADVANTAGED BUSINESS STATUS (OCT 1999)

(a) General. This provision is used to assess an offeror's small disadvantaged business status for the purpose of obtaining a benefit on this solicitation. Status as a small business and status as a small disadvantaged business for general statistical purposes is covered by the provision at FAR 52.219-1, Small Business Program Representation.

(b) Representations.

(1) General. The offeror represents, as part of its offer, that it is a small business under the size standard applicable to this acquisition; and either--

___ (i) It has received certification by the Small Business Administration as a small disadvantaged business concern consistent with 13 CFR 124, Subpart B; and

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

(B) Where the concern is owned by one or more disadvantaged 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

(C) It is identified, on the date of this representation, as a certified small disadvantaged business concern in the database maintained by the Small Business Administration(PRO0Net); or

___ (ii) It has submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted.

(2)___ For Joint Ventures. The offeror represents, as part of its offer, that it is a joint venture that complies with the requirements at 13 CFR 124.1002(f) and that the representation in paragraph (b)(1) of this provision is accurate for the small disadvantaged business concern that is participating in the joint venture. [The offeror shall enter the name of the small disadvantaged business concern that is participating in the joint venture: _____.]

(c) Penalties and Remedies. Anyone who misrepresents any aspects of the disadvantaged status of a concern for the purposes of securing a contract or subcontract shall:

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

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

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

(End of provision)

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

The offeror represents that --

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

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

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

(End of provision)

52.222-25 AFFIRMATIVE ACTION COMPLIANCE (APR 1984)

The offeror represents that

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

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

(End of provision)

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

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

(End of provision)

52.223-4 RECOVERED MATERIAL CERTIFICATION (OCT 1997)

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

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (AUG 2003)

(a) Executive Order 13148, of April 21, 2000, Greening the Government through Leadership in Environmental Management, requires submission of this certification as a prerequisite for contract award.

(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 in 40 CFR 372.65;

( ) (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 the following Standard Industrial Classification (SIC) codes or their corresponding North American Industry Classification System sectors:

(A) Major group code 10 (except 1011, 1081, and 1094.

(B) Major group code 12 (except 1241).

(C) Major group codes 20 through 39.

(D) Industry code 4911, 4931, or 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce).

(E) Industry code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C (42 U.S.C. 6921, et seq.), 5169, 5171, or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); 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 (SEP 2004)

(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 subject to this provision include: Cuba, Iran, 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)

252.243-7001 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.

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

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

(b) Representation. The Offeror represents that it:

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

____ (2) Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

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

Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

(End of provision)

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CLAUSES INCORPORATED BY FULL TEXT

52.204-7 CENTRAL CONTRACTOR REGISTRATION (OCT 2003)

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

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

Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet, Inc. (D&B) to identify unique business entities.

Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by D&B plus a 4-character suffix that may be assigned by a business concern. (D&B has no affiliation with this 4-character suffix.) This 4-character suffix may be assigned at the discretion of the business concern to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see the FAR at Subpart 32.11) for the same parent concern.

Registered in the CCR database means that--

(1) The Contractor has entered all mandatory information, including the DUNS number or the DUNS+4 number, into the CCR database; and

(2) The Government has validated all mandatory data fields and has marked the record “Active”.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.

(2) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “DUNS” or “DUNS +4” followed by the DUNS or DUNS +4 number that identifies the offeror's name and address exactly as stated in the offer. The DUNS number will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(c) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at http://www.dnb.com; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company Physical Street Address, City, State, and Zip Code.

(iv) Company Mailing Address, City, State and Zip Code (if separate from physical).

(v) Company Telephone Number.

(vi) Date the company was started.

(vii) Number of employees at your location.

(viii) Chief executive officer/key manager.

(ix) Line of business (industry).

(x) Company Headquarters name and address (reporting relationship within your entity).

(d) If the Offeror does not become registered in the CCR database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.

(e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.

(f) The Contractor is responsible for the accuracy and completeness of the data within the CCR database, 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 review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(g)(1)(i) If a Contractor has legally changed its business name, “doing business as” name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of Subpart 42.12 of the FAR; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (g)(1)(i) of this clause, or fails to perform the agreement at paragraph (g)(1)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the “Suspension of Payment” paragraph of the electronic funds transfer (EFT) clause of this contract.

(2) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see FAR Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the “Suspension of payment” paragraph of the EFT clause of this contract.

(h) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at http://www.ccr.gov or by calling 1-888-227-2423, or 269-961-5757.

(End of clause)

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 2003)

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.dla.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) 697-2179, Facsimile (215) 697-1462.

(End of provision)

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 (JUL 2004)

(a) When a solicitation provision or contract clause uses a word or term that is defined in the Federal Acquisition Regulation (FAR), the word or term has the same meaning as the definition in FAR 2.101 in effect at the time the solicitation was issued, unless--

(1) The solicitation, or amended solicitation, provides a different definition;

(2) The contracting parties agree to a different definition;

(3) The part, subpart, or section of the FAR where the provision or clause is prescribed provides a different meaning; or

(4) The word or term is defined in FAR Part 31, for use in the cost principles and procedures.

(b) The FAR Index is a guide to words and terms the FAR defines and shows where each definition is located. The FAR Index is available via the Internet at http://www.acqnet.gov at the end of the FAR, after the FAR Appendix.

(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)

52.203-7 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 amo unt 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)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(End of clause)

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

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

(a) The Schedule (excluding the specifications).

(b) Representations and other instructions.

(c) Contract clauses.

(d) Other documents, exhibits, and attachments.

(e) The specifications.

(End of clause)

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

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

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

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

(1) The actual subcontract; or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(End of clause)

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

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

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

(2) Be limited to such modifications.

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

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

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

(End of clause)

52.215-19 NOTIFICATION OF OWNERSHIP CHANGES (OCT 1997)

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

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

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

(b) The Contractor shall--

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

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

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

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

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

(End of clause)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(End of clause)

52.219-4 NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (OCT 2004)

(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 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 (MAY 2004)

(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 service-disabled 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 PLAN (JAN 1999)

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

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

stated. The amount of probable damages attributable to the Contractor's failure to comply shall be an amount equal to the actual dollar amount by which the Contractor failed to achieve each subcontract goal.

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

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

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

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

(End of clause)

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

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

(b) Reporting requirement. If this contract contains SDB participation targets, the Contractor shall report on the participation of SDB concerns at contract completion, or as otherwise provided in this contract. Reporting may be on Optional Form 312, Small Disadvantaged Business Participation Report, or in the Contractor's own format providing the same information. This report is required for each contract containing SDB participation targets. If this contract contains an individual Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, reports may be submitted with the final Subcontracting Report for Individual Contracts (Standard Form 294) at the completion of the contract.

(End of clause)

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

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

(End of clause)

52.222-3 CONVICT LABOR (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.

(b) 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.

(i) 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).

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

(End of clause)

52.222-21 PROHIBITION OF SEGREGATED FACILITIES (FEB 1999)

(a) Segregated facilities, as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national

origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

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

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

(End of clause)

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

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

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

Goals for minority participation for each trade	Goals for female participation for each trade
6.8%	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 community organizations, and the action taken with respect to each individual. If an individual was sent to the union hiring hall for referral and not referred back to the Contractor by the union or, if referred back, not employed by the Contractor, this shall be documented in the file, along with whatever additional actions the Contractor may have taken.

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

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

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

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

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

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

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

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

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

(8) Disseminate the Contractor's equal employment policy externally by including it in any advertising in the news media, specifically including minority and female news media. Provide written notification to, and discuss this policy with, other Contractors and subcontractors with which the Contractor does or anticipates doing business.

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

(10) Encourage present minority and female employees to recruit minority persons and women. Where reasonable,

provide after-school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

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

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

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

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

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

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

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

(1) Actively participates in the group;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(End of clause)

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

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

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

Executive and top management means any employee--

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

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

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

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

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

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

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

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

Special disabled veteran means--

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

(i) Rated at 30 percent or more; or

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

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

Veteran of the Vietnam era means a person who--

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(2) The employment notices shall--

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

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

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

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

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

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

(End of clause)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(ii) The rights of applicants and employees.

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

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

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

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

(End of clause)

52.222-37 EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS (DEC 2001)

(a) Unless the Contractor is a State or local government agency, the Contractor shall report at least annually, as required by the Secretary of Labor, on--

(1) The number of disabled veterans and the number of veterans of the Vietnam era in the workforce of the contractor by job category and hiring location; and

(2) The total number of new employees hired during the period covered by the report, and of that total, the number of disabled veterans, and the number of veterans of the Vietnam era.

(b) The above items shall be reported by completing the form entitled "Federal Contractor Veterans' Employment Report VETS-100."

(c) Reports shall be submitted no later than September 30 of each year beginning September 30, 1988.

(d) The employment activity report required by paragraph (a)(2) of this clause shall reflect total hires during the most recent 12-month period as of the ending date selected for the employment profile report required by paragraph (a)(1) of this clause. Contractors may select an ending date: (1) As of the end of any pay period during the period January through March 1st of the year the report is due, or (2) as of December 31, if the contractor has previous written approval from the Equal Employment Opportunity Commission to do so for purposes of submitting the Employer Information Report EEO-1 (Standard Form 100).

(e) The count of veterans reported according to paragraph (a) of this clause shall be based on voluntary disclosure. Each Contractor subject to the reporting requirements at 38 U.S.C. 4212 shall invite all disabled veterans and veterans of the Vietnam era who wish to benefit under the affirmative action program at 38 U.S.C. 4212 to identify themselves to the Contractor. The invitation shall state that the information is voluntarily provided; that the information will be kept confidential; that disclosure or refusal to provide the information will not subject the applicant or employee to any adverse treatment; and that the information will be used only in accordance with the regulations promulgated under 38 U.S.C. 4212.

(f) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary.

(End of clause)

52.223-3 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 (AUG 2003)

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

Priority chemical means a chemical identified by the Interagency Environmental Leadership Workgroup or, alternatively, by an agency pursuant to section 503 of Executive Order 13148 of April 21, 2000, Greening the Government through Leadership in Environmental Management.

“Toxic chemical means a chemical or chemical category listed in 40 CFR 372.65.”

(b) Executive Order 13148 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).

(c) The Contractor shall provide all information needed by the Federal facility to comply with the following:

(1) The emergency planning reporting requirements of section 302 of EPCRA.

(2) The emergency notice requirements of section 304 of EPCRA.

(3) The list of Material Safety Data Sheets, required by section 311 of EPCRA.

(4) The emergency and hazardous chemical inventory forms of section 312 of EPCRA.

(5) The toxic chemical release inventory of section 313 of EPCRA, which includes the reduction and recycling information required by section 6607 of PPA.

(6) The toxic chemical, priority chemical, and hazardous substance release and use reduction goals of sections 502 and 503 of Executive Order 13148.

(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 (AUG 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 in 40 CFR 372.65;

(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 the following Standard Industrial Classification (SIC) codes or their corresponding North American Industry Classification System sectors:

(i) Major group code 10 (except 1011, 1081, and 1094.

(ii) Major group code 12 (except 1241).

(iii) Major group codes 20 through 39.

(iv) Industry code 4911, 4931, or 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce).

(v) Industry code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C (42 U.S.C. 6921, et seq.)), 5169, 5171, or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); 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 provis ion at FAR 52.223-13, Certification of Toxic Chemical Release Reporting; and

(2) Include in any resultant subcontract exceeding $100,000 (including all options), the substance of this clause, except this paragraph (e).

(End of clause)

52.224-1 PRIVACY ACT NOTIFICATION (APR 1984)

The Contractor will be required to design, develop, or operate a system of records on individuals, to accomplish an agency function subject to the Privacy Act of 1974, Public Law 93-579, December 31, 1974 (5 U.S.C. 552a) and applicable agency regulations. Violation of the Act may involve the imposition of criminal penalties.

(End of clause)

52.224-2 PRIVACY ACT (APR 1984)

(a) The Contractor agrees to--

(1) Comply with the Privacy Act of 1974 (the Act) and the agency rules and regulations issued under the Act in the design, development, or operation of any system of records on individuals to accomplish an agency function when the contract specifically identifies--

(i) The systems of records; and

(ii) The design, development, or operation work that the contractor is to perform;

(2) Include the Privacy Act notification contained in this contract in every solicitation and resulting subcontract and in every subcontract awarded without a solicitation, when the work statement in the proposed subcontract requires the redesign, development, or operation of a system of records on individuals that is subject to the Act; and

(3) Include this clause, including this subparagraph (3), in all subcontracts awarded under this contract which requires the design, development, or operation of such a system of records.

(b) In the event of violations of the Act, a civil action may be brought against the agency involved when the violation concerns the design, development, or operation of a system of records on individuals to accomplish an agency function, and criminal penalties may be imposed upon the officers or employees of the agency when the violation concerns the operation of a system of records on individuals to accomplish an agency function. For purposes of the Act, when the contract is for the operation of a system of records on individuals to accomplish an agency function, the Contractor is considered to be an employee of the agency.

(c)(1) "Operation of a system of records," as used in this clause, means performance of any of the activities associated with maintaining the system of records, including the collection, use, and dissemination of records.

(2) "Record," as used in this clause, means any item, collection, or grouping of information about an individual that is maintained by an agency, including, but not limited to, education, financial transactions, medical history, and criminal or employment history and that contains the person's name, or the identifying number, symbol, or other identifying particular assigned to the individual, such as a fingerprint or voiceprint or a photograph.

(3) "System of records on individuals," as used in this clause, means a group of any records under the control of any agency from which information is retrieved by the name of the individual or by some identifying number, symbol, or other identifying particular assigned to the individual.

(End of clause)

52.225-11 BUY AMERICAN ACT--CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (OCT 2004)

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

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the end product.

Designated country means any of the following countries: Aruba, Austria, Bangladesh, Belgium, Benin, Bhutan, Botswana, Burkina Faso, Burundi, Canada, Cape Verde, Central African Republic, Chad, Comoros, Cyprus, Czech Republic, Denmark. Djibouti, Equatorial Guinea, Estonia, Finland, France, Gambia, Germany, Greece, Guinea, Guinea-Bissau, Haiti, Hong Kong, Hungary, Ireland, Israel, Italy, Japan. Kiribati, Korea, Republic of, Lativia, Lesotho, Liechtenstein, Lithuania, Luxembourg, Malawi, Maldives, Mali, Malta, Mozambique, Nepal, Netherlands, Niger, Norway, Poland, Portugal, Rwanda. Sao Tome and Principe, Sierra Leone, Singapore, Slovak Republic, Slovenia, Somalia, Spain, Sweden, Switzerland, Tanzania U.R., Togo, Tuvalu, Uganda, United Kingdom, Vanuatu, Western Samoa, Yemen.

Designated country construction material means a construction material that--

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

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different construction material distinct from the materials from which it was transfomed.

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.

Free Trade Agreement country means Canada, Chile, Mexico, or Singapore.

Free Trade Agreement country construction material means a construction material that--

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

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a FTA country into a new and different construction material distinct from the materials from which it was transformed.

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

(b) Construction materials. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) by providing a preference for domestic construction material. In addition, the Contracting Officer has determined that the Trade Agreements Act and Free Trade Agreements (FTAs) apply to this acquisition. Therefore, the Buy American Act restrictions are waived for designated country and FTA country construction materials.

(2) The Contractor shall use only domestic, designated country, or NAFTA country construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

(3) The requirement in paragraph (b)(2) of this clause does not apply to the construction materials or components listed by the Government as follows: (Contracting Officer to list applicable excepted materials or indicate “none”)

(4) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(3) of this clause if the Government determines that--

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the restrictions of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent;

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act.

(1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(4) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American Act applies, use of foreign construction material is noncompliant with the Buy American Act.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....
Item 2:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....

\1\ Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).

List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

(End of clause)

52.225-13 RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (DEC 2003)

(a) Except as authorized by the Office of Foreign Assets Control (OFAC) in the Department of the Treasury, the Contractor shall not acquire, for use in the performance of this contract, any supplies or services if any proclamation, Executive order, or statute administered by OFAC, or if OFAC's implementing regulations at 31 CFR chapter V, would prohibit such a transaction by a person subject to the jurisdiction of the United States.

(b) Except as authorized by OFAC, most transactions involving Cuba, Iran, Libya, and Sudan are prohibited, as are most imports from North Korea, into the United States or its outlying areas. Lists of entities and individuals subject to economic sanctions are included in OFAC's List of Specially Designated Nationals and Blocked Persons at TerList1.html. More information about these restrictions, as well as updates, is available in the OFAC's regulations at 31 CFR chapter V and/or on OFAC's Web site at http://www.treas.gov/ofac.

(c) The Contractor shall insert this clause, including this paragraph (c), in all subcontracts.

(End of clause)

52.227-1 AUTHORIZATION AND CONSENT (JUL 1995)

(a) The Government authorizes and consents to all use and manufacture, in performing this contract or any subcontract at any tier, of any invention described in and covered by a United States patent (1) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract or (2) used in machinery, tools, or methods whose use necessarily results from compliance by the Contractor or a subcontractor with (i) specifications or written provisions forming a part of this contract or (ii) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely by the provisions of the indemnity clause, if any, included in this contract or any subcontract hereunder (including any lower-tier subcontract), and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted.

(b) The Contractor agrees to include, and require inclusion of, this clause, suitably modified to identify the parties, in all subcontracts at any tier for supplies or services (including construction, architect-engineer services, and materials, supplies, models, samples, and design or testing services expected to exceed the simplified acquisition threshold (however, omission of this clause from any subcontract, including those at or below the simplified acquisition threshold, does not affect this authorization and consent.)

(End of clause)

52.227-2 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (AUG 1996)

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed under this contract, the Contractor shall furnish to the Government, when requested by the

Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(d) The Contractor agrees to include, and require inclusion of, this clause in all subcontracts at any tier for supplies or services (including construction and architect-engineer subcontracts and those for material, supplies, models, samples, or design or testing services) expected to exceed the simplified acquisition threshold at (FAR) 2.101.to exceed the dollar amount set forth in 13.000 of the Federal Acquisition Regulation (FAR).

(End of clause)

52.227-4 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)

52.228-13 ALTERNATIVE PAYMENT PROTECTIONS (JULY 2000)

(a) The Contractor shall submit one of the following payment protections:

(b) The amount of the payment protection shall be 100 percent of the contract price.

(c) The submission of the payment protection is required within days of contract award.

(d) The payment protection shall provide protection for the full contract performance period plus a one-year period.

(e) Except for escrow agreements and payment bonds, which provide their own protection procedures, the Contracting Officer is authorized to access funds under the payment protection when it has been alleged in writing by a supplier of labor or material that a nonpayment has occurred, and to withhold such funds pending resolution by administrative or judicial proceedings or mutual agreement of the parties.

(f) When a tripartite escrow agreement is used, the Contractor shall utilize only suppliers of labor and material that signed the escrow agreement.

(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)

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.

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 (OCT 2003)

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 contract financing or invoice payment or that the Government has otherwise overpaid on a contract financing or 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 (OCT 2003)

(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) 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.

(f) 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.

(g) 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 separately in the CCR database and shall be paid by EFT in accordance with the terms of this clause. Notwithstanding any other requirement of this contract, payment to an ultimate recipient other than the Contractor, or a financial institution properly recognized under an assignment of claims pursuant to subpart 32.8, is not permitted. 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.

(h) 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.

(i) 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.

(e) 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)

52.243-5 CHANGES AND CHANGED CONDITIONS (APR 1984)

(a) The Contracting Officer may, in writing, order changes in the drawings and specifications within the general scope of the contract.

(b) The Contractor shall promptly notify the Contracting Officer, in writing, of subsurface or latent physical conditions differing materially from those indicated in this contract or unknown unusual physical conditions at the site before proceeding with the work.

(c) If changes under paragraph (a) or conditions under paragraph (b) increase or decrease the cost of, or time required for performing the work, the Contracting Officer shall make an equitable adjustment (see paragraph (d)) upon submittal of a "proposal for adjustment" (hereafter referred to as proposal) by the Contractor before final payment under the contract.

(d) The Contracting Officer shall not make an equitable adjustment under paragraph (b) unless--

(1) The Contractor has submitted and the Contracting Officer has received the required written notice; or

(2) The Contracting Officer waives the requirement for the written notice.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause.

(End of clause)

52.244-6 SUBCONTRACTS FOR COMMERCIAL ITEMS (UL 2004)

(a) Definitions.

"Commercial item", has the meaning contained in Federal Acquistion Regulation 2.101, 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 (MAY 2004) (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 premises.

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

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

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

(End of clause)

52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.
(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(End of clause)

52.246-25 LIMITATION OF LIABILITY--SERVICES (FEB 1997)

(a) Except as provided in paragraphs (b) and (c) below, and except to the extent that the Contractor is expressly responsible under this contract for deficiencies in the services required to be performed under it (including any materials furnished in conjunction with those services), the Contractor shall not be liable for loss of or damage to property of the Government that (1) occurs after Government acceptance of services performed under this contract, and (2) results from any defects or deficiencies in the services performed or materials furnished.

(b) The limitation of liability under paragraph (a) above shall not apply when a defect or deficiency in, or the Government's acceptance of, services performed or materials furnished results from willful misconduct or lack of good faith on the part of any of the Contractor's managerial personnel. The term "Contractor's managerial personnel," as used in this clause, means the Contractor's directors, officers, and any of the Contractor's managers, superintendents, or equivalent representatives who have supervision or direction of--

(1) All or substantially all of the Contractor's business;

(2) All or substantially all of the Contractor's operations at any one plant, laboratory, or separate location at which the contract is being performed; or

(3) A separate and complete major industrial operation connected with the performance of this contract.

(c) If the Contractor carries insurance, or has established a reserve for self-insurance, covering liability for loss or damage suffered by the Government through the Contractor's performance of services or furnishing of materials under this contract, the Contractor shall be liable to the Government, to the extent of such insurance or reserve, for loss of or damage to property of the Government occurring after Government acceptance of, and resulting from any

defects and deficiencies in, services performed or materials furnished under this contract.

(End of clause)

52.248-3 VALUE ENGINEERING--CONSTRUCTION (FEB 2000)

(a) General. The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECP's) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECP's, in accordance with paragraph (f) below.

(b) Definitions. "Collateral costs," as used in this clause, means agency costs of operation, maintenance, logistic support, or Government-furnished property.

"Collateral savings," as used in this clause, means those measurable net reductions resulting from a VECP in the agency's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

"Contractor's development and implementation costs," as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

"Government costs," as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistic support. The term does not include the normal administrative costs of processing the VECP.

"Instant contract savings," as used in this clause, means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor's development and implementation costs, including subcontractors' development and implementation costs (see paragraph (h) below).

"Value engineering change proposal (VECP)" means a proposal that--

(1) Requires a change to this, the instant contract, to implement; and

(2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; provided, that it does not involve a change--

(i) In deliverable end item quantities only; or

(ii) To the contract type only.

(c) VECP preparation. As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and 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) (MAY 2004) - 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 49.001 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:

(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.

(f) 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.

(g) The Contractor need not comply with paragraph (a) of this clause if it has established a mechanism, such as

a hotline, by which employees may report suspected instances of improper conduct, and instructions that encourage employees to make such reports.

(End of clause)

252.204-7000 DISCLOSURE OF INFORMATION (DEC 1991)

(a) The Contractor shall not release to anyone outside the Contractor's organization any unclassified information, regardless of medium (e.g., film, tape, document), pertaining to any part of this contract or any program related to this contract, unless--

(1) The Contracting Officer has given prior written approval; or

(2) The information is otherwise in the public domain before the date of release.

(b) Requests for approval shall identify the specific information to be released, the medium to be used, and the purpose for the release. The Contractor shall submit its request to the Contracting Officer at least 45 days before the proposed date for release.

(c) The Contractor agrees to include a similar requirement in each subcontract under this contract. Subcontractors shall submit requests for authorization to release through the prime contractor to the Contracting Officer.

(End of clause)

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

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

(End of clause)

252.209-7004 SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) Unless the Government determines that there is a compelling reason to do so, the Contractor shall not enter into any subcontract in excess of $25,000 with a firm, or subsidiary of a firm, that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country.

(b) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country. The notice must include the name of the proposed subcontractor notwithstanding its inclusion on the List of Parties Excluded From Federal Procurement and Nonprocurement Programs.

(End of clause)

252.215-7000 PRICING ADJUSTMENTS (DEC 1991)

The term "pricing adjustment," as used in paragraph (a) of the clauses entitled "Price Reduction for Defective Cost or Pricing Data - Modifications," "Subcontractor Cost or Pricing Data," and "Subcontractor Cost or Pricing Data - Modifications," means the aggregate increases and/or decreases in cost plus applicable profits.

(End of clause)

252.219-7003 SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS) (APR. 1996)

This clause supplements the Federal Acquisition Regulation 52.219-9, Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, clause of this contract.

(a) *Definitions. Historically black colleges and universities,* as used in this clause, means institutions determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. The term also means any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institutions, as used in this clause, means institutions meeting the requirements of section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)). The term also includes Hispanic-serving institutions as defined in section 316(b)(1) of such Act (20 U.S.C. 1059c(b)(1)).

(b) Except for company or division-wide commercial items subcontracting plans, the term *small disadvantaged business,* when used in the FAR 52.219-9 clause, includes historically black colleges and universities and minority institutions, in addition to small disadvantaged business concerns.

(c) Work under the contract or its subcontracts shall be credited toward meeting the small disadvantaged business concern goal required by paragraph (d) of the FAR 52.219-9 clause when:

(1) It is performed on Indian lands or in joint venture with an Indian tribe or a tribally-owned corporation, and

(2) It meets the requirements of 10 U.S.C. 2323a.

(d) Subcontracts awarded to workshops approved by the Committee for Purchase from People Who are Blind or Severely Disabled (41 U.S.C. 46-48), may be counted toward the Contractor's small business subcontracting goal.

(e) A mentor firm, under the Pilot Mentor-Protege Program established under Section 831 of Pub. L. 101-510, as amended, may count toward its small disadvantaged business goal, subcontracts awarded--

(f) The master plan approval referred to in paragraph (f) of the FAR 52.219-9 clause is approval by the Contractor's cognizant contract administration activity.

(g) In those subcontracting plans which specifically identify small, small disadvantaged, and women-owned small businesses, the Contractor shall notify the Administrative Contracting Officer of any substitutions of firms that are not small, small disadvantaged, or women-owned small businesses for the firms listed in the subcontracting plan. Notifications shall be in writing and shall occur within a reasonable period of time after award of the subcontract. Contractor-specified formats shall be acceptable.

(End of clause)

252.223-7004 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 establish 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)

252.225-7031 SECONDARY ARAB BOYCOTT OF ISRAEL (APR 2003)

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

(1) Foreign person means any person (including any individual, partnership, corporation, or other form of association) other than a United States person.

(2) United States person is defined in 50 U.S.C. App. 2415(2) and means--

(i) Any United States resident or national (other than an individual resident outside the United States who is employed by other than a United States person);

(ii) Any domestic concern (including any permanent domestic establishment of any foreign concern); and

(iii) Any foreign subsidiary or affiliate (including any permanent foreign establishment) of any domestic concern that is controlled in fact by such domestic concern.

(b) Certification. If the offeror is a foreign person, the offeror certifies, by submission of an offer, that it--

(1) Does not comply with the Secondary Arab Boycott of Israel; and

(2) Is not taking or knowingly agreeing to take any action, with respect to the Secondary Boycott of Israel by Arab countries, which 50 U.S.C. App. 2407(a) prohibits a United States person from taking.

(End of provision)

252.225-7036 BUY AMERICAN ACT--FREE TRADE AGREEMENT--BALANCE OF PAYMENTS PROGRAM (JAN 2004)

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

(1) Component means an article, material, or supply incorporated directly into an end product.

(2) Domestic end product means--

(i) An unmanufactured end product that has been mined or produced in the United States; or

(ii) An end product manufactured in the United States if the cost of its qualifying country components and its components that are mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. The cost of components includes transportation costs to the place of incorporation into the end product and U.S. duty (whether or not a duty-free entry certificate is issued). Scrap generated, collected, and prepared for processing in the United States is considered domestic. A component is considered to have been mined, produced, or manufactured in the United States (regardless of its source in fact) if the end product in which it is incorporated is manufactured in the United States and the component is of a class or kind for which the Government has determined that--

(A) Sufficient and reasonably available commercial quantities of a satisfactory quality are not mined, produced, or manufactured in the United States; or

(B) It is inconsistent with the public interest to apply the restrictions of the Buy American Act.

(3) End product means those articles, materials, and supplies to be acquired under this contract for public use.

(4) Foreign end product means an end product other than a domestic end product.

(5) Free Trade Agreement country means Canada,Chile, Mexico or Singapore.

(6) Free Trade Agreement country end product means an article that--

(i) Is wholly the growth, product, or manufacture of a Free Trade Agreement country; or

(ii) In the case of an article that consists in whole or in part of materials from another country or instrumentality, has been substantially transformed in a Free Trade Agreement 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 its supply, provided that the value of those incidental services does not exceed the value of the product itself.

(7) Qualifying country means any country set forth in subsection 225.872-1 of the Defense Federal Acquisition Regulation Supplement.

(8) Qualifying country component means a component mined, produced, or manufactured in a qualifying country.

(9) Qualifying country end product means--

(i) An unmanufactured end product mined or produced in a qualifying country; or

(ii) An end product manufactured in a qualifying country if the cost of the following types of components exceeds 50 percent of the cost of all its components:

(A) Components mined, produced, or manufactured in a qualifying country.

(B) Components mined, produced, or manufactured in the United States.

(C) Components of foreign origin of a class or kind for which the Government has determined that sufficient and reasonably available commercial quantities of a satisfactory quality are not mined, produced, or manufactured in the United States.

(10) United States means the United States, its possessions, Puerto Rico, and any other place subject to its jurisdiction, but does not include leased bases or trust territories.

(b) Unless otherwise specified, this clause applies to all items in the Schedule.

(c) The Contractor shall deliver under this contract only domestic end products unless, in its offer, it specified delivery of qualifying country, Free Trade Agreement country, or other foreign end products in the Buy American Act--Free Trade Agreements--Balance of Payments Program Certificate provision of the solicitation. If the Contractor certified in its offer that it will deliver a qualifying country end product or a Free Trade Agreement country end product, the Contractor shall deliver a qualifying country end product, a Free Trade Agreement country end product, or, at the Contractor's option, a domestic end product.

(d) The contract price does not include duty for end products or components for which the Contractor will claim duty-free entry.

(e) United States law will apply to resolve any claim of breach of this contract.

(End of clause)

252.226-7001 UTILIZATION OF INDIAN ORGANIZATIONS AND INDIAN-OWNED ECONOMIC ENTERPRISES, AND NATIVE HAWAIIAN SMALL BUSINESS CONCERNS (SEP 2004)

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

Indian means--

(1) 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

(2) Any ``Native'' as defined in the Alaska Native Claims Settlement Act (43 U.S.C. 1601 et seq.).

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.

Native Hawaiian small business concern means an entity that is --

(1) A small business concern as defined in section 3 of the Small Business Act (15 U.S.C. 632) and relevant implementing regulations; and

(2) Owned and controlled by a Native Hawaiian as defined in 25 U.S.C. 4221(9).

(b) The Contractor shall use its best efforts to give Indian organizations, Indian-owned economic enterprises, and Native Hawaiian small business concerns 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, Indian-owned economic enterprise, or Native Hawaiian small business concern as to its eligibility, unless an 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--

(1) For matters relating to Indian organizations or Indian-owned economic enterprises: 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.

(2) For matters relating to Native Hawaiian small business concerns: Department of Hawaiian Home Lands, PO Box 1879, Honolulu, HI 96805. The Department of Hawaiian Home Lands will determine the eligibility and will notify the Contracting Officer.

(e) No incentive payment will be made--

(1) While a challenge is pending; or

(2) If a subcontractor is determined to be an ineligible participant.

(f)(1) The Contractor, on its own behalf or on behalf of a subcontractor at any tier, may request an incentive payment in accordance with this clause.

(2) The incentive amount that may be requested is 5 percent of the estimated cost, target cost, or fixed price included in the subcontract at the time of award to the Indian organization, Indian-owned economic enterprise, or Native Hawaiian small business concern.

(3) In the case of a subcontract for commercial items, the Contractor may receive an incentive payment only if the subcontracted items are produced or manufactured in whole or in part by an Indian organization, Indian-owned economic enterprise, or Native Hawaiian small business concern.

(4) The Contractor has the burden of proving the amount claimed and shall assert its request for an incentive payment prior to completion of contract performance.

(5) 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 estimated cost, target cost, or fixed price included in the subcontract awarded to the Indian organization, Indian-owned economic enterprise, or Native Hawaiian small business concern.

(6) If the Contractor requests and receives an incentive payment on behalf of a subcontractor, the Contractor is obligated to pay the subcontractor the incentive amount.

(g) The Contractor shall insert the substance of this clause, including this paragraph (g), in all subcontracts exceeding $500,000.
(End of clause)

252.227-7023 DRAWINGS AND OTHER DATA TO BECOME PROPERTY OF GOVERNMENT. (MAR 1979)

All designs, drawings, specifications, notes and other works developed in the performance of this contract shall become the sole property of the Government and may be used on any other design or construction without additional compensation to the Contractor. The Government shall be considered the "person for whom the work was prepared" for the purpose of authorship in any copyrightable work under 17 U.S.C. 201(b). With respect thereto, the Contractor agrees not to assert or authorize others to assert any rights nor establish any claim under the design patent or copyright laws. The Contractor for a period of three (3) years after completion of the project agrees to furnish all retained works on the request of the Contracting Officer. Unless otherwise provided in this contract, the Contractor shall have the right to retain copies of all works beyond such period.

(End of clause)

252.227-7033 RIGHTS IN SHOP DRAWINGS (APR 1966)

(a) Shop drawings for construction means drawings, submitted to the Government by the Construction Contractor, subcontractor or any lower-tier subcontractor pursuant to a construction contract, showing in detail (i) the proposed

fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or equipment. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(b) This clause, including this paragraph (b), shall be included in all subcontracts hereunder at any tier.

252.231-7000 SUPPLEMENTAL COST PRINCIPLES (DEC 1991)

When the allowability of costs under this contract is determined in accordance with part 31 of the Federal Acquisition Regulation (FAR), allowability shall also be determined in accordance with part 231 of the Defense FAR Supplement, in effect on the date of this contract.

(End of clause)

252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991)

(a) The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Contracting Officer, with any proposal for a contract modification.

(b) The price breakdown --

(1) Must include sufficient detail to permit an analysis of profit, and of all costs for --

(i) Material;

(ii) Labor;

(iii) Equipment;

(iv) Subcontracts; and

(v) Overhead; and

(2) Must cover all work involved in the modification, whether the work was deleted, added, or changed.

(c) The Contractor shall provide similar price breakdowns to support any amounts claimed for subcontracts.

(d) The Contractor's proposal shall include a justification for any time extension proposed.

252.242-7000 POSTAWARD CONFERENCE (DEC 1991)

The Contractor agrees to attend any postaward conference convened by the contracting activity or contract administration office in accordance with Federal Acquisition Regulation subpart 42.5.

(End of clause)

252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991)

When costs are a factor in any price adjustment under this contract, the contract cost principles and procedures in FAR part 31 and DFARS part 231, in effect on the date of this contract, apply.

252.243-7002 REQUESTS FOR EQUITABLE ADJUSTMENT (MAR 1998)

(a) The amount of any request for equitable adjustment to contract terms shall accurately reflect the contract adjustment for which the Contractor believes the Government is liable. The request shall include only costs for performing the change, and shall not include any costs that already have been reimbursed or that have been separately claimed. All indirect costs included in the request shall be properly allocable to the change in accordance with applicable acquisition regulations.

(b) In accordance with 10 U.S.C. 2410(a), any request for equitable adjustment to contract terms that exceeds the simplified acquisition threshold shall bear, at the time of submission, the following certificate executed by an individual authorized to certify the request on behalf of the Contractor:

I certify that the request is made in good faith, and that the supporting data are accurate and complete to the best of my knowledge and belief.

(Official's Name)

(Title)

(c) The certification in paragraph (b) of this clause requires full disclosure of all relevant facts, including--

(1) Cost or pricing data if required in accordance with subsection 15.403-4 of the Federal Acquisition Regulation (FAR); and

(2) Information other than cost or pricing data, in accordance with subsection 15.403-3 of the FAR, including actual cost data and data to support any estimated costs, even if cost or pricing data are not required.

(d) The certification requirement in paragraph (b) of this clause does not apply to----

(1) Requests for routine contract payments; for example, requests for payment for accepted supplies and services, routine vouchers under a cost-reimbursement type contract, or progress payment invoices; or

(2) Final adjustment under an incentive provision of the contract.

252.244-7000 SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS (DOD) (MAR 2000)

In addition to the clauses listed in paragraph (c) of the Subcontracts for Commercial Items and Commercial Components clause of this contract (Federal Acquisition Regulation 52.244-6), the Contractor shall include the terms of the following clauses, if applicable, in subcontracts for commercial items or commercial components, awarded at any tier under this contract:

252.225-7014 Preference for Domestic Specialty Metals, Alternate I (10 U.S.C. 2241 note).

252.247-7023 Transportation of Supplies by Sea (10 U.S.C. 2631).

252.247-7024 Notification of Transportation of Supplies by Sea (10 U.S.C. 2631).

(End of clause)

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002)

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

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Maritime Administration, Office of Cargo Preference, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information:

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor shall provide with its final invoice under this contract a representation that to the best of its knowledge and belief--

(1) No ocean transportation was used in the performance of this contract;

(2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

ITEM DESCRIPTION	CONTRACT LINE ITEMS	QUANTITY

TOTAL_____

(g) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(h) In the award of subcontracts for the types of supplies described in paragraph (b)(2) of this clause, the Contractor shall flow down the requirements of this clause as follows:

(1) The Contractor shall insert the substance of this clause, including this paragraph (h), in subcontracts that exceed the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(2) The Contractor shall insert the substance of paragraphs (a) through (e) of this clause, and this paragraph (h), in subcontracts that are at or below the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(End of clause)

252.247-7024 NOTIFICATION OF TRANSPORTATION OF SUPPLIES BY SEA (MAR 2000)

(a) The Contractor has indicated by the response to the solicitation provision, Representation of Extent of Transportation by Sea, that it did not anticipate transporting by sea any supplies. If, however, after the award of this

contract, the Contractor learns that supplies, as defined in the Transportation of Supplies by Sea clause of this contract, will be transported by sea, the Contractor --

(1) Shall notify the Contracting Officer of that fact; and

(2) Hereby agrees to comply with all the terms and conditions of the Transportation of Supplies by Sea clause of this contract.

(b) The Contractor shall include this clause; including this paragraph (b), revised as necessary to reflect the relationship of the contracting parties--

(1) In all subcontracts under this contract, if this contract is a construction contract; or

(2) If this contract is not a construction contract, in all subcontracts under this contract that are for--

(i) Noncommercial items; or

(ii) Commercial items that--

(A) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it subcontracts for f.o.b. destination shipment);

(B) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(C) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(End of clause)

Security Contract Language for all Corps of Engineers' Unclassified Contracts (PIL 2003-06, 19 Feb 03)

All Contractor employees (U.S. citizens and Non-U.S. citizens) working under this contract (*to include grants, cooperative agreements and task orders*) who require access to Automated Information Systems (AIS), (stand alone computers, network computers/systems, e-mail) shall, at a minimum, be designated into an ADP-III position (non-sensitive) in accordance with DoD 5220-22-R, Industrial Security Regulation. The investigative requirements for an ADP-III position are a favorable National Agency Check (NAC), SF-85P, Public Trust Position. The contractor shall have each applicable employee complete a SF-85P and submit to the Seattle District, U.S. Army, Corps of Engineers, PO Box 3755, Seattle, WA 98124-3755, Security Officer within three (3) working days after award of any contract or task order, and shall be submitted prior to the individual being permitted access to an AIS. Contractors that have a commercial or government entity (CAGE) Code and Facility Security Clearance through the Defense Security Service shall process the NACs and forward visit requests/results of NAC to the Seattle District, U.S. Army, Corps of Engineers, PO Box 3755, Seattle, WA 98124-3755, Security Officer. For those contractors that do not have a CAGE Code or Facility Security Clearance, the Seattle District, U.S. Army, Corps of Engineers, PO Box 3755, Seattle, WA 98124-3755, Security Office will process the investigation in coordination with the Contractor and contract employees.

In accordance with Engineering Regulation, ER 380-1-18, Section 4, foreign nationals who work on Corps of Engineers' contracts or task orders shall be approved by the HQUSACE Foreign Disclosure Officer or higher before beginning work on the contract/task order. This regulation includes subcontractor employees. (NOTE: exceptions to the above requirement include foreign nationals who perform janitorial and/or ground maintenance services.) The contractor shall submit to the Division/District Contract Office, the names of all foreign nationals proposed for

performance under this contract/task order, along with documentation to verify that he/she was legally admitted into the United States and has authority to work and/or go to school in the US. Such documentation may include a US passport, Certificate of US citizenship (INS Form N-560 or N-561), Certificate of Naturalization (INS Form N-550 or N-570), foreign passport with I-551 stamp or attached INS Form I-94 indicating employment authorization, Alien Registration Receipt Card with photograph (INS Form I-151 or I-551), Temporary Resident Card (INS Form I-688), Employment Authorization Card (INS Form I-688A), Reentry Permit (INS Form I-327), Refugee Travel Document (INS Form I-571), Employment Authorization Document issued by the INS which contains a photograph (INS Form I-688B).

Classified contracts require the issuance of a DD Form 254 (Department of Defense Contract Security Classification Specification).

(End of Clause)

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SC-19	DELETED - TECHNICAL PROPOSAL - COPIES TO BE FURNISHED UPON AWARD

SC-20 DELETED - COMPLIANCE CERTIFICATION

SC-21 DELETED - VALUE ENGINEERING

SC-22 DELETED - EPA ENERGY STAR

SC-23 RECOVERED MATERIALS

SECTION 00800

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 720 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 any or all of Optional Items 0008 through 0020 within 120 days of the receipt by the Contractor of the notice to proceed.

b. The notice to proceed on work Items added by exercise of the options will be given upon execution of consent of surety.

c. 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 mails.

d. 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) shown in Sections 02921 SEEDING, paragraph 3.1.1; 02922 SODDING, paragraph 3.1.1; or 02930 EXTERIOR PLANTING, paragraphs 3.1.1 and 3.1.2 - all within the contract completion period stated in paragraph SC-1 above, the Contractor shall accomplish such work in the first planting period(s) 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 $1701.00 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 SC-1.2 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 AND SC-12. DELETED.

SC-13. IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY (See Section 11451 RESIDENTIAL APPLINCES)

SC-13. IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY (APR 1984) (FAR 52.245-3)

The Government will furnish to the Contractor the property identified in Section 11451 RESIDENTIAL APPLIANCES, paragraph 3.2D, to be incorporated or installed into the work or used in performing the contract. The listed property will be furnished to the Contractor at the place designated by the Contracting Officer. The Contractor is required to accept delivery, pay any detention charges, and unload and transport the property to the jobsite at its own expense. When the property is delivered, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of delivery any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract.

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-22. DELETED

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.

§ 247.15Landscaping 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

INDEX OF DRAWINGS

REPLACE FAMILY HOUSING, PHASE V (Jupiter Village)
MALMSTROM AFB, MONTANA
PN: NZAS 994005C

DRAWING FILE NO. 225s/711-15-11

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110	A-001	Architectural Legends, Symbols & General Notes		04NOV29
111	A-100	Housing site Plan		04NOV29
112	A-101	Floor Plans – Unit 2J		04NOV29
113	A-102	Floor Plans – Unit 4J		04NOV29
114	A-103	Roof Plans – Unit 2 J		04NOV29
115	A-104	Roof Plans – Unit 4J		04NOV29
116	A-201	Exterior Elevations – Unit 2J – Shed Roof		04NOV29
117	A-202	Exterior Elevations – Unit 2J – Gable Roof		04NOV29
118	A-203	Exterior Elevations – Unit 4J – Shed Roof		04NOV29
119	A-204	Exterior Elevations – Unit 4J – Gable Roof		04NOV29
120	A-211	Interior Elevations – Unit 2J		04NOV29
121	A-212	Interior Elevations – Unit 4J		04NOV29
122	A-301	Building Sections – Unit 2J		04NOV29
123	A-302	Building Sections – Unit 4J		04NOV29
124	A-311	Wall Sections		04NOV29
125	A-312	Wall Sections		04NOV29
126	A-313	Wall Sections		04NOV29
127	A-501	Exterior Details		04NOV29
128	A-502	Exterior Details		04NOV29
129	A-511	Details		04NOV29
130	A-601	Finish Schedules		04NOV29
131	A-602	Door and Window Schedules		04NOV29
132	A-701	Stair Plans, Sections & Details		04NOV29

SHEET NUMBER	PLATE NUMBER	TITLE	REVISION NUMBER	DATE
		MECHANICAL		
133	M-001	Mechanical Legend		04NOV29
134	M-101	Floor Plans – HVAC – Unit 2J		04NOV29
135	M-102	Floor Plans – HVAC – Unit 4J		04NOV29
136	M-601	HVAC Schedules, Details & Sequence of Operations		04NOV29
		PLUMBING		
137	P-101	Floor Plans – Plumbing – Unit 2J		04NOV29
138	P-102	Floor Plans – Plumbing – Unit 4J		04NOV29
139	P-601	Plumbing Schedules, Details & Drawings		04NOV29
		ELECTRICAL		
140	E-001	Electrical Symbols, Abbreviations and General Notes		04NOV29
141	E-002	Demolition Site Utilities Plan (Area A)		04NOV29
142	E-003	Demolition Site Utilities Plan (Area B)		04NOV29
143	E-004	Demolition Site Utilities Plan (Area C)		04NOV29
144	E-005	Demolition Site Utilities Plan (Area D)		04NOV29
145	E-006	Demolition Site Utilities Plan (Area E)		04NOV29
146	E-007	Utilities Plan (Area A)		04NOV29
147	E-008	Utilities Plan (Area B)		04NOV29
148	E-009	Utilities Plan (Area C)		04NOV29
149	E-010	Utilities Plan (Area D)		04NOV29
150	E-011	Utilities Plan Area E and “Optional Bid Item”		04NOV29
151	E-012	Distribution Equipment - Details		04NOV29
152	E013	Distribution Equipment - Details		04NOV29
153	E-014	Distribution Equipment - Details		04NOV29
154	E-015	Distribution Equipment - Details		04NOV29
155	E-016	Distribution Equipment - Details		04NOV29
156	E-017	Distribution Equipment - Details		04NOV29
157	E-101	Electrical Floor Plans – Unit 2J		04NOV29
158	E-102	Electrical Floor Plans – Unit 4J		04NOV29
159	E-501	Electrical Details		04NOV29
160	E-502	Electrical Details		04NOV29
161	E-503	Electrical Details		04NOV29
162	E-601	Electrical Load Calcs & Schedules		04NOV29
163	E-602	Schedule, One-Line Diagram and Grounding Detail		04NOV29
164	E-603	Electrical Utilities (Area A) One-Line Diagram		04NOV29

SHEET NUMBER	PLATE NUMBER	TITLE	REVISION NUMBER	DATE
165	E-604	Electrical Utilities (Area B) One-Line Diagram		04NOV29
166	E-605	Electrical Utilities (Area C) One-Line Diagram		04NOV29
167	E-606	Electrical Utilities (Area D) One-Line Diagram		04NOV29
168	E-607	Electrical Utilities (Area E) One-Line Diagram		04NOV29

REFERENCE DRAWING

SHEET NUMBER	PLATE NUMBER	TITLE
169	REF-01	Repair Electrical Distribution (Jupiter Village)

STANDARD DETAILS BOUND IN THE SPECIFICATIONS

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

END OF SECTION

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WAIS Document Retrieval
GENERAL DECISION: MT20030026 MT26

Date: June 13, 2003
General Decision Number: MT20030026

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.

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

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.

"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 a specification “SECTION 01330 – SUBMITTAL PROCEDURES”.

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

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 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. The manual is available on http://www.hq.usace.army.mil/soh/em385/current/current38511.htm

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.D.02, revise as follows:

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

(2) Add new paragraph f 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

Three 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 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 36 inches by 36 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

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 4:45 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 marshal, as well as security directives. This includes, but is not limited to, obtaining a Work Clearance Request (AF Form 103) before any digging and yielding to alert vehicles during alerts if located on a marked alert route. Security directives include Antiterrorism Force Protection (paragraph 1.3.4 below) and the GENERAL CONTRACTING ENTRY AUTHORITY LIST attached the end of this Section. This list shall include all Contractor personnel working on the base.

1.3.1 BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST

Prior to the start of field operations and prior to any excavation performed under the subject contract, a Base Civil Engineering Work Clearance Request (AF Form 103), commonly known as a “digging permit” must be in the possession of the contractor. The document must be fully executed and signed by an approving officer of the Air Force. This permit will be provided to the contractor through the Malmstrom Project Office. The permit will take a minimum of 14 calendar days to procure after a written request is received from the contractor. The contractor shall be solely responsible for all repairs and damages occurring as a result of construction operations performed without a properly execute AF 103 and proper locates.

It is the sole responsibility of the contractor to make all requests for locates and marking to Air Force shops, groups, contractors, or other parties listed on the permit (AF Form 103). It is also the sole responsibility of the contractor to make all requests for locates and marking by the private sector. Note that private companies supply numerous utilities and services on Malmstrom

Air Force Base. AF Form 103 does not address coordination with private companies. Requests for locates by private firms shall be performed by the contractor in accordance with State of Montana and Federal regulations.

1.3.2 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 770 (7218 Goddard Dr., Suite 19). 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.

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

1.3.4 Equipment and storage areas: See specification Section 01501 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

1.3.5 Antiterrorism Force Protection

During the course of this contract, the Base may be under Force Protection Conditions (FPCONS). FPCONS are as follows:

FPCON NORMAL: This condition applies when there is a general threat of possible terrorist activity exists warrants only a routine security posture.

FPCON ALPHA: This condition applies when there is a general threat of possible terrorist activity against personnel and facilities, the nature and extent of which are unpredictable, and circumstances do not justify full implementation of FPCON BRAVO measures. However, it may be necessary to implement certain measures from higher FPCONS resulting from intelligence received or as a deterrent. The measures in this FPCON must be capable of being maintained indefinitely.

FPCON BRAVO: This condition applies when an increased and more predictable threat of terrorist activity exists. The measures in this FPCON must be capable of being maintained for weeks without causing undue hardship, affecting operational capability, and aggravating relations with local authorities.

FPCON CHARLIE: This condition applies when an incident occurs or intelligence is received indicating some form of terrorist action against personnel and facilities is

imminent. Implementation of measures in this FPCON for more than a short period probably create hardship and affect the peacetime activities of the unit and its personnel.

FPCON DELTA: This condition applies in the immediate area where a terrorist attack has occurred or when intelligence has been received that terrorist action against a specific location or person is likely. Normally, this FPCON is declared as a localized condition.

If the Contractor should notice anything suspicious during the course of his work, the Contractor should contact the 911 Dispatch Center at 731-3895 as soon as possible. Point of Contact for FPCON conditions/actions is 341st Space Wing AT/FP Section, phone 406-731-4105.

1.4 CONSTRUCTION AND STAGING AREA FENCE

The Contractor shall provide fence around all construction areas, staging areas and storage areas. The fence shall be chain link, 6 ft. high, with construction area signage at each corner and at 100 ft. intervals.

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.

Trucks shall periodically be required to pass over the base truck scale to verify compliance with the above vehicle load limits.

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 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 at the Contractor's expense during the outage, as may required by the Government.

1.7 UTILITY SERVICE AND COORDINATION

1.7.1 Natural Gas Service

Extension of and/or connection to the existing natural gas distribution system is the responsibility of the Contractor. All natural gas work shall be performed in accordance with the supplier's requirements. Additionally, all natural gas work must be performed as depicted on the drawings, and as required by the contract specifications.

1.7.2 Electrical Service

All electrical distribution work including the street light system and temporary and permanent electrical services shall be performed by Contractor. All electrical distribution work shall be performed in accordance with the supplier's requirements and the most current versions of the National Electric Safety Code and the National Electric Code (NFPA 70). Additionally, all permanent electrical distribution work must be performed as depicted on the drawings, and as required by the contract specifications. In any case of conflict between the applicable codes or references listed above, the most restrictive shall apply.

1.7.3 Telephone Service

Telephone cable and pedestal installation will be by Qwest. Network interface devices (NID) and installation will be by Qwest. Site trenching, backfill and the installation of conduit shall be performed by Contractor. Point(s) of Contact for Qwest is shown in Section 16710 COMMUNICATIONS CIRCUITS, paragraph 1.3 System Description.

1.7.4 CATV Service

CATV cable and pedestal installation will be by AT&T Broadband. Network interface devices (NID) and installation will be by AT&T Broadband. Site trenching, backfill and the installation of conduit shall be by Contractor. Point(s) of Contact for AT&T Broadband is shown in Section 16710 COMMUNICATIONS CIRCUITS, paragraph 1.3 System Description

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 that 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.

1.9 COORDINATION OF WORK

The Contractor shall arrange his work schedule in such a way to maintain two-lane road passage at all times unless prior approval is granted by the Contracting Officer. The Contractor shall be responsible for coordinating lane closures with Malmstrom Air Force Base emergency response personnel (Base Fire Department, Law Enforcement and ambulance services), city and county

emergency response personnel, trash collection contractor and school bus operators. A work schedule shall be prepared in writing and approved by the Contracting Officer's least 14 days prior to the start of work. A traffic control plan prepared in accordance with the most recent version of the Manual on Uniform Traffic Control Devices shall be submitted and approved by the government prior to any road demolition, construction, or lane closure.

1.10 OTHER CONTRACTS (BY OTHERS)

During the course of this contract another contract titled "Repair Electrical Distribution (Jupiter Village)" will be under construction. The contract will install a new underground electrical distribution line where shown on Drawing No. REF-01. The Family Housing contractor shall coordinate it's work with the Contractor installing the electrical distribution line. The existing electrical utility poles located along Perimeter Road will remain (to be removed by the Government after the conclusion of the Family Housing project).

PARTS 2 AND 3 (NOT USED)

Attachment follows:
GENERAL CONTRACTING ENTRY AUTHORITY LIST

From: xxxxxxxxxxxxxxxxxx, Contract # XXXXXX-XX-X-XXXX

SUBJECT: General Contractng Entry Authority List (EAL) for Malmstrom AFB

1. The personnel listed below have been verified and given a base pass to perform official contractual duties on Malmstrom AFB. These contractors do require vehicle searches in increased Force Protection. If there are any questions please contact Carolyn Brown at (406) 771-0092.

NAME (Last, First, MI)	SEX	SSN	COMPANY	RESIDENCE ADDRESS	DOB	PASS ISSUED	PASS EXPIRES	HEIGHT / WEIGHT/ EYE COLOR / HOURS (A or N)	VERIFYING OFFICIAL

INFORMATION CONTAINED HEREIN IS PERSONAL AND WILL NOT BE DISCLOSED TO THE PUBLIC WITHOUT THE CONSENT OF THE INDIVIDUAL

CONTRACTING OFFICER VERIFICATION BY:

PROJECT MANAGER VERIFICATON BY:

Legend:
A = 7 day / 24 Hours
N = Mon - Fri (0600 -1800)

NAME (Last, First, MI)	SEX	SSN	COMPANY	RESIDENCE ADDRESS	DOB	PASS ISSUED	PASS EXPIRES	HEIGHT / WEIGHT/ EYE COLOR	VERIFYING OFFICIAL

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SECTION 01025

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 construct and complete 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, not withstanding that minor features may not be mentioned herein. 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

1.2.1 ITEM NO. 0001 (BASE ITEM)

Payment will be made at the contract lump sum price for Item No. 0001, All Work for construction of 50 Duplex Buildings (100 Units), Type 2J, as shown on Drawing A-100, within a line 5 feet outside of the building exterior walls payment of which shall constitute full compensation for Item No. 0001, complete. This item includes patio vinyl privacy fence, unit vinyl fencing around trash enclosures and utility connections, as shown on the drawings. Work includes all labor, professional services, materials, equipment and transportation, and other work as required.

1.2.2 ITEM NO. 0002 (BASE ITEM)

Payment will be made at the contract lump sum price for Item No. 0002, All Work for Construction of 15 Duplex Buildings (30 Units), Type 4J, as shown on Drawing A-100, within a line 5 feet outside of the building exterior walls, payment of which shall constitute full compensation for Item No. 0002, complete. This item includes patio vinyl privacy fence, unit vinyl fencing around trash enclosures and utility connections, as shown on the drawings. Work includes all labor, professional services, materials, equipment and transportation and other work as required.

1.2.3 ITEM NO. 0003 (BASE ITEM)

Payment will be made at the contract unit price for Item No. 0003, Additional Drilling and Installation of Piles for Items 0001 and 0002, payment of which shall constitute full compensation for Item No. 0003, complete. This item is for pier depths that may be in excess of the standard pier depths shown on the drawings due to differing site conditions. Work includes all labor, professional services, materials, equipment and transportation and other work as required.

1.2.4 ITEM NO. 0004 (BASE ITEM)

Payment will be made at the contract lump sum price for Item No. 0004, Provide Sitework and Utilities for Base Items 0001 and 0002 outside a line 5 feet outside of the building exterior walls, except for Items 0011 through 0014 and 0016, payment of which shall constitute full compensation for Item No. 0004, complete. Complete back yard vinyl fencing system shall be installed at Buildings 16, 18, 20, 22, 40, 41, 50, 52, 54, 68, 70 and 72 (which are adjacent to the landscape retaining walls) under this item. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.2.5 ITEM NO. 0005 (BASE ITEM)

Payment will be made at the contract lump sum price for Item No. 0005, All Work for As-Built Drawings as Specified in Section 01702 from Preparation to Final Approval for Base Items and any Optional Items exercised, payment of which shall constitute full compensation for Item No. 0005, 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/mylars are fully approved by the Government (A or B action) and all copies of approved drawings and electronic media received by the Government.

1.2.6 ITEM 0006 (BASE ITEM)

Payment will be made at the contract lump sum price for Item No. 0006, All Work for O&M Manuals, as Specified in Section 01701 from Preparation to Final Approval for Base Items and any Optional Items exercised, payment of which shall constitute full compensation for Item No. 0006, 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.

1.2.7 ITEM 0007 (BASE ITEM)

Payment will be made at the contract lump sum price for Item No. 0007, All Work for Form 1354 Checklist and Equipment-in-Place List, as Specified in Section 01704 and 01705 from Preparation to Final Approval for Base Items and any Optional Items exercised, payment of which shall constitute full compensation for Item No. 0008, 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.

1.2.8 ITEM NO. 0008 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item No. 0008, All Work for Construction of 10 Duplex Buildings (20 Units), Type 4 J, as shown on Drawing A-100, within a line 5 feet outside of the building exterior walls, payment of which shall constitute full compensation for Item No. 0008, complete. This item includes patio vinyl privacy fence, unit vinyl fencing around trash enclosures and utility connections, as shown on the drawings. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.9 ITEM NO. 0009 (OPTION ITEM)

Payment will be made at the contract unit price for Item No. 0009, Additional Drilling and Installation of Piles for Item 0008, payment of which shall constitute full compensation for Item No. 0009, complete. This item is for pier depths that may be in excess of the standard pier depths shown on the drawings due to differing site conditions. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.10 ITEM 0010 (OPTIONAL ITEM)

Payment will be made at the contract lump sum price for Item No. 0010, Provide Sitework and Utilities for Option Item 0008 from a line 5 feet outside for the building exterior walls, except for Items 0015, 0017 and 0019, payment of which shall constitute full compensation for Item No. 0010, complete. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.2.11 ITEM NO. 0011 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item No. 0011, All Work for Construction of Vinyl Fencing for Buildings 30-32, 34, 36-39, 48, 49, 51 and 53, payment of which shall constitute full compensation for Item No. 0011, complete. Refer to Site Plans. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.12 ITEM NO. 0012 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item No. 0012, All Work for Construction of Vinyl Fencing for Buildings 04, 06, 33, 35 and 42-47, payment of which shall constitute full compensation for Item No. 0012, complete. Refer to Site Plans. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.13 ITEM NO. 0013 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item No. 0013, All Work for Construction of Vinyl Fencing for Buildings 01-03, 05, 07-15, 17, 19, 21 and 23-29, payment of which shall constitute full compensation for Item No. 0013, complete. Refer to Site Plans. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.14 ITEM NO. 0014 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item No. 0014, All Work for Construction of Vinyl Fencing for Buildings 65-67, 69, 71 and 73-75, payment of which shall constitute full compensation for Item No. 0014, complete. Refer to Site Plans. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.15 ITEM NO. 0015 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item No. 0015, All Work for Construction of Vinyl Fencing for Buildings 55-64, payment of which shall constitute full

compensation for Item No. 0015, complete. Refer to Site Plans. Work includes labor, professional services, equipment and transportation and other work as required.

1.2.16 ITEM NO. 0016 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item 0016, Installation of Irrigation System in Common Areas for Buildings Constructed in Items 0001 and 0002 (shown on Drawings L-101 and L-102), payment of which shall constitute full compensation for Item 0016, complete. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.2.17 ITEM NO. 0017 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item 0017, Installation of Irrigation System in Common Areas for Buildings Constructed in Item 0008 (shown on Drawing L-104), payment of which shall constitute full compensation for Item 0017, complete. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.2.18 ITEM NO. 0018 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item 0018, Place Sod and Plant Trees in Common Areas for Items 0001 and 0002 (shown on Drawings L-107 and L-108), payment of which shall constitute full compensation for Item 0018, complete. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.2.19 ITEM NO. 0019 (OPTION ITEM)

Payment will be made at the contract lump sum price for Item 0019, Place Sod and Plant Trees in Common Areas for Item 0008 (shown on Drawing L-110), payment of which shall constitute full compensation for Item 0019, complete. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.2.20 ITEM 0020 (OPTIONAL ITEM)

Payment will be made at the contract lump sum price for Item No. 0020, Provide Sitework and Equipment for construction of the playground, tot-lot, Basketball Court and the Tennis Court Areas where indicated on the plans, payment of which shall constitute full compensation for Item No. 0020, complete. Work includes all necessary grading, drainage, irrigation, sod and tree planting associated with construction of the playground area, tot-lot and courts. Work includes all labor, professional services, materials, equipment and transportation necessary for all work related to this item.

1.4 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.

1.4.1 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.

1.4.2 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.

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

END OF SECTION

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 Pre-construction 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)

END OF SECTION

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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 Pre-Construction Conference or at the earliest convenience at the Contractor’s jobsite office.

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".

1.6.1.5 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.

1.6.1.7 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 input the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER, using QCS . 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.

END OF SECTION

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SECTION 01320

PROJECT SCHEDULE

PART 1 GENERAL

1.1 SUBMITTALS

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

SD-07 Schedules

G Preliminary project schedule, two (2) copies.

G 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-08 Statements

Qualifications; G.

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 shall 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 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, 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.

3.3.2.9 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.

3.3.2.10 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 and approval of testing and balancing and HVAC commissioning plans and data
- air and water balance dates
- any other systems testing
- pre-final inspection correction of punch list from pre-final 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 Phse 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 insure 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 shall 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 insure 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 his 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 monthly 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.cecer.aarmy.mil/PL/SDEF.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with this Section.

SD-01 Preconstruction Submittals

Final Submittal Register 4288; G

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 provide and further develop the preliminary submittal register, ENG Form 4288, attached to the end of this section. The Government will 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 with the prefix "SD" (submittal data) followed by a number (category, i.e., data, drawings, reports, etc.). This is for bookkeeping and record sorting in the system:

SD-01 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.

SD-02 Shop Drawings:

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

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

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

SD-03 Product Data:

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

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

SD-04 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.

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

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

SD-O5 Design Data:

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

SD-06 Test Reports:

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

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

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

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

SD-07 Certificates:

Statements printed on the manufacturer's letterhead, 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.

Confined space entry permits.

Text of posted operating instructions.

SD-08 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.

SD-09 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.

SD-10 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.

SD-11 Closeout Submittals:

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

1.3 FORMAT OF SUBMITTALS

1.3.1 Transmittal Form

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

1.3.2 Identifying Submittals

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

a. Project title and location.

b. Construction contract number.

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

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

e. When a resubmission, add alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.

f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal.

g. Product identification and location in project.

1.3.3 Format for SD-02 Shop Drawings

a. Shop drawings shall not be less than A4 (8 1/2 by 11 inches) nor more than AO (30 by 42 inches).

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

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

d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

e. Drawings shall include the nameplate data, size and capacity. Also include applicable federal, military, industry and technical society publication references.

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

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

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

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

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

e. Product data shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable federal, military, industry and technical society publication references. Should

manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for SD-07 Certificates.

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

g. Submit manufacturer's instruction prior to installation.

1.3.5 Format of SD-04 Samples

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

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

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

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

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

(5) Sample of Non-Solid Materials: 750 ml(Pint). Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 2 by 4 inches.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: 100 square feet.

b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

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

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

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.3.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 297 by 210 mm (8 1/2 by 11 inches) paper. Provide a bound volume for submittals containing numerous pages.

1.3.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

a. Provide reports on 297 by 210 mm (8 1/2 by 11 inches) paper in a complete bound volume.

b. Indicate by prominent notation, each report in the submittal. Indicate specification number and pararaph number to which it pertains.

1.3.8 Format of SD-10 Operation and Maintenance (O&M) Data

O&M Data format shall comply with the requirements specified in Section 01781, Operation and Maintenance Data"

1.3.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittalss

a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

b. Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with English units only, submit metric dimensions on separate sheet.

1.3 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 which 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 will be provided by the Government and a hard copy shall be further developed by the Contractor prior to the submittal coordination meeting. The submittal register will 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 01451CONTRACTOR 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 A3 (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 ______________________|
|                                                                           |
|___________________________________________________________________________|
```

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 ☐ FIO ☐ GOV'T. APPROVAL

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

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 93 IS OBSOLETE. SHEET ___ OF ___ (Reverse) CEMPCD

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)

RMS SUBMITTAL REGISTER INPUT FORM

Get Data From Text File

CONTRACT NUMBER

DELIVERY ORDER

TITLE AND LOCATION

Replace Family Housing, Phase V, Malmstrom AFB, Wa .

Button <-----Right click for Instructions

SECTION	PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		REVIEWING OFFICE				
			01 - PRECON SUBMITTALS	02 - SHOP DRAWINGS	03 - PRODUCT DATA	04 - SAMPLES	05 - DESIGN DATA	06 - TEST REPORTS	07 - CERTIFICATES	08 - MFRS INSTRUCTIONS	09 - MFRS FIELD REPORT	10 - O&M DATA	11 - CLOSEOUT SUBMITTALS	FOR INFORMATION ONLY	GOVERNMENT APPROVED	DO - DISTRICT OFFICE	AO - AREA OFFICE	RO - RESIDENT OFFICE	PO - PROJECT OFFICE	AE - ARCHITECT / ENGINEER
01001	1.9	Color Boards				X									X					
01001	1.10.3	Certification							X					X						
01005	1.3.1	Work Clearance Request			X									X						
01005	1.6	Utility Outage Notice			X										X					
01005	1.9	Traffic Control Plan			X										X					
01025	1.4	Progress Payment Invoice			X									X						
01035	1.1	Proposed Modification Prices			X									X						
01312	1.6	Data Updates			X									X						
01312	1.6.3	Data Diskette or CD Rom			X									X						
01312	1.6.3.1	Daily CQC Report						X						X						
01312	1.6.3.1	Signed cy. Daily CQC Report						X						X						
01330	1.3.1	Transmittal Form			X															
01330	3.11	Government Approved Submittals			X															
01355	1.7	Environmental Protection Plan			X										X					
01355	3.2.3	SWPPP Plan			X									X						
01355	3.3.1	NOI for Storm Water Discharge			X									X						
01355	3.3.1	State Storm Water Discharge Permit			X									X						
01451	3.2.1	CQC Plan			X										X					
01501	1.3.3	Temporary Power Connections		X										X						
01501	1.14	Traffic Control Plan			X										X					
01701	1.1.1	Prelim. O&M Manual and data Submittal			X										X					
01701	1.1.1	Proposed Binder-Marking Format			X									X						
01701	1.1.2	Final O&M Manual and Data Submittal			X									X						
01702	3.2.1	As-Built Electronic File Drawings		X										X						
01702	3.2.1	Marked-up As-Built Prints		X										X						
01704	1.2	Final Equipment Lists			X									X						
01705	3.1	Installed Building Equipment List			X									X						
01705	3.2	Equipment-in-Place List			X										X					
02220	1.3	Work Plan			X										X					
02220	1.3	Demolition Plan							X						X					
02220	1.3	Notifications							X						X					
02220	1.3	Notification of Demo. Forms							X						X					
02220	1.3	Receipts (Closeout Submittals)										X		X						
02300	1.3	Compaction Test Plan			X										X					
02300	1.3	Density, Gradation						X							X					
02300	1.3	Commercial Testing Lab. Qualifications							X					X						
02315	1.3	Compaction Test Plan			X										X					
02315	1.3	Test Plan						X							X					
02315	1.3	Testing						X							X					
02316	1.3	Compaction Test Plan			X										X					
02316	1.3	Field Density Tests			X									X						
02316	1.3	Testing of Backfill Materials			X									X						
02466	1.3	Caissons		X					X						X					
02466	1.3	Qualifications							X					X						
02510	1.3	Installation			X									X						
02510	1.3	Waste Water Disposal Method			X									X						
02510	1.3	Satisfactory Installation			X									X						

02510	1.3	Bacteriological Disinfection						X						X						
02510	1.3	Installation							X					X						
02510	1.3	Meters							X					X						
02531	1.3	Portland Cement							X					X						
02531B	1.2	Pipe Bursting System - Qualifications							X					X						
02531B	1.3	Pipe Bursting System - Drawings		X										X						
02531B	1.3	Method od Construction and Reatoration		X										X						
02531B	1.3	Workman Training							X					X						
02531B	1.3	Television Inspection Reports & Video Tapes						X						X						
02531C	1.3	Lining Materials and Resins		X	X				X	X				X						
02531C	1.3	Bypass Pumping and/or Diversion Plans			X										X					
02531C	1.3	Liner Insertion & Bypass Pumping Locations & Methods		X											X					
02531C	1.3	Resin Manufacturer's Heating Requirements									X			X						
02556	1.2	Pipe, Fittings and Materials		X										X						
02566	1.2	Materials and Equipment - Meters, Regulators			X									X						
02566	1.2	Spare Parts Data			X									X						
02566	1.2	Connections to Existing Lines			X									X						
02556	1.2	Jointing Polyethylene & Fiberglass Piping-Qualifications			X										X					
02566	1.2	Connection Plan			X										X					
02566	1.2	Pressure and Leak Tests						X							X					
02566	1.2	Utility Work							X					X						
02566	1.2	Training							X					X						
02566	1.2	Gas Distribution System										X			X					
02630	1.2	Placing Pipe			X									X						
02630	1.2	Resin Certification							X					X						
02630	1.2	Pipeline Testing							X					X						
02630	1.2	Hydrost. Test on Wtrtight Joints							X					X						
02630	1.2	Determination of Density							X					X						
02630	1.2	Frame and Cover for Gratings							X					X						
02721	1.2	Compaction Test Plan			X										X					
02721	1.2	Waybills and delivery Tickets			X									X						
02721	1.2	Sampling and Testing						X						X						
02722	1.3	Compaction Test Plan			X										X					
02722	1.3	Sampling and Testing						X						X						
02722	1.3	Field Density Tests						X						X						
02741	1.3	Mix Design			X										X					
02741	1.3	Aggregates						X							X					
02741	1.3	Aggregate & QC Test Results						X						X						
02748	1.2	Waybills & Delivery Tickets			X									X						
02748	1.2	Sampling and Testing						X						X						
02763	1.2	Equipment			X									X						
02763	1.2	Composition Requirements			X									X						
02763	1.2	Qualifications			X									X						
02763	1.2	Volitale Organic Compound							X					X						
02770	1.2	Concrete Mix Design			X									X						
02770	1.2	Field Quality Control						X						X						
02791	1.4	Loose Fill Surfacing			X	X									X					
02791	1.4	Geotextile Fabric			X										X					
02791	1.4	Wood By-Products			X										X					
02791	1.4	Wood Treatment			X										X					
02791	1.4	Materials							X					X						
02791	1.4	Manufacturer's Qualifications							X					X						
02791	1.4	Manufacturer's Representative							X					X						
02791	1.4	Installer's Qualification							X					X						
02791	1.4	Substitution							X					X						
02791	1.4	Child Safety and Accessibility Evaluation							X					X						
02791	1.4	Maintenance Instruction										X		X						
02811	1.3	Framed Instructions			X									X						
02811	1.3	Field Training			X									X						
02811	1.3	Sprinkler System			X									X						
02811	1.3	Spare Parts			X									X						
02811	1.3	Field Tests						X						X						
02811	1.3	Sprinkler System							X					X						
02821	1.2	Chain Link Fence							X					X						

02835	1.2	Fence Panels		X											X					
02835	1.2	Fence Panels			X										X					
02835	1.2	PVC Color				X														
02870	1.2	Beaches		X											X					
02870	1.2	Tables		X											X					
02870	1.2	Shelters		X											X					
02870	1.2	Assembly Instruction Drawings		X											X					
02870	1.2	Bus Shelters			X					X				X						
02870	1.3	Benches, Picnic Tables, Trash Receptacles			X					X				X						
02870	1.2	Finish				X								X						
02870	1.2	Primer Certificate							X					X						
02882	1.4	Configuration		X											X					
02882	1.4	Fall Height		X											X					
02882	1.4	Finished Grade and Underground Utilities		X										X						
02882	1.4	Equipment			X										X					
02882	1.4	Equipment Identification			X										X					
02882	1.4	Delivery, Storage and Handling			X									X						
02882	1.4	Manufacturer Qualification			X									X						
02882	1.4	Wood			X									X						
02882	1.4	Spare Parts			X									X						
02882	1.4	Materials			X									X						
02882	1.4	Color Boards				X									X					
02882	1.4	Recycled Plastic						X						X						
02882	1.4	Wood Finishes						X						X						
02882	1.4	Materials							X					X						
02882	1.4	Manufacturer Qualification							X						X					
02882	1.4	Installer Qualification							X						X					
02882	1.4	Manufacturer's Representative							X						X					
02882	1.4	Wood Treatment							X						X					
02882	1.4	Substitution							X					X						
02882	1.4	Play Event Modification							X						X					
02882	1.4	Child Safety and Accessibility Evaluation							X						X					
02882	1.4	Maintenance Instruction										X			X					
02921	1.2	Equipment			X									X						
02921	1.2	Surface Erosion Cntrol Material			X									X						
02921	1.2	Chemical Treatment Material			X									X						
02921	1.2	Delivery			X									X						
02921	1.2	Finished Grade & Topsoil			X									X						
02921	1.2	Quantity Check			X									X						
02921	1.2	Seed Establishment Period			X									X						
02921	1.2	Maintenance Record			X									X						
02921	1.2	Application of Pesticide			X									X						
02921	1.2	Delivered Topsoil				X									X					
02921	1.2	Soil Amendments				X								X						
02921	1.2	Mulch				X								X						
02921	1.2	Equipment Calibration						X						X						
02921	1.2	Soil Test						X						X						
02921	1.2	Seed							X						X					
02921	1.2	Topsoil							X						X					
02921	1.2	pH Adjuster							X					X						
02921	1.2	Fertilizer							X					X						
02921	1.2	Organic Material							X					X						
29210	1.2	Soil Conditioner							X					X						
02921	1.2	Mulch							X					X						
02921	1.2	Pesticide							X					X						
02922	1.2	Quantity Check			X									X						
02922	1.2	Sod Establishment Period			X									X						
02922	1.2	Maintenance Record			X									X						
02922	1.2	Application of Pesticide			X									X						
02922	1.2	Sod							X					X						
02922	1.2	Topsoil							X					X						
02922	1.2	pH Adjuster							X					X						
02922	1.2	Fertilizer							X					X						
02922	1.2	Pesticide							X					X						

02930	1.2	Plant Establishment Period			X									X						
29300	1.2	Maintenance Record			X									X						
02930	1.2	Application of Pesticide			X									X						
02930	1.2	Delivered Topsoil				X								X						
02930	1.2	Soil Test						X						X						
02930	1.2	Plant Material							X					X						
02930	1.2	Topsoil							X					X						
02930	1.2	Pesticide							X					X						
02930	1.2	Maintenance Instructions											X		X					
02935	1.2	Chemical Treatment Material			X									X						
02935	1.2	Work Plan and Schedule			X									X						
02935	1.2	Maintenance Record			X									X						
02935	1.2	Application of Pesticide			X										X					
02935	1.2	Fertilizer							X					X						
02935	1.2	Pesticide							X					X						
03301	1.3	Manufactured Mat'l & Product			X									X						
03301	1.3	Design Mix			X									X						
03301	1.3	Steel Reinforcing		X											X					
04810	1.2	Product Info.			X									X						
04810	1.2	Reinforcing Steel		X										X						
04810	1.2	Masonary Sample				X								X						
04810	1.2	Product Info						X						X						
04810	1.2	Product Info							X					X						
04810	1.2	Mortar & Grout					X							X						
06100	1.4	Fabricated products			X									X						
06100	1.4	Research/Evaluation Reports						X						X						
06176	1.5	Metal Plate Connectors			X									X						
06176	1.5	Mtl Framing Anchors, Bolts Fas, etc.			X									X						
06176	1.5	Shop Drawings		X										X						
06176	1.5	Wood Trusses							X					X						
06176	1.5	Mtl Plate Mfgr, Fabricator, Insta			X									X						
06176	1.5	Material Certificates							X					X						
06176	1.5	Preservative Treated Wood						X						X						
06176	1.5	Metal Plate Connectors						X						X						
06176	1.5	Metal Framing Anchors						X						X						
06200	1.4	Process & Factory Fab. Product			X									X						
06200	1.4	Process & Factory Fab. Product				X								X						
06200	1.4	Species & Lumber Cut				X								X						
06200	1.4	Finish System				X								X						
07115	1.3	Each Type of Product			X									X						
07190	1.4	Each Type of Product			X									X						
07190	1.4	Each Type of Water Repellent and Substrate				X								X						
07190	1.4	Manufacturer's Certificates							X					X						
07190	1.4	Insstaller Qualification Data			X									X						
07190	1.4	Precon str. Testing, Water Repellent Treated Substrates						X						X						
07190	1.4	Product Test Reports						X						X						
07210	1.3	Each Type of Product			X									X						
07210	1.3	Product Test Reports						X						X						
07310	1.4	Each Type of Product			X									X						
07310	1.4	Asphalt Shingle				X								X						
07310	1.4	Ridge and Hip Cap Shingles				X								X						
07310	1.4	Ice & Water Shield Underlayment				X								X						
07310	1.4	Warranty			X									X						
07460	1.3	Each Type of Product			X									X						
07460	1.3	Each Type of Product				X								X						
07460	1.3	Siding				X								X						
07460	1.3	Trim				X								X						
07620	1.4	Each Type of Product			X									X						
07620	1.4	Sheet Metal Flashing & Trim		X										X						
07620	1.4	Sheet Metal Flashing & Trim				X								X						
07650	1.5	For Product Indicated			X									X						
07650	1.5	Each Product Supplied				X								X						
07920	1.4	Each Joint Sealant Product			X									X						
07920	1.4	Each Joint Sealant Product							X						X					

08110	1.4	Each Type of Door & Frame			X									X						
08110	1.4	Each Door		X										X						
08211	1.3	Each Type of Door			X									X						
08211	1.3	Each Kind of Door		X										X						
08212	1.3	Each Type of Door			X									X						
08212	1.3	Each Kind of Door		X										X						
08361	1.5	Section Overhead Doors		X										X						
08361	1.5	Section Overhead Doors			X									X						
08361	1.5	Installer Qualification Data							X					X						
08550	1.5	Wood Windows				X								X						
08550	1.5	Wood Windows			X									X						
08550	1.5	Wood Windows		X										X						
08550	1.5	Qualification Data			X									X						
08550	1.5	Maintenance Data			X									X						
08631	1.3	Fabricated product			X									X						
08631	1.3	Support Bracing		X										X						
08712	1.3	Product Data			X									X						
08712	1.3	Hinges				X								X						
08712	1.3	Locks and latches				X								X						
08712	1.3	Cylinders and keys				X								X						
08712	1.3	Operating trim				X								X						
08712	1.3	Closers				X								X						
08712	1.3	Stops and holders				X								X						
08712	1.3	Door gasketing				X								X						
08712	1.3	Thresholds				X								X						
08712	1.3	Door Hardware Schedule			X									X						
08712	1.3	Keying Schedule			X									X						
08712	1.3	Qualification Data			X									X						
08712	1.3	Warranties			X									X						
08800	1.5	Glass Product & Glazing Mat'l.							X					X						
08800	1.5	Glass Product & Glazing Mat'l.			X									X						
08800	1.5	Coated Vision Glass				X								X						
08800	1.5	Insulating Glass				X								X						
08800	1.5	Quallification Data for Installers			X									X						
08800	1.5	Coated Float Galss						X						X						
08800	1.5	Insulating Glass						X						X						
08800	1.5	Glazing Gaskets						X						X						
08800	1.5	Warranties			X									X						
08814	1.5	Silvered Mirror Glass							X					X						
08814	1.5	Silvered Mirror Glass			X									X						
08814	1.5	Mirror Hardware			X									X						
08814	1.5	Shop Drawings		X										X						
09310	1.4	Each Product Indicated			X									X						
09310	1.4	Each Product Indicated			X									X						
09310	1.4	Tile, Color, Finish				X								X						
09310	1.4	Trim and Accessory				X								X						
09310	1.4	Qualification Data For Installer			X									X						
09652	1.3	Each Product Indicated			X									X						
09652	1.3	Each Color and Pattern				X								X						
09652	1.3	Floor Coverings Maintenance Data			X									X						
09653	1.3	Each Product Indicated			X									X						
09653	1.3	Initial Selection				X								X						
09653	1.3	Verification				X								X						
09680	1.3	Each Product			X									X						
09680	1.3	Carpet				X								X						
09680	1.3	Carpet Cushion				X								X						
09680	1.3	Carpet Seam				X								X						
09680	1.3	Maintenance Data											X							
09911	1.4	Matarial Data			X									X						
09911	1.4	Manufacturer's Info			X									X						
09911	1.4	Color Chips				X								X						
09911	1.4	Qualification Data for Applicator			X									X						
10801	1.3	Product Data			X									X						
10801	1.3	Each Accessory Item				X									X					

10801	1.3	Setting Drawings		X										X						
11451	1.2	Each Appliance										X		X						
12356	1.4	Cabinets			X									X						
12356	1.4	Plastic-Laminet Countertops			X									X						
12356	1.4	Cabinet Hardware			X									X						
12356	1.4	Solid Surface Nonp. Countertps			X									X						
12356	1.4	Cabinets and Countertops		X										X						
12356	1.4	Manufacturer's Color Charts				X								X						
12356	1.4	Finished Base Cabinet				X									X					
12356	1.4	Finished Wall Cabinet				X									X					
12356	1.4	Plastic-Laminate for Countertop				X									X					
12356	1.4	Plastic Laminate Countertps				X									X					
12356	1.4	Manufacturer's Casework							X					X						
12491	1.4	Each Type of Product			X									X						
12491	1.4	Shop Drawings		X										X						
12491	1.4	Initial Selection				X								X						
12491	1.4	Horizontal Louver Blinds										X		X						
13110	1.2	Insulating Flange Sets		X										X						
13110	1.2	Joint Bonds		X										X						
13110	1.2	Anodes			X										X					
13110	1.2	Insulating Flange Sets			X									X						
13110	1.2	Dielectric Unions			X									X						
13110	1.2	Wires			X									X						
13110	1.2	Cable and Wire			X									X						
13110	1.2	Casings, Insulation and Seals			X									X						
13110	1.2	Shunt Resistors			X									X						
13110	1.2	Data Package										X			X					
13110	1.2	Corrosion Engineer Qualif.							X					X						
13110	1.2	Data Package										X			X					
13110	1.2	Cathodic Protection System											X	X						
13280	1.4	Respiratory Protection			X									X						
13280	1.4	Cleanup and Disposal			X										X					
13280	1.4	Detailed Drawings			X										X					
13280	1.4	Materials and Equipment			X										X					
13280	1.4	Qualifications			X										X					
13280	1.4	Training Program			X										X					
13280	1.4	Medical Requirements			X									X						
13280	1.4	Encapsulants			X										X					
13280	1.4	Exposure Assessment and Air Monitoring						X							X					
13280	1.4	Local Exhaust Ventilation			X									X						
13280	1.4	Licenses, Permits and Notifications			X										X					
13280	1.4	Vacuum, Filtration and Ventilation Equipment							X					X						
15010	1.3	Mechanical Submittal			X									X						
15010	1.3	Mechanical Requirements		X										X						
15010	1.3	Re-Submittals			X									X						
15010	1.3	Test Reports & Certificates						X						X						
15010	1.3	Test Reports & Certificates							X					X						
15010	1.3	Balancing and Testing Reports						X						X						
15010	1.3	Documents at Job Site			X									X						
15010	1.3	Mechanical O & M Manual											X	X						
15010	1.3	Record Drawings		X										X						
15010	1.3	Substantial Completion												X						
15010	1.3	Certifications							X					X						
15050	1.3	Piping Identification			X									X						
15050	1.3	Test Reports						X						X						
15050	1.3	Seismic Calculations							X					X						
15060	1.3	Pipe and Fittings			X									X						
15060	1.3	Valves			X									X						
15060	1.3	Unions			X									X						
15060	1.3	Pipe Hangers and Supports			X									X						
15060	1.3	Dielectric Unions and Nipples			X									X						
15060	1.3	Escutcheon Plates			X									X						
15060	1.3	Gas Flexible Connectors			X									X						
15250	1.3	Insulation			X									X						

15250	1.3	Inserts			X									X						
15400	1.3	Potable Water Piping			X									X						
15400	1.3	Building Drainage Systems			X									X						
15400	1.3	Natural Gas Piping			X									X						
15400	1.3	Pipe Hangers and Supports			X									X						
15400	1.3	Cleanouts			X									X						
15400	1.3	Vents through Roof			X									X						
15400	1.3	Water Hammer Arresters			X									X						
15400	1.3	Relief Valves			X									X						
15400	1.3	Plumbing Trim			X									X						
15400	1.3	Plumbing Fixtures			X									X						
15400	1.3	Wall Seal			X									X						
15400	1.3	Plumbing Equipment			X									X						
15400	1.3	Inspection							X					X						
15400	1.3	Bacteriological Test							X					X						
15535	1.3	Refrigerant Piping			X									X						
15535	1.3	Refrigerant			X									X						
15535	1.3	Test & Charge Report						X						X						
15780	1.3	Gas-Fired Furnace			X									X						
15780	1.3	Air Cooled Condensing			X									X						
15780	1.3	Thermostat			X									X						
15780	1.3	Motor Operated Damper			X									X						
15850	1.3	Ceiling Exhaust Fans			X									X						
15850	1.3	Range Hood			X									X						
15880	1.3	Turning Vanes			X									X						
15880	1.3	Acoustical Turning Vanes			X									X						
15880	1.3	Duct Sealer			X									X						
15880	1.3	Volume Dampers and Quadrar			X									X						
15880	1.3	Spin-in Fittings			X									X						
15880	1.3	Grilles and Registers			X									X						
15880	1.3	Wall Caps			X									X						
15880	1.3	Dryer Caps			X									X						
15880	1.3	Sheet Metal		X										X						
15880	1.3	Pressure Test for Leakage						X						X						
15990	1.3	Name of TAB Contractor			X									X						
15990	1.3	Individual Qualifications							X					X						
15990	1.3	TAB Adgenda			X									X						
15990	1.3	Check-Out Report						X						X						
15990	1.3	Balancing Report						X						X						
16010	1.8	Electrical Provisions Shop Drawings		X										X						
16050	1.6	Grounding Electrodes & Connec			X									X						
16050	1.6	Nameplates, Labels, Markers			X									X						
16050	1.6	Test Reports						X						X						
16121	1.3	Cable, Terminations, Accessor			X									X						
16121	1.3	Test Reports						X						X						
16121	1.3	Ground Rings at Transformers						X						X						
16123	1.4	Wire and Cable Assemblies			X									X						
16123	1.4	Test Reports						X						X						
16130	1.5	Flexible Metal Conduit			X									X						
16130	1.5	Liquidtight Flex Metal Conduit			X									X						
16130	1.5	Nonmetalic Conduit			X									X						
16130	1.5	Raceway Fittings			X									X						
16130	1.5	Conduit Bodies			X									X						
16130	1.5	Pull and Junction Boxes			X									X						
16130	1.5	Handholes			X									X						
16130	1.5	Mfgr. Installation Instructions								X				X						
16140	1.3	Mfgr. Catalog Information			X									X						
16150	1.3	Manufacturer's Catalog			X									X						
16150	1.3	Installation Instructions								X				X						
16210	1.3	Utility Co. Drawings		X										X						
16210	1.3	Catalog Data			X									X						
16271	1.3	Pad-Mounted Transformers		X										X						
16271	1.3	Pad-Mounted Transformers			X									X						
16271	1.3	Test Reports						X						X						

16271	1.3	Manufacturer's Field Reports						X						X						
16442	1.3	Load Centers		X										X						
16442	1.3	Catalog data			X															
16510	1.3	Interior Luminaries		X										X						
16510	1.3	Dimensions, Ratings and Performance data			X									X						
16520	1.3	Exterior Liminaries		X										X						
16520	1.3	Dimensions, Ratings and Performance DataData			X									X						
16710	1.4	Termination Device			X									X						
16710	1.4	Field-testing and Inspection						X						X						
16722	1.4	Catalog Data			X									X						
16722	1.5	Detector Locations and Circuits wired to											X	X						
16950	1.3	Tests Listed			X									X						
16950	1.3	Tests Listed						X						X						
16950	1.3	Testing Agency							X					X						
16950	1.3	Qualifications of Individuals Performing Tests							X					X						

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End of Section

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SECTION 01360

ENVIRONMENTAL PROTECTION

1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. All references listed in these specifications are intended to be the current version or edition, unless specifically identified otherwise. The Contractor shall conform to the Occupational Safety & Health Act, Environmental Protection Agency, Montana Dept. of Environmental Quality, U.S. Air Force and all other Federal, State and Local environmental regulatory requirements.

29 CFR	Occupational Safety and Health Administration Code of Federal Regulations
40 CFR	Environmental Protection Agency Code of Federal Regulations
49 CFR	Department of Transportation Code of Federal Regulations
EM 385-1-1	(1996) U.S. Army Corps on Engineers Safety and Health Requirements Manual
WETLANDS	U.S. Army Corps of Engineers Wetlands Delineation Manual
OPLAN 00-01	341st Space Wing Affirmative Procurement Plan
OPLAN 32-4	341st Space Wing Integrated Hazardous Material Emergency Response Plan
OPLAN 32-7042	341st Space Wing Hazardous Material Management Plan
AFI 32-7080	Air Force Instruction (Ozone Depleting Chemicals)

2. PERMITS AND FEES

2.1 No separate payment will be made for work covered under this section. The Contractor shall be responsible for payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor. All costs associated with this section shall be included in the contract price. The Contractor shall be responsible for payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations.

2.2 The Contractor shall be responsible for obtaining and complying with all environmental permits and commitments required by Federal, State, regional, and local environmental laws and regulations.

2.3 Demolition Work: Contractors shall notify the Montana Dept. of Environmental Quality, Permitting & Compliance Division, Air & Waste Management Bureau, P.O. Box 200901, Helena, MT. 59620-0901 for all demolition work where load bearing members are removed.

3. AIR QUALITY

3.1 Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and performance laws and standards.

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

3.3 Particulates - The contractor shall not operate a construction site or demolition project unless reasonable precautions are taken to control emissions of particulate matter. Such emissions of airborne particulate matter shall not exceed 20% opacity as defined in 40 CFR 60 Appendix A.

3.4 Sound Intrusions - The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of the State of Montana rules.

3.5 Ozone Depleting Chemicals (ODCs)

3.5.1 The contractor shall ensure activities performed under this contract are in compliance with the Air Force Policy on ODCs. The contractor shall not purchase, use, nor specify the use of any Class I ODC in the production, design, or maintenance of the end item. Class II ODCs may be used or specified only with the written approval of the Contracting Officer. ODCs are identified and classified in Air Force Instruction (AFI 32-7080).

4. WATER RESOURCES AND STORM WATER DISCHARGE

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. The Contractor shall monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

4.1 The contractor shall not discharge any contaminated materials into the storm drain system on Base. EPA authorizes the following non-storm water discharges: fire fighting activities; fire hydrant flushing; potable water sources; irrigation drainage; lawn watering; routine building wash-down without detergents; pavement wash-waters where spills/leaks of toxic or hazardous materials have not occurred and where detergents are not used; air conditioning condensate; springs; uncontaminated groundwater; and foundation/footing drains where flows are not contaminated with process materials such as hydrocarbons/solvents.

4.2 Sanitary Sewer - The Contractor shall not dump any restricted materials down the sanitary sewer or wastewater 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 MAFB discharges. The base sewer discharge is tested weekly by the City of Great Falls for conformance requirements.

4.2.1 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; any fats, wax, grease,

or oils in excess of 100 mg/l, total petroleum hydrocarbons in excess of 25 mg/l, noxious or malodorous liquids; contain metals in excess of iron-0.03 mg/l, chromium-5.676 mg/l, copper-4.985 mg/l, cyanide-0.505 mg/l, zinc-1.019 mg/l, arsenic-0.462 mg/l, cadmium-3.551 mg/l, lead-0.946 mg/l, mercury-0.028 mg/l, nickel-4.782 mg/l or silver-0.531 mg/l, MAFB's industrial permit allowable limits; contain phenols or dyes; are radioactive; that 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/l BOD or 250 mg/l TSS.

4.2.2 For discharge of ground water, the Contractor shall [obtain a State or Federal permit specific for pumping and discharging ground water prior to surface discharging.] [surface discharge in accordance with all Federal, State, and local laws and regulations.] [surface discharge in accordance with the requirements of the NPDES or State Storm Water Discharges From Construction Sites permit.]

4.3 Storm Water Discharge Permit

4.3.1 Construction Activities-Storm water Discharge Permit - 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 (NOI) package must be sent to MDEQ and consists of the following:

A. 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

D. The NOI package shall be routed through the Civil Engineer Squadron Environmental Flight (341 CES/CEV) 10 days prior to construction start date.

E. The SWPPP must be maintained on the construction site.

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

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

4.3.1.1 The contractor should reference the Montana Department of Environmental Quality'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.

5. EROSION, SEDIMENT CONTROLS, AND WETLANDS

5.1 Wetlands - The Contractor shall not enter, disturb, destroy, place fill into, or allow discharge of contaminants into any wetlands except as specifically authorized herein. The Contractor shall be responsible for the protection of wetlands on Malmstrom AFB. Authorization to enter specific wetlands identified shall not relieve the Contractor from any obligation to protect other wetlands within, adjacent to, or in the vicinity of the construction site and associated boundaries.

Maps showing locations of wetlands within Malmstrom AFB can be obtained from the 341 CES/CEV.

5.2 The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices shall also be in accordance with the Base Montana Pollutant Discharge Elimination System (MPDES) Storm Water Pollution Prevention Plan (SWPPP) which may be reviewed at the Malmstrom AFB Environmental Office. Any temporary measures shall be removed after the area has been stabilized.

6. TOXICS

The Contractor is responsible for ensuring that no employee is exposed to toxic materials like airborne asbestos, lead from lead base paint or polychlorinated biphenyls (PCB's).

6.1 Asbestos and Asbestos Hazards - The Contractor shall conform to all the requirements of 29 CFR 1926.1101, Occupational Exposure to Asbestos. Typical suspect asbestos containing materials include floor and/or ceiling tile, tile mastic, roofing materials and flashing mastics, pipe and boiler insulation, wall coverings, sheet rock joint compound, transite materials, etc.

6.1.2 <u>No new asbestos containing materials shall be used or installed at any facilities under the jurisdiction of Malmstrom AFB.</u>

6.1.3 The contractor shall notify the Montana Department of Environmental Quality, Permitting & Compliance Division, Air & Waste Management Bureau, Asbestos Control Program, PO Box 200901, Helena, MT. 59620-0901, of all demolition and renovation work where asbestos containing material removal quantities meet minimums specified for notification. (Demolition work is defined as any alteration of a structure where a load bearing beam is removed.) Notification is required for demolition work even though the facility contains no asbestos containing material (40 CFR 61.145(a)(2)).

6.2 Paint and Paint Hazards - 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 (:g/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. If the lead PEL is exceeded all workers shall wear appropriate personal protective equipment. The Contractor shall adhere to all other requirements of 29 CFR 1926.62. 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.

6.2.1 New-Paint Restriction - The Contractor shall not furnish or use any paints or coatings containing mercury or lead for interior or exterior applications.

6.2.2 No oil-based paints or coatings are to be used on base unless the entire liquid material is applied to the intended surface. No oil based paint liquid is to be left for disposal by base personnel nor is any of this material to be improperly disposed of by the contractor.

6.2.3 Use of environmentally safe water base paints and stains is recommended.

6.3 Polychlorinated Biphenyls (PCB's) – No PCB’s or products containing PCB’s shall be installed on Malmstrom AFB.

6.3.1 Turn in all light ballasts or electrical equipment with PCB’s to the 341 CES/CEV. Transformers, capacitors, switching gear, etc., often contain PCB’s for cooling purposes.

6.3.2 If hermetically sealed equipment, then turn in to 341 CES/CEV assuming it has a PCB concentration greater than the 500-ppm limit.

6.3.3 Contractor shall:

6.3.3.1 Count the number of units for turn in.

6.3.3.2 Place units in a 49 CFR 178.500, Subpart L shipping container furnished by him.

6.3.3.3 Call 341 CES/CEV (Ph x6163) three days in advance to schedule contractor delivery.

6.3.3.4 Contractor shall deliver to appropriate storage facility.

7. HAZARDOUS MATERIALS (HAZMAT)

7.1 HAZMAT Contractor Authorization Procedures

7.1.1 Contractors must obtain an authorization prior to bringing any hazardous materials (as identified in Federal Standard 313D paragraph 3.2) onto Air Force installations. Following contract award, the contractor must identify all hazardous materials the contractor plans to use and the projected amounts to 341 CES/CEV through the contracting officer. 341 CES/CEV will review the submittal and identify those hazardous materials requiring formal HAZMAT authorization procedures. Some of these identified materials may be disapproved. All other materials on the list require no additional authorization. The standardized procedure for authorizing HAZMAT is explained in the HAZMAT Made Easy Guide and in AFI 32-7086. A copy of the HAZMAT Made Easy Guide will be provided to the contractor. For those materials requiring formal HAZMAT authorization procedures, the contractor will complete an AF Form 3952 Authorization Request Worksheet and attach the appropriate Material Safety Data Sheets (MSDS).

7.1.2 For hazardous materials requiring formal HAZMAT authorization procedures, the contractor will provide all AF Form 3952 worksheets and MSDS's to the base HAZMART through the contracting officer. The HAZMART will then enter the authorization request data

into the HAZMAT tracking system. The authorization will require 341 CES/CEV approval for environmental and emergency response purposes.

7.1.3 The contractor will report to the HAZMART for bar code issuance each time they bring formally authorized HAZMAT as described above onto the installation. The contractor will report on a monthly basis their consumption of these formally authorized hazardous materials to the HAZMART.

7.1.4 The contractor will maintain MSDS's for those hazardous materials requiring formal HAZMAT authorization procedures as described above. The MSDS's shall be on file at the construction site at all times.

7.1.5 Prior to completion of the contract, the contractor will submit a final report of the actual quantities used on base. The report will be used to reconcile actual chemical usage during the contract period. The contractor is responsible for the removal of all excess hazardous materials from the base and close out the HAZMART account. The contractor shall submit a HAZMART account close out report as a formal contract submittal.

7.1.6 The contractor shall submit all of the above data as a formal contract submittal.

8. EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA)

For contracts over $100,000, contractors shall comply with the Toxic Release Inventory reporting provisions of EPCRA Section 313 by filing Form R reports during the life of the contract. Contractors shall provide a list of any extremely hazardous or hazardous substances listed under EPCRA along with maximum inventory and consumption. HAZMART registration fulfills this requirement. Contractors shall provide this information to 341 CES/CEVV and HAZMART. Should the potential contractor not be subject to reporting under EPCRA, he shall certify as such. References: Federal Register, August 10, 1995, Vol. 60, No. 154, p40987-40992 and Federal Register, September 29, 1995, Vol 60, No. 189, p50737-50743.

9. STORAGE OF HAZARDOUS MATERIALS

9.1 All hazardous materials used by the contractor on base property shall be stored properly in special areas in accordance with all regulatory and MAFB Fire Department requirements. Storage shall include, but not be limited to:

A. Keep containers closed when not in use

B. Label containers with warning labels

C. Post hazardous signs as required

D. Provide storage with secondary containment and routinely check for leaks and spills

E. Store materials at a central location

F. Flammable items must be stored in an approved flammable storage locker

G. All fuel storage tanks must have secondary containment

H. Fuel and Lubricants

9.2 Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. There shall be no storage of fuel on the project site. Fuel must be brought to the project site each day that work is performed.

10. HAZARDOUS WASTE PROCEDURES

10.1 All hazardous waste, except those that come under Universal Waste Rules, must be managed and disposed of in accordance with 40 Code of Federal Regulations (40 CFR) Subchapter I, Parts 260-268.

10.1.1 The contractor is responsible for the disposal of all hazardous waste generated from his operations, including spill cleanup. The contractor shall bear all costs associated with hazardous waste disposal.

10.1.2 Contractors storing hazardous waste on site for more than 24 hours must follow the Malmstrom Hazardous Waste Plan OPLAN 32-7042. As a minimum he must establish satellite accumulation points, appoint and train satellite accumulation point managers. If more than 55 gallons of hazardous waste or more than 5 lbs. of acutely hazardous waste is generated then the contractor must obtain approval for and establish a 90 day accumulation site.

10.1.3 The contractor shall manage his generated waste accumulations in accordance with 40 CFR Section 262.34 (c)(1). The contractor shall characterize (including sampling, analysis and manifesting) hazardous waste to a RCRA permitted facility. The contractor must arrange for a DOT trained and authorized person from the environmental flight to inspect the shipment and sign the hazardous waste manifest before manifesting the waste off base. The contractor shall provide a copy of the manifest to the 341 CES/CEV, Bldg 1708, prior to hazardous waste being shipped off the installation. A signed copy of the manifest must be returned to the 341 CES/CEV within 45 days.

10.1.4 The contractor is responsible for all fines and penalties, which may stem from an EPA or State of Montana Department Environmental Quality hazardous waste inspection of his operation.

10.2 Fluorescent Light Tubes

10.2.1 All fluorescent light tubes are considered hazardous waste even if they are sent to a recycling facility (unless there is data showing otherwise). Fluorescent tubes are to be managed in compliance with RCRA, 40 CFR Part 273, Universal Waste Rules and sent to recycling. All fluorescent light tubes shall be handled in such a way as to prevent breakage and the subsequent release of mercury-containing vapor. All tube removal related work shall be performed in conformance with all environmental, safety and health regulations.

10.2.2 Fluorescent light tubes shall be carefully removed from fixtures and packaged to prevent breakage during subsequent handling and shipping. If fluorescent bulbs are broken, then the contractor must cleanup immediately and the material must be treated as a hazardous waste.

Broken bulbs must be managed under the provisions of 40 CFR, part 260. If bulbs are broken, they must be managed according to Section 10.1.

10.2.3 Fluorescent tube recycling must be performed at a qualified recycling center that complies with 40 CFR 273 Subpart E standards for destination facilities. Upon completion of recycling, the Contractor must provide the Contracting Officer and 341 CES/CEVV certificates detailing the number of tubes recycled, date of recycling, and name and location of the recycler. Each certificate shall be signed and dated by the contractor removing the tubes and by the recycling firm performing the recycling.

10.3 The contractor may obtain guidance from the 341 CES/CEVV, 731-6163, on proper storage and handling of hazardous waste while on Malmstrom AFB. However, all responsibility rests with the contractor to comply with all federal and state hazardous waste requirements and any information obtained from the Environmental Flight does not remove responsibility from the contractor for proper waste management.

11. SOLID WASTES

11.1 The contractor is responsible for handling and disposal of all solid waste generated at the job site including laboratory testing and any documentation submittals required by the landfill owner.

11.2 Solid wastes (excluding clearing debris) shall be placed in containers that are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill shall be the minimum acceptable off-site solid waste disposal option. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

11.3 Contractors are required to divert / recycle any solid waste generated from their work. The following on-site generated waste must be recycled: glass, tin, aluminum, cardboard, newspaper and office paper.

11.4 The Contractor shall make all arrangements for disposal of any wastes including wastes requiring special handling such as asbestos and lead containing materials, rubble, sludge or non-hazardous chemical wastes.

11.5 Solid Waste Disposal Facilities

11.5.1 All non-hazardous wastes shall be properly disposed of through a licensed landfill or recycling center. Montana Dept of Environmental Quality 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 a Class III landfill site. No written approval is required if a Class II or Class IV landfill site is used for disposal of these non-inert materials.

11.5.2 Class IV landfills accept Group VI wastes which include construction and demolition waste such as waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements (including asphalt waste), houses, commercial buildings, and other structures.

11.5.3 Regulated hazardous wastes are excluded from all Class II, III and IV landfill sites. Class II landfill sites can receive any wastes acceptable at Class III and Class IV landfill sites in addition to municipal and household solid wastes such as garbage and putrescible organic materials.

11.5.4 No landfill site is available on base. Demolition rubble shall not be buried or placed upon the land anywhere on base or at the work site.

11.5.5 The cost for cleanup of improperly disposed wastes and/or the costs for removals of improperly placed hazardous waste materials shall be the responsibility of the contractor.

11.5.6 Copies of all disposal documents and weight tickets shall be furnished to the Contracting Officer.

11.6 Non-Hazardous Solid Waste Diversion Report

The Contractor shall maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. The Contractor shall submit a report to the 341 CES/CEVV through the Contracting Officer ten days prior to the final acceptance inspection. The report “Waste Management Plan” is provided at the end of this section.

12. AFFIRMATIVE PROCUREMENT

12.1 In compliance with the Affirmative Procurement requirements of Section 6002 of RCRA and Executive Order 13101, the Government requires the use of the recycled and recovered materials and products identified in the Environmental Protection Agency’s Comprehensive Procurement Guidelines in all purchases.

12.1.1 These materials and products must meet the requirements of the specifications, must not delay the progress of the work, and must not be cost prohibitive.

12.2 EPA guideline items are seen as the minimum that should be considered when evaluating recycled/reuse materials. Other materials and products not listed, but commonly used in industry outside of the government should also be considered.

12.3 Material and product submittals for all recycled-content items required will list the recycled and recovered materials used and the percentage content. Contractor shall use the “Recovered Materials Written Determination Form” attached at the end of this section.

12.4 Any decision not to acquire guideline items as required in the contract must be approved by the Contracting Officer. All purchases of guideline items must be verified by the Contracting Officer before contract closure. Activities subject to upward reporting and verification will be contracts with a total value over $100,000.

12.5 Paper products such as government documents, agreements, contracts, etc. shall be printed on paper containing 30% post consumer materials. The use of bio-based or bio-based containing products is encouraged.

12.6 All contractually required documents and reports produced by or for the Air Force longer than two pages shall be double-sided.

13. SPILLS AND SPILL RESPONSE PROCEDURES

13.1 Spills of any type material (excluding clean water) shall be reported to the QAE and the 341 CES/CEVV, 731-6163, for evaluation to determine if cleanup is required and evaluate the need for reporting.

13.2 The contractor will be charged for any cleanups & disposal costs accomplished by Malmstrom civilian or contract personnel.

13.3 All spill cleanups will be completed in accordance with the Malmstrom AFB Integrated Hazardous Materials Emergency Response Plan OPLAN 32-4 and be handled by trained personnel only. Refer to the OPLAN 32-4 and 29 CFR 1910.120.

13.4 Any hazardous products or materials of environmental concern cleaned up on Malmstrom facilities must be tested to determine if it is a hazardous waste.

13.5 Spill Response procedures

13.5.1 Determine if the spill can be contained by the responsible organization. If it can be contained without injury to personnel and without assistance from response personnel. Observe the following: Contain and/or control the release. Clean up the release using proper absorbent media for the chemical spilled. Recover as much of the spill as possible using absorbent media or approved vacuum device to minimize hazardous waste volume. Do not hose down the spilled material into floor/storm drains. Report spill to the Contracting Officer and 341 CES/CEVV, 731-6163, for the proper reporting and guidance in the proper disposal of recovered material. It is the contractor's responsibility to properly handle and dispose of clean up materials.

13.5.2 For spills beyond the capabilities of contractor personnel call the Base Fire Dept at 911.

13.5.3 Evacuate the area downwind of the spill if warranted by type of release.

13.5.4 Ensure all workers shut down their operations and secure their equipment, time permitting.

13.5.5 Stop source of spill with out undue risk of personal injury. Use on site containment, safety equipment, & materials.

14. DISCOVERY OF CONTAMINATED SOILS, MILITARY MUNITIONS, AND HISTORIC, ARCHAEOLOGICAL, OR CULTURAL RESOURCES

14.1 If contaminated soil is encountered during any excavation work, the Spill Response procedure above shall be followed. Following site evaluation, the Contracting Officer will advise of the steps that the contractor must follow to complete the work through the contaminated area. This may include a requirement for 40 hour Hazardous Waste Operations and Emergency Response training, Confined Space Entry training and permitting, respiratory protection, and completion of a Site Safety & Health Plan. Any additional cost, not specified in the original contract, of work performed by the contractor in the contaminated area, shall be negotiated through the Malmstrom Contracting office.

14.2 Historical, Archaeological, and Cultural Resources [Known historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings]. The Contractor shall protect Historical, Archaeological, and Cultural Resources and shall be responsible for their preservation during the life of the Contract. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, paintings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

14.3 Military Munitions: In the event the Contractor discovers or uncovers military munitions as defined in 40 CFR 260, the Contractor shall immediately stop work in that area and immediately inform the Contracting Officer.

Attachments

- Waste Management Plan
- Recovered Materials Written Determination Form

Waste Management Plan

I. Total Project Waste

From: _____
Project: _____
Date: _____

Quantity (tons)	Landfill Site	Tip fee/ton	Total cost of disposal, including hauling, container rental, tip fees	Total cost/ton

II. Alternatives to Landfilling

Type of Material	Quantity (tons)	Destination and means of transportation	Cost to handle and transport	Expected revenue & tip fee earnings	Net cost	Cost if landfilled	Comparison cost (+) / savings (-)
Cardboard							
Dimensional wood							
Beverage containers							
Land debris							
Concrete							
CMU							
Asphalt							
Metals - all types							
Gypsum board							
Paint							
Carpet							
Insulation							
Glass							
Cast stone							
Wood materials							
Electric cable							
PVC piping							
Rubber flooring							
Raised flooring							

III. Total net cost (+) or savings (_) from all alternatives to landfilling all project waste _____

IV. Means of keeping recyclables free of contamination

All similar materials will be grouped together based on the requirements of the recycling center. All dissimilar materials will be kept in separate containers/bins in order to avoid contamination.

V. Meetings to be held to address waste management

At regularly scheduled jobsite coordination/progress meetings and at job safety meetings, waste management requirements will be discussed to clarify any confusion with the craftpeople.

RECOVERED MATERIALS WRITTEN DETERMINATION FORM

This form is needed only if item(s) being procured are subject to the installation's Affirmative Procurement Program for EPA-Designated Recycled Content Products.

The contracting officer must place in the contract file a written justification if an acquisition of EPA-designated products above the micro-purchase threshold does not contain recovered material. The procurement originator and/or contracting officer must check the appropriate justification(s), provide a written explanation, and sign and date the form.

Procurement Request / Project No._____

EPA Designated Recycled Content Item NOT being Procured: _____

___ Designated Item is not competitively available within a reasonable period of time.
*(If contract is greater than $25,000, on DD Form 350, line B12F, choose "**B**.")*

Need Date: _____ Date Available: _____

___ Designated Item is at an unreasonable price (recycled item costs more).
*(If contract greater than $25,000, on DD Form 350, line B12F, choose "**C**.")*

Price of Designated Item: _____

Price of Non-Recycled Item: _____

___ Designated Item does not meet the installation's performance standards.
(If contract greater than $25,000, on DD Form 350, line B12F, choose "**D**.")

Describe the performance need, document and section number and explain briefly why a recycled content product will not meet that need.

_____

_____

_____

_____

_____

_____

This written determination is made in accordance with FAR 23.405(c).

_____	_____	_____	_____
Procurement Originator Signature	Date	Contracting Officer Signature	Date

END OF SECTION

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SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(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 Bid 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 and approval 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 Government Approval 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

Government Approval 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 approval 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 (MUTAL UNDERSTANDING 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. 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 Contractor Quality Control (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 an approved 4-year construction management program, with a minimum of 5 years construction experience on projects similar to the subject contract or a highly experienced construction person with a minimum of 10 years of construction experience in work of comparative scope and complexity as the subject contract. 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 Assistant CQC System Manager

The Contractor shall identify as Assistant CQC System Manager and individual within the onsite work organization who shall be responsible for management of CQC and shall have the authority to act in all CQC matters for the CQC System Manager and the Contractor. The Assistant CQC System Manager shall be a graduate engineer, graduate architect, a graduate of construction management or certified construction manager with a minimum of 2 years construction experience on construction similar to this contract, or a construction person with a minimum of 5 years in related work. This Assistant CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The Assistant CQC System Manager shall be assigned no other duties.

3.4.4 CQC Personnel

See Section 02466 DRILLED FOUNDATION CAISSONS (PIERS) for specialized subcontractors employed by the Contractor during piling installation for this contract.

3.4.5 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed and possess a valid certificate for the course entitled "Construction Quality Management For Contractors". This course certificate remains valid for 2 years from course completion. After the two-year period the certification has expired and the course must be retaken in order to remain eligible to perform the duties of CQC System Manager. This course is periodically offered at AGC offices throughout the state of Washington and Oregon for a nominal fee.

3.4.6 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 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. 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 Table 1 – Minimum Testing, attached at the end of this specification section. 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 that 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. Cost of onsite inspections is $2500 plus travel time and cost from Vicksburg MS. Cost of audits is $1500. If an onsite inspection

is required following an audit, the cost of the inspection shall be $1500 plus travel time and cost. 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/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase 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. The QCS Daily Report, as specified in SECTION 01312 QUALITY CONTROL SYSTEM (QCS) is the official record.

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.

TABLE 1

MINIMUM SAMPLING AND TESTING FREQUENCY

Materials	Test	Minimum Sampling and Testing Frequency
	Backfills and Subgrade	
Backfill for Trenches, Buildings and Walls, Pavements, Fills and Embankment, Subbase and Base, and other structures	Field Density2/12/	Trenches: One test per lift for each increment or fraction of 500 linear feet for backfill. Under pavements, one test every lift and at every crossing. Walls and Buildings Perimeters, Including Footings: One test per lift for each unit or two per building. Buildings Slabs on Grade: One test per lift for each slab. Building areas or other areas enclosed by grade beams, compacted with power driven hand operated compactors: One test per lift for each increment or fraction of 500 square feet. Pavements: Two tests per lift for each increment or fraction of 500 square yards Fill and Embankment: Two tests per lift for each increment or fraction of 500 square yards and any time material type changes Subbase and Base: One test every 1000 square feet or fraction there of.
	Lab Density3/	One test initially per each type of material or blended material and one every 10 field density tests.
	Gradation1/	One test per each type of material or blended material and one every 10 field density tests.

Materials	Test	Minimum Sampling and Testing Frequency
	Asphaltic Concrete and Pavements (Non airfield)	
Asphaltic concrete	Marshall method Test	1 test per day minimum.
	Specific Gravity	1 per each Marshall Test.
	Extraction	1 test for each Marshall Method.
	Gradation[5/]	1 per each extraction test.
	Fracture faces[5/]	1 per each extraction test.
	Portland Cement Concrete (Non airfield)	
Coarse and Fine Aggregate[7/]	Moisture, specific gravity and absorption[8/]	1 initially.
	Gradation and fineness modules	1 every 27 cy of concrete.
	Moisture, specific gravity and absorption[8/]	(same as coarse aggregate).
Concrete	Slump	Conduct a test every truck load placed.
	Entrained Air	Conduct with slump test.
	Ambient and concrete temperatures	Conduct with slump tests.
	Unit weight, yield, and water cement ratio	Conduct with strength tests. Check unit weight and adjust aggregate weights to ensure proper yield.
	Compressive strength	One set of 3 cylinders per day and every 27 cubic yards for each class of structural concrete. Test one cylinder at 7 days and two at 28 days.
Vibrators	Frequency and amplitude	Check frequency and amplitude initially and any time vibration is questionable.

NOTES:

1/ All acceptance tests shall be conducted from in-place samples.
2/ Additional tests shall be conducted when variations occur due to the contractors operations, weather conditions, site conditions, etc.
3/ Classification (ASTM D-2487), moisture contents, Atterberg limits and specific gravity tests shall be conducted for each compaction test if applicable.
4/ Materials to be submitted only upon request by the Contracting Officer.
5/ Tests can substitute for same tests required under "Aggregates" (from bins or source), although gradations will be required when blending aggregates.
6/ Increase quantities by 50 percent for Paving mixes and by 100 percent for Government testing of admixtures. Include standard deviation for similar mixes from the intended batch plant and data from a minimum of 30 tests, if available. Refer to ACI 214.
7/ A petrographic report for aggregate is required with the sample for source approval. If the total amount of all types of concrete is less than 153 cubic meters (200 c.y.) service records from three separate structures in similar environments which used the aggregates may substitute for the petrographic report.
8/ Aggregate moisture tests are to be conducted in conjunction with concrete strength tests for w/c calculations.
9/ For less than 1,000 units, the above test may be waived at the discretion of the Contracting Officer and acceptance based on manufacturers certification and test report.
10/ Additional tests shall be performed when changes are made either in the manufacturing processes or in materials used in the production of the masonry units.
11/ If adequate storage protection is not provided at the jobsite, additional tests shall be made to determine that the allowable moisture condition has not been exceeded before the blocks can be placed in the structure.
12/ The nuclear densometer, if properly calibrated, may be used but only in addition to the required testing frequency and procedures using sandcones. The densometer shall be calibrated and is recommended for use when the time for complete results becomes critical.

(sample of typical Contractor's Daily Report, unless the use of QCS is specified, if QCS is specified refer to QCS specification)

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
_____

_____

_____

END OF SECTION

SECTION 01501

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 AVAILABILITY OF UTILITY SERVICES

1.1.1 Water

The Government will make available reasonable amounts of potable water to the Contractor, from existing outlets and supplies only, without charge. Contractor shall reasonably conserve potable water furnished. The contractor, at his own expense, shall install and maintain all necessary temporary connections and distribution lines as required for delivery of water to points of usage and shall remove these connections and lines prior to final acceptance of construction. Contractor shall restore the utility system to its original condition, and repair any damage to the utility caused by temporary connection.

1.1.2 Electricity

Subject to available supply, the Government will furnish reasonable amounts of electric power without charge from existing outlets and supplies. All temporary connections, equipment, and systems shall be installed and maintained in accordance with EM 385-1-1, the National Electric Code (NFPA 70), and the National Electric Safety Code (NESC). Skilled, licensed, electrical journeymen shall accomplish all work. The Contractor shall judiciously conserve electricity furnished. The Contractor, at his own expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain necessary temporary connections including transformers and related equipment as needed and shall remove this equipment and connections prior to final acceptance of the construction. The Contractor shall restore utility to original condition, and repair any damage to the utility caused by temporary connection. Government furnished electrical power shall not be used for temporary heat without the written approval of the CO. The government makes no guarantee that temporary connection to such utilities will be economical or feasible.

1.1.3 Natural Gas

The Government will make available to Contractor, from existing outlets and supplies, reasonable amounts of natural gas without charge. The Contractor shall judiciously conserve natural gas furnished. All temporary connections, equipment, and systems shall be installed and maintained in accordance with EM-385-1-1 and the American Gas Association (AGA) Manual. The Contractor, at his own expense, shall install and maintain necessary temporary connections and distribution lines and shall remove all temporary connections, equipment, and piping prior to final acceptance of construction. Contractor shall restore utility to original condition, and repair any damage to the utility caused by temporary connection. The government makes no guarantee that temporary connection to such utilities will be economical or feasible.

1.1.4 Sanitary Provisions

The Government will make available to Contractor, from existing outlets and supplies, access to sanitary sewer systems without charge. The contractor shall at his own expense install and maintain temporary connections and accommodations in accordance with all requirements of the State of Montana Health Department, Base Civil Engineer, other authorities having jurisdiction, and in accordance with the requirements of the Corps of Engineers Safety and Health Requirements Manual EM 385-1-1. The contractor shall at his own expense restore the utility to its original condition and repair any damage to the utility caused by temporary connection. Under no circumstances shall contaminated water as defined by RCRA, surface water, rainwater, waters related to dewatering activities, or similar be introduced into the sanitary sewer system. In the absence of sanitary facilities from existing outlets, the Contractor shall supply chemical toilets in accordance with the requirements of the Corps of Engineers Safety and Health Requirements Manual EM 385-1-1.

1.1.5 Telephone Service

Contractor shall make arrangements and pay all costs for telephone facilities desired including connection fees. Use of Government telephone service will not be permitted except in emergency situations or as otherwise approved by the Contracting Officer.

NOTE: All utility connections and details shall be as approved by the Contracting Officer’s Representative prior to connection and use. The availability of government furnished utilities is subject to local availability and existing infrastructure. The government makes no guarantee that temporary connection to such utilities will be economical or feasible. The supply of government owned utilities or the lack thereof shall not be the basis for any claim against the government.

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 his delegated subcontractor, shall enforce the safety requirements of electrical extensions for the work of subcontractors. Skilled, licensed, electrical journeymen shall accomplish all work.

1.3.1.1 Contractor shall provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

1.3.1.2 Contractor shall maintain lighting and provide all repairs.

1.3.2 Temporary Connections

The Contractor, at his own expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections and distribution lines. The Contractor shall notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired. The Government will make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor shall not make the

final electrical connection.

1.3.3 Submittals

The contractor shall obtain written approval from the Contracting Officer prior to making any utility connection. 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, natural gas connection, water connection, sanitary sewer connection, 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.

Prior to the start of flame cutting, welding, brazing, soldering, or similar open flame operations a Welding Cutting and Brazing Permit (AF From 592) shall be procured in from the Malmstrom Air Force Base Fire Department. POC is the Dispatcher/Station Captain at (406) 731-3746. Depending on the location and hazards associated with the operation permits will be issued for varying periods of time.

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, and brightly colored. 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. Any existing marker tapes or tracer wires damaged during construction shall be repaired to original condition.

1.6 STAGING AREA

a. Contractor will be provided adequate open staging area adjacent to the site, as directed by the Contracting Officer. Staging areas are currently unsecured. The Contractor shall make provisions for his own security. All staging areas and storage areas shall be enclosed by a contractor installed, contractor furnished fence as specified in Section 01005 Site Specific Supplementary Requirements, paragraph 1.4 Construction and Staging Area Fence. The fence shall be gated and locked when not attended by the contractor’s staff.

b. The Contractor shall be responsible for keeping his staging area and office area clean and free of weeds and uncontrolled vegetation growth. Weeds shall be removed by pulling or cutting to within 6 inches 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.

c. 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 6 feet 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. Office trailers, storage trailers, and similar shall be blocked and anchored to the ground in accordance with EM 385-1-1 to prevent overturning during periods of high wind.

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 insure compliance. The Contractor shall submit a detailed written plan for implementation of this requirement. The plan will be presented as part of the pre-construction safety plan and will provide for keeping the total construction site, structures, and access ways 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 insure compliance with this requirement. Housekeeping and cleanup shall be assigned by the Contractor to specific personnel. The name(s) of the personnel shall be available at the project site.

1. 8 CONSTRUCTION NEAR COMMUNICATIONS CABLES

1.8.1 Excavation Near Communication Cables

Digging within 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 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. A work clearance permit (AF Form 103) must be obtained from Base Civil Engineer Construction Management prior to any excavation work. Information on location of existing utilities will be available with the permit. 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.

1.8.2 Reburial of Exposed Utilities

When existing utility lines are reburied, a tape, detectable by pipe detector systems, shall be installed above the uncovered length of the utility. See paragraph UTILITY LOCATOR/IDENTIFICATION TAPE above for specific tape requirements.

1.8.3 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.

1.8.4 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 two (2) project signs in accordance with conditions hereinafter specified and layout shown on drawing No. 49s-40-05-15, Sheets 1 and 2 attached at the end of this section, except Corps of Engineers' castle and Department of Air Force seal will be Government furnished. If construction occurs in more than one general location, a separate sign shall be required for each project area. 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 signs shall be located as directed. Upon completion of project, signs shall be removed and shall remain the property of Contractor.

1.10 ELEVATED WORK AREAS

Workers in elevated work areas in excess of 6 feet above an adjoining surface require special safety attention. In addition to the provisions of 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 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 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 1 meter, 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.

1.11 CONCEALED WORK

All items of work to be concealed shall be Government inspected prior to concealment.

1.12 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 drivable and passable condition.

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 PLAN

The Contractor shall submit an overall Traffic Control Plan for moving traffic through and around the construction zone in a manner that is conducive to the safety of motorists, pedestrians, and workers. This plan shall indicate scheduling, 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. A specific plan depicting placement and type of signage, barricades, barriers, and related items shall be submitted to the government and approved a minimum of 2 weeks prior to each individual road closure, detour, or partial blockage of roadway, sidewalk, or bike path.

1.14.1 Government Approval

The Contractor shall submit a Traffic Control Plan to the Contracting Officer for approval and coordination with the Owner. The Contractor shall submit the Traffic Control Plan at least 15 working days prior to commencement of street or roadwork. No field work may be undertaken without specific approval Traffic Control Plan by the Contracting Officer. Streets (except dead end) may be closed to traffic temporarily (except at least one access lane shall be kept open to traffic) by approved written request to the Contracting Officer at least 10 working days prior to street closure. 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

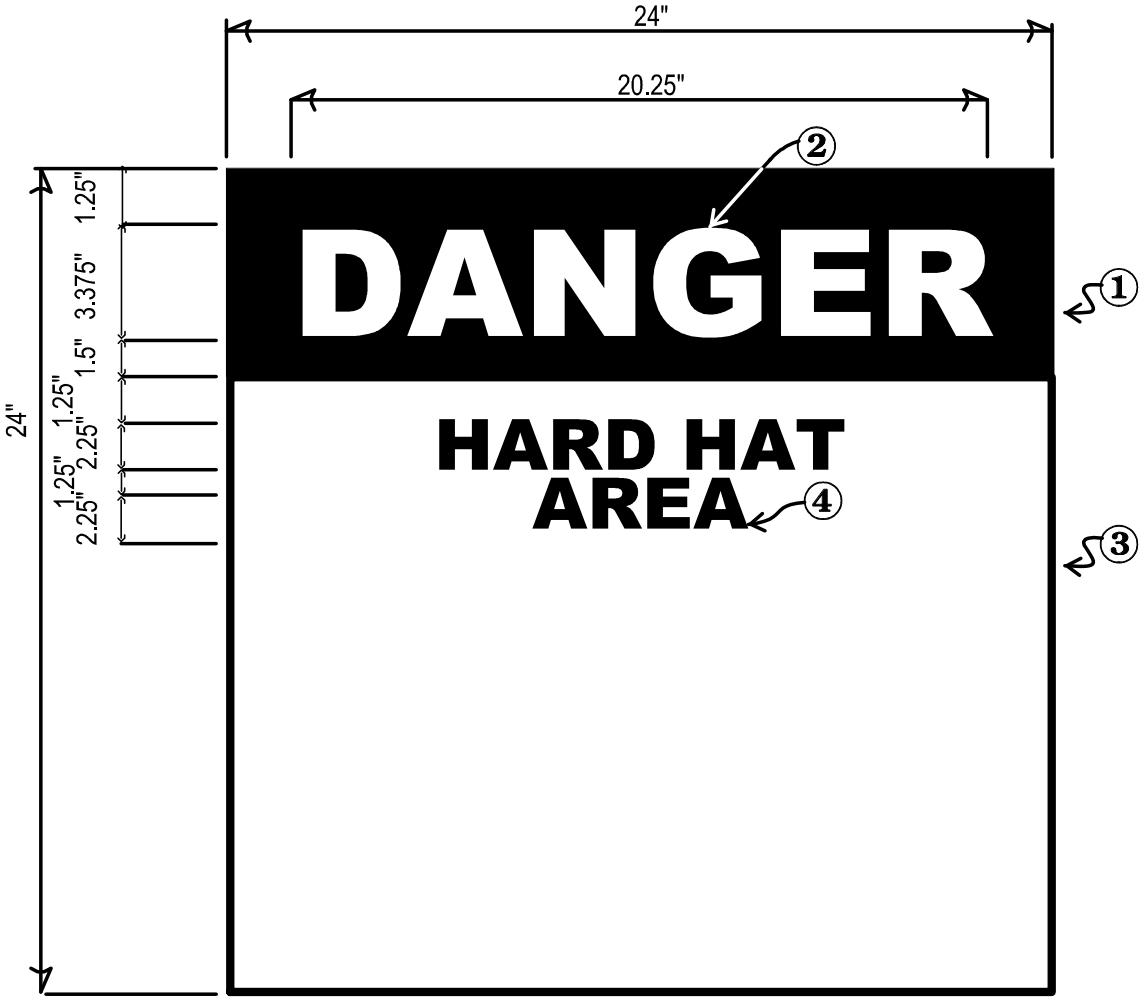
The Contractor shall notify the Contracting Officer, by serial letter, of dates and agenda of all performance testing of the following systems: mechanical (including fire protection and EMCS) and electrical (including fire protection), a minimum of 10 calendar days prior to start of such testing. In 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, meals, and lodging expenses. Should testing be conducted, but fail and require rescheduling for any reason not the fault of the Government, the Contractor shall similarly reimburse the Government for all expenses incurred.

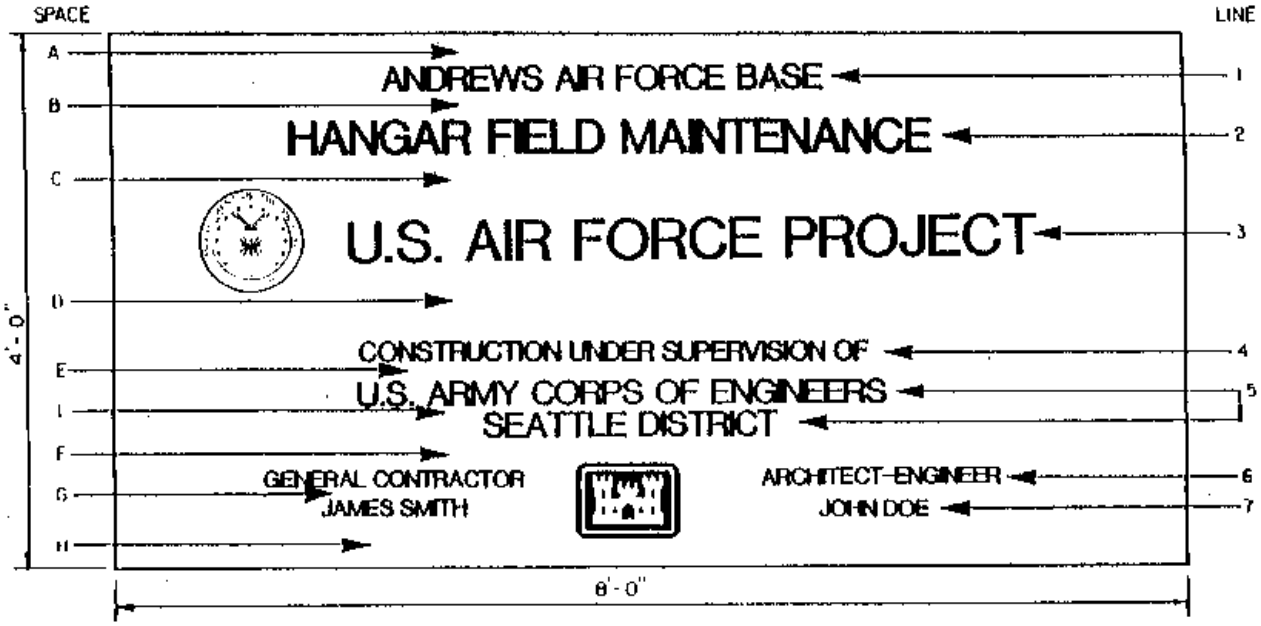
1.17 HARD HAT SIGNS

The Contractor shall provide 24 x 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. Additional construction signage is required to be attached to perimeter fencing or at the perimeter of the project area at 100-foot intervals. Additional signage requirements shall be in accordance with EM 385-1-1.

PART 2 PRODUCTS AND PART 3 EXECUTION (NOT APPLICABLE)



- SIGN SHALL BE FABRICATED FROM .125 THICK 6061-T6 ALUMINUM PANEL
- <u>COLOR</u>
    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.



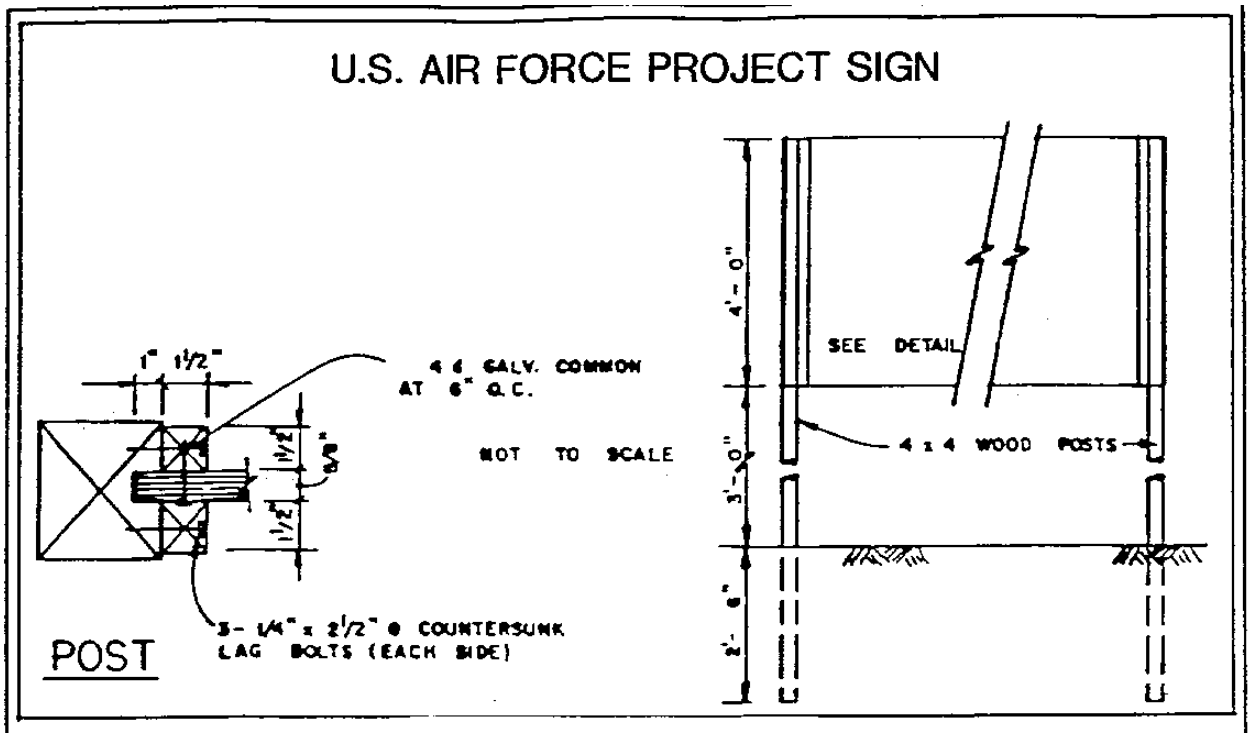
SAMPLE CONSTRUCTION SIGN FOR MCP PROJECTS

SCHEDULE

SPACE	HT.	LINE	DESCRIPTION	LETTER HT.	STROKE
A	2"	1	LOCATION	2 3/8"	1/4"
B	2 5/8	2	PROJECT NOMENCLATURE *	2 3/4"	3/8"
C	5 3/4"	3	U.S. AIR FORCE PROJECT	4"	1/2"
D	8"	4	CONSTRUCTION UNDER SUPERVISION OF	1 1/2"	1/8"
E	4"	5	CONSTRUCTION AGENCY *	2 3/8"	1/4"
F	4"	6	GENERAL CONTRACTOR *	1 3/8"	3/16"
G	1"	7	GENERAL CONTRACTOR *	1 3/8"	3/16"
H	2 7/8"		* WILL VARY TO SUIT PROJECT REQUIREMENTS		
I	2"		SEATTLE DISTRICT		

U.S. AIR FORCE
PROJECT
CONSTRUCTION SIGN

Sheet 1 OF 2 Scale: As shown
U.S. Army Engr. Dist. Seattle, WA.
Drl R.L.M. Transmitted with report
Trl R.L.M. DATE: 20 JUNE 84
Chl R.L.M. File No. 49: / 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

SECTION 01701

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.1 SUBMITTALS

Submittals shall be in accordance with Section 01330: SUBMITTAL PROCEDURES.

1.1.1 Preliminary O&M Manual And Data Submittal

To establish and assure uniform O&M manual format, the Contractor shall submit and receive Contracting Officer approval on one (1) complete set of the O&M data package without the binders prior to submission of the final bound manuals for each data package. Initial O & M Manual data submittal shall be a minimum of 30 days prior to 90 percent completion of the first housing unit or other facility to be constructed.

The Contractor shall also provide two typewritten pages representing the proposed binder-marking format as required under Paragraph: Marking and Binding. One page will represent the front cover/spine and the other page will represent the inside of the front cover.

1.1.1.1 Data submitted for the manual are to be for the specific equipment furnished, and are in addition to that furnished as shop drawings.

1.1.1.2 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 its option, update the copy retained by the Government in lieu of providing the added copy.

1.1.2 Final O&M Manual And Data Submittal

1.1.2.1 Number of Manuals

a. Base Housing Office Data Packages: Three copies of the final manuals are required for the complete project. The requirement for three copies of the O&M manual shall supersede and replace any requirements for the number of manuals, which may be indicated in other specifications.

b. Occupants Maintenance Manual Data Package: Five copies of the final manual are required for the first completed single family housing unit and one additional copy for each additional completed single family housing unit.

1.1.2.2 For equipment or systems requiring personnel training and/or acceptance testing, the final O&M data shall be approved by the Contracting Officer prior to the scheduling of the training and/or testing. O&M data on equipment or systems not requiring training or testing

shall be submitted so all data will be approved and bound in the O&M manuals in the required quantity by the time the facility reaches 90 percent completion. Failure to furnish approved, bound manuals in the required quantity by the time the facility is 90 percent complete, will be cause for the Contracting Officer to hold or adjust the retained percentage in accordance with CONTRACT CLAUSE, PAYMENTS UNDER FIXED PRICE CONSTRUCTION CONTRACTS.

1.1.2.3 One of the three completed copies of the final O&M Base Housing Office manuals 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.

1.1.3 Binders

All final submittals for O&M Data Packages shall be bound as follows:

1.1.3.1 Base Engineering/Housing Office Manuals

1.1.3.1.1 Construction and Assembly

Manuals shall be locking, D-ring style, three ring binders with clear insert sleeves for covers and spines. Only one manufacturer and model or type binder shall be used for all manuals. The manual binders shall be hardback, plastic-covered and cleanable designed for 8-1/2 x 11 inch paper. Binders shall not exceed three (3) inches in thickness. The hard cover shall be of minimum stiffness equal to 0.080 inch display board or double weight illustration board.

1.1.3.1.2 Marking and Binding

Each binder shall have the following information printed on the insert for the spine and cover of the manual: "EQUIPMENT OPERATION, MAINTENANCE, AND REPAIR MANUAL;" REPLACE FAMILY HOUSING, PHASE IV, MALMSTROM AFB, MONTANA, FAMILY HOUSING UNIT OR SITE FACILITIES (as applicable), and DATA PACKAGE NUMBER (as applicable). The Contractor's name and address as well as the contract title and contract number shall be provided in a clear sheet protector on the first page of the manual.

1.1.3.1.3 Color

Color of binder and printing shall be black for all manuals.

1.1.3.2 Occupants Maintenance Manual Data Package

1.1.3.2.1 Construction and Assembly

Construction and assembly shall be similar to the manual described above for Base Engineering/Housing Office Manuals. Thickness of the binder shall be as required for the data quantity included. Manual binders shall not be filled beyond their capacity.

1.1.3.2.2 Color

Color of binder, interior separator pages and printing shall be subject to the approval of the Base Housing Office.

1.1.4 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M data. Changes, additions, or revision required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2 OPERATION AND MAINTENANCE DATA

Operation and maintenance (O&M) data/manuals shall be specifically applicable to this contract and provide a complete and concise description all provided equipment, products and systems. Data containing extraneous information to be sorted through to find applicable instructions will not be accepted. Present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01330, "Submittal Procedures." Additional O&M data requirements are specified in individual sections of the technical specifications. O&M manual requirements shall be coordinated with the requirements specified in the other technical sections of the specifications.

1.2.1 Manual Content

For each product, system, or piece of equipment requiring submission of O&M data, the individual manual content shall, as a minimum, include the items required in the data packages described in the paragraph entitled "Schedule of Operations and Maintenance Data Manual" except irrelevant or inapplicable items need not be included.

1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation:

1.3.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all conditions.

1.3.1.2 Normal Operations

Provide narrative description of normal operating procedures. Include control diagrams with data to explain operation and control of systems and specific equipment.

1.3.1.3 Emergency Operations

Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

1.3.1.4 Operator Service Requirements

Include instructions for services to be performed by the operator for all equipment provided, including lubrication, adjustment, inspection, and gage reading recording.

1.3.1.5 Environmental Conditions

Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

1.3.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.

1.3.2.1 Lubrication Data

Include lubrication data, other than instructions for lubrication in accordance with paragraph entitled "Operator Service Requirements":

1.3.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance work-hours on a daily weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.3.3 Corrective Maintenance

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.3.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation numbering.

1.3.3.3 Maintenance and Repair Procedures

Include instructions and list tools required to restore product or equipment to proper condition or operating standards.

1.3.3.4 Removal and Replacement Instructions

Include step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.3.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. List spare parts and supplies that have a long lead-time to obtain.

1.3.4 Architectural/General O&M

1.3.4.1 Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products. Data shall include, but not be limited to, information on carpet, floor tile, vinyl wall finishes, builder's hardware, etc.

1.3.4.2 Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

1.3.4.3 Moisture-protection and Weather-exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

1.3.4.4 Additional Requirements: As specified in individual specifications sections.

1.3.5 Appendices

1.3.5.1 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies. Parts data may cover more than one model or series of equipment. components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard

commercial practice. Provide a copy of the nameplate data as shown on each item of equipment furnished.

1.3.5.2 Warranty Information

List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.3.5.3 Personnel Training Requirements

Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

1.3.5.4 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3.5.5 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each subcontractor installing the product or equipment. Include local representatives and service organizations most convenient to the project site. Provide the name, address, and telephone number of the product or equipment manufacturers.

1.3.6 Occupants Maintenance Manual

This manual is intended as a guide for the use of the occupants of the family housing unit and shall provide general information for use of the housing unit features, including basic operating instructions, care and cleaning instructions, safety precautions, and simple troubleshooting. It is not intended for performing repair or maintenance requiring trained or experienced personnel.

1.4 SCHEDULE OF OPERATION AND MAINTENANCE DATA MANUAL

See paragraph 1.1.2.1 for number of manuals required. Data Packages 1, 2, 3 and 4 shall be supplied in a single manual for the Base Housing Office (See paragraph 1.1.2.1a).

Provide O&M data packages with the required information as follows for each item of equipment and systems furnished in accordance with the following schedule:

1.4.1 Data Package 1 – Family Housing Unit (Base Engineering/Housing Office Manual)

As applicable for the equipment or building feature having a motor and some sequence of operation the following data items are required (except data for appliances may be the manufacturer’s standard information package provided to retail purchasers) Coordinate with individual technical sections:

a. Safety precautions

b. Normal operations

c. Environmental conditions

d. Operator service requirements (include general lubrication instructions)

e. Lubrication data

f. Troubleshooting guides and diagnostic techniques

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j Parts identification and nameplate data

k. Warranty information

l. Contractor information

1.4.2 Data Package 2 – Family Housing Unit (Base Engineering/Housing Office Manual)

As applicable for architectural/general building features the following data items are required (coordinate with individual technical sections):

a. Safety precautions

b. Maintenance and repair procedures

c. Removal and replacement instructions

d. Warranty information

e. Contractor information

1.4.3 Data Package 3 – Site Facilities Other than Family Housing Units (Base Engineering/Housing Office Manual)

As applicable for equipment or systems with motors and specialized controls the following data items are required (coordinate with individual technical sections):

a. Safety precautions

b. Normal operations

c. Emergency operations

d. Environmental conditions

e. Operator service requirements (include general lubrication instructions)

f. Lubrication data

g. Troubleshooting guides and diagnostic techniques

h. Preventive maintenance plan and schedule

i. Wiring Diagrams and Control Diagrams

j. Maintenance and repair procedures

k. Removal and replacement instructions

l. Spare parts and supply list

m. Parts identification and nameplate data

n. Warranty information

o. Contractor information

1.4.4 Data Package 4 – Site Facilities Other than Family Housing Units (Base Engineering/Housing Office Manual)

As applicable for any specialized electrical equipment the following data items are required (coordinate with individual technical sections):

a. Safety precautions

b. Operator prestart

c. Start-up, shutdown, and post shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan and schedule

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Spare parts and supply list

k. Testing Equipment and Special Tool

l. Warranty information

m. Contractor information

1.4.5 Data Package 5 – Family Housing Unit (Occupants Maintenance Manual)

Suggested format:

Table of Contents

a. Introduction

b. Emergency Phone Numbers

c. Cabinets

d. Counter Tops

e. Steel Siding

f. Stain Removal Chart for Steel Siding

g. Overhead Doors

h. Patio Doors

i. Slate Tile

j. Sheet Vinyl Floor

k. Carpet

l. Paint

m. Water Heater

n. Solid Surface Countertops

o. Programmable Thermostat

p. Gas Furnace and humidifier

q. Air Conditioner

r. Range Hood

s. Smoke & CO Alarms

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

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 AS-BUILT FIELD DATA

3.1.1 General

The Contractor shall keep at the construction site two complete sets of full size blueline 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, both Contractor installed and those installed by utility providers. Wherever a tie is made to an existing utility line, the location shall be identified on the As-Built drawings with either coordinates or by dimension.

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. 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.

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

g. All changes or modifications from the original design and from the final inspection.

h. 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.

3.1.2 Submittal of the As-Built Field Data

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.

3.2 AS-BUILT ELECTRONIC FILE DRAWINGS

3.2.1 No later than 30 days after final acceptance a complete set of as-built drawings shall be submitted in AutoCAD electronic file format. The electronic file format, layering standards and submittal requirements are specified in paragraphs below. The Contractor shall incorporate all deviations from the original contract drawings as recorded in the approved ‘As-built Field Data’ (see paragraph 3.1.2.). The Contractor shall also incorporate all the written modifications to the contract drawings which were issued by amendment or contract modification. All revisions and changes shall be incorporated, i.e. items marked “deleted” shall be deleted, clouds around new items shall be removed, etc. 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, lettering, and symbols. If additional drawings are required they shall be prepared in electronic file format under the same guidance. When final revisions have been completed, each drawings shall be identified with the words “AS-BUILT” in block letters at least 10 mm 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.

3.2.2 Electronic File Submittal Requirements

3.2.2.1 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.

3.2.2.2 Layering shall remain as provided in the electronic files. An explanatory list of which layers are used in each drawing, including any additional layers needed to complete incorporation of the As-Built data, shall be provided with each submittal.

3.2.2.3 Electronic File Deliverable Media: All electronic files shall be submitted in ISO 9660 format CD-ROM (CD). Zip drive disks shall not be provided. Two complete sets of CD(s) shall be submitted along with one complete set of ½ size prints and one complete set of full size mylars taken from the CD(s). The mylars are to be submitted only after corrections are made, if any. See paragraph 3.2.3 below. 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.

3.2.3 Submittal of the Final As-Built Drawings

The final as-built record drawings shall be completed and returned together with the approved preliminary as-built drawings to the COE, Malmstrom Project Office, within 30 calendar days of final acceptance. 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. The Contractor shall make all corrections and shall return the drawings to the same office within 7 calendar days of receipt.

3.3 PAYMENT

No partial or total payment will be made for as-built drawings until the complete set of 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 (see Bid Schedule for details).

3.4 ADDITIONAL DRAWINGS

One set of marked-up as-built blueline prints shall be furnished at the time of system acceptance testing. These as-built blueline prints shall be in addition to the submittals of marked-up as-built blueline prints specified elsewhere in the contract.

END OF SECTION

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SECTION 01703

WARRANTY OF CONSTRUCTION

PART 1 GENERAL

1.1 SUBMITTALS

Submittals shall be made in accordance with SECTION 01330: SUBMITTAL PROCEDURES. Submittal dates shall be as defined in PART 3 of this section.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 WARRANTY OF CONSTRUCTION (APR 1994) (FAR52.246-21):

3.1.1 In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph 3.1.9 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.

3.1.2 This warranty shall continue for a period of 1 year from the date of final acceptance of the work or beneficial occupancy by the owner. 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.

3.1.3 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:

a. the Contractor's failure to conform to contract requirements or

b. any defect of equipment, material, workmanship, or design furnished.

3.1.4 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.

3.1.5 The Government will notify the Contractor, in writing or by telephone, after the discovery of any failure, defect, or damage. The Contractor shall furnish, and maintain, a 24 hour emergency telephone number as the point of contact. For failures, defects, or damage causing loss of power, heating, air conditioning or air distribution the Contractor shall respond and mitigate the problem within 4 hours and twenty four (24) hours for all other systems.

3.1.6 If the Contractor fails to remedy any failure, defect, or damage within 5 working days after receipt of notice, the Government will have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

3.1.7 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:

a. obtain all warranties that would be given in normal commercial practice;

b. require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

c. enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

3.1.8 In the event the Contractor's warranty under paragraph 3.1.2 of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

3.1.9 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.

3.1.10 This warranty shall not limit the Government's rights under the Inspection of Construction clause of this contract with respect to latent defects, gross mistakes, or fraud.

3.2 ADDITIONAL WARRANTY REQUIREMENTS

3.2.1 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 the Paragraph: WARRANTY OF CONSTRUCTION. Communication procedures for the Contractor notification of warranty defects, priorities with respect to the type of defect and other details deemed necessary by the Contracting Officer for the execution of the construction warranty shall be established/reviewed at this time. The Contractor shall furnish the name, telephone number and address of the service representative who is authorized to initiate and pursue warranty work action on behalf of the Contractor. This single point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any contractual responsibilities in connection with the paragraph WARRANTY OF CONSTRUCTION.

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 WARRANTY OF CONSTRUCTION and in any event shall not exceed 200 miles radius of the construction site.

3.2.2 Equipment Warranty Identification Tags

The Contractor shall provide warranty identification tags on all Contractor and Government furnished equipment that is Contractor installed. (Same equipment as listed on the Equipment-In-Place List required under Section 01705 EQUIPMENT-IN-PLACE LIST).

The tags and information shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and shall be installed in a position that is easily noticeable. If the equipment surface is not suitable for adhesive back tags, the Contractor shall submit an alternative to the Government for review and approval. Contractor furnished equipment that has differing warranties on its components will have each component tagged/identified.). Lettering on the tags shall be block-type upper case and easily readable. Tags shall be similar in format to the following:

EQUIPMENT WARRANTY CONTRACTOR FURNISHED EQUIPMENT
MFG _____ MODEL NO. _____ SERIAL NO. _____ CONTRACT NO. _____ CONTRACTOR NAME _____ CONTRACTOR ADDRESS _____ CONTRACTOR PHONE NO. _____ DATE WARRANTY EXPIRES _____
IN CASE OF WARRANTY ACTION FIRST CONTACT (Point of contact, including name and telephone number.)

EQUIPMENT WARRANTY GOVERNMENT FURNISHED EQUIPMENT
MFG _____ MODEL NO. _____ SERIAL NO. _____ CONTRACT NO. _____ DATE EQUIPMENT PLACED IN SERVICE _____

In the case of equipment repaired or replaced by the Contractor during the warranty period, the Equipment Warranty tag shall be replaced or updated, as applicable, to indicate the scope of the repair/replacement and the new warranty expiration date in accordance with paragraph WARRANTY OF CONSTRUCTION.

3.2.3 Equipment Identification Nameplates

In addition to the warranty identification tags noted above, all major items of equipment shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number as indicated in the drawings, schedules, submittal data, or as directed. Designation of items such as motors shall coincide with their designation in the motor control panel. Items such as pumps and air handlers shall coincide with their respective controller or disconnect. Unless otherwise specified, identification nameplates shall be made of laminated plastic in accordance with ASTM D 709 with black (red for fire protection related equipment items) outer layers and a white core. Edges should be chamfered. Plates shall be fastened with round-head drive screws or with an approved adhesive. In cases where a nameplate is to be installed on an irregular object the nameplate shall be attached using a corrosion resistant metallic chain looped around the object or an appurtenance through a hole drilled in the nameplate. Additionally, each access door or access panel shall be provided with matching Identification Nameplate providing the same information so that the equipment behind the access door can be identified without opening the access door. Similarly equipment located above suspended ceilings shall be provided with an Identification Nameplate applied to the suspended ceiling grid or at the wall near the wall angle providing matching information so that the equipment above ceiling can be located without removing ceiling panels.

As a minimum all significant items of equipment shall be provided with an Equipment Identification Nameplate. Items shall include, but not be limited to the following items:

Liquid Chiller Units
Water Tanks
Glycol Tanks
Pumps
Major Valves
Boilers
Condensate Pumps
Make Up Air Units
VAV Units
Unit Heaters
Air Handlers
Meters
Major Water Treatment System Items
Main Gas Shut Off Valve
Water Heaters
Humidifiers
Steam Converter
Condensers
Fan Coil Units

Electrical Panel Boards and sub-panels
All Electrical Disconnects & Voltage
Starters
Safety Switches
Transformers
Motor Control Centers
Equipment Enclosures
Communication Panels & Enclosures
Control Power Transformers
Control Devices
Instrument Transformers
Switchboards
Switchgear
Motors
Time Clocks
Major Communication Equipment Items

DDC Control Panels and Subpanels
Control Equipment
Motor Operated Dampers

Kitchen Equipment Items
Food Service Equipment
Refrigeration and Freezing Equipment
Fire protection equipment
Fire Protection Panels

END OF SECTION

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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 5 foot line (1.5 meter), or on site 5 feet (1.5 meters) beyond the building perimeter must be accounted for completely. Only a few of the most common items beyond the 5 foot line (1.5 meter) 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.

NOTE: USE ENGLISH UNITS OF MEASURE (even if project is in metric units).

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 feet (LM) from building entry to next larger size of pipe

(a) Water (size & type of pipe; number of lineal feet (LM)_____
(b) Gas (size & type of pipe; number of lineal feet (LM)_____
(c) Sewer (size & type of pipe; number of lineal feet (LM)_____
(d) Electric (phase, voltage, size & type of wire, connected load in amps_____

(5) **Air Conditioning**:

(a) Type_____
(b) Capacity TONS (Kilograms)_____
(c) SQ YDS (SQ METERS) covered by system_____

(6) **Heating**:

(a) Source_____
(b) Fuel_____

(7) **Hot Water Facilities**:

(a) Capacity GA (Liters)_____
(b) Temperature Rise_____

BUILDING COST:_____

5. **BUILDING SYSTEMS (INTERIOR)**

A. **FIRE PROTECTION**:
Property Code

(1) (880 50/880-211) CLOSED HEAD AUTO SPRINKLERS - Square Feet (SM) & HD (wet or dry pipe; # of Lineal Feet (LM) of service pipe; type of pipe & # of heads; # of Square Feet (SM) covered by system)
DESCRIPTION:
_____
_____
_____
COST: _____

(2) (880 50/880-212) OPEN HEAD DELUGE SYSTEM - Square Feet (SM) & HD (# of Lineal Meters (LF) of service pipe; type of pipe; # of heads; # of Square Feet (SM) covered)
DESCRIPTION:
_____
_____
_____
COST: _____

(3) (880 10/880-221) AUTO FIRE DETECTION SYSTEM - Square Feet (SM) & 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 – Tons (kilograms) & Square Feet (SM)-(# of units installed; amount of Square Feet (SM) covered per unit; size & capacity of each unit)
DESCRIPTION:

_____
_____
_____
COST: _____

(2) (826 14/890-125) A/C PLT LESS THAN 5 Tons (4,536 kilograms) – Tons (kilograms) & square feet (SM)-(# of Tons (kilograms); # of square feet (SM) covered)
DESCRIPTION:

_____
_____
COST: _____

(3) (826 13/890-121) A/C PLT 5 TO 25 TN (4,536 to 22,680 kilograms) - TN (kilograms)-(# of TN (kilograms); # of square feet (meters) covered)
DESCRIPTION:

_____
_____
_____
COST: _____

(4) (826 12/826-122) A/C PLT 25 TO 100 TN (22,680 to 2,267,962 kilograms) - TN (kilograms)-(# of TN (kilograms); # of square feet (meters) covered)
DESCRIPTION:

_____
_____
_____
COST: _____

(5) (826 11/826-123) A/C PLT OVER 100 TN (2,267,962 kilograms) - TN (kilograms)-(# of TN (kilograms); # of square feet (meters) 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-GAL (Liters); TYPE; FUEL-(Size, type of tank, kind of fuel & # of gallon (liters))

DESCRIPTION:

_____
_____
_____
_____
COST: _____

(10) (89220/890-272) EMCS – EA (Direct Digital Control Sys)

_____
_____
_____
_____

COST: _____

(D) **SITE WORK**

6. **UTILITIES/SURFACE CONSTRUCTION**:

(1) (812 41/812-223) PRIM DISTR LINE OH-Lineal Feet (LM)- # Lineal Feet (LM) of wire; size & type of wire; # of poles; voltage)
DESCRIPTION:

_____
_____
_____

COST: _____

(2) (812/81360) TRANSFORMERS-KVA
POWER POLES-Lineal Feet (LM)
(# poles; # transformers - pad or pole mounted; kVA of wire; # Lineal Feet (LM) of wire)
DESCRIPTION:

_____
_____
_____

COST: _____

(3) (812 40/812-224) SEC DISTR LINE OH-Lineal Feet (LM)-(voltage; size & type of wire; # transformers; kVA; # Lineal Feet (LM) of wire; # of service drops; # poles)
DESCRIPTION:

_____
_____
_____

COST: _____

(4) (812 42/812-225) PRIM DISTR LINE UG-Lineal Feet (LM)-(kVA; voltage; type of conduit & size(encased or direct burial); size & kind of wire inside conduit; Lineal Feet (LM) of wire & conduit)
DESCRIPTION:

_____
_____
_____

COST: _____

(5) (812 42/812-226) SEC DISTR LINE UG-Lineal Feet (LM)-(type of conduit & size; type & size
of wires in conduit; Lineal Feet (LM) 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 Feet (LM) of connecting wire if pole mounted)
DESCRIPTION:

_____
_____
_____
COST: _____

(7) (824 10/824-464) GAS MAINS-Lineal Feet (LM) (size, type, & # of Lineal Feet (LM) of pipe)
DESCRIPTION:

_____
_____
_____
COST: _____

(8) (831 90/831-169) SEWAGE SEPTIC TANK-KG (thousand liters)-(size, kind of material, & capacity)
DESCRIPTION:

_____
_____
_____
COST: _____

(9) (832 10/832-266) SANITARY SEWER-Lineal Feet (LM)-(sizes & types of pipes - # of Lineal Feet (LM) of each; # of cleanouts; # & size of manholes)
DESCRIPTION:

_____
_____
_____
COST: _____

(10) (842 10/842-245) WATER DISTR MAINS (POTABLE)-Lineal Feet (LM)-(# Lineal Feet (LM) & 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 Feet (LM)-(# Lineal Feet (LM); material; width & height)
DESCRIPTION: (Is curb extruded or standard?)_

_____
_____
_____
COST: _____

(13) (851 90/851-145) DRIVEWAY-Square Yards (SM)-Square Yards (SM); material used; thickness)
DESCRIPTION:

_____
_____
_____
COST: _____

(14) (851 10/12/851-147) ROAD-Square Yards (SM) & Lineal Feet (LM)-Square Yards (SM); material used; thickness; Lineal Feet (LM))
DESCRIPTION:

_____
_____
_____
COST: _____

(15) (85210/11 /852-262) VEHICLE PARKING-Square Yards (SM)-Square Yards (SM); material used; thickness; # of bollards; # of wheel stops; # of regular parking spaces; # of handicap spaces)
DESCRIPTION:

_____
_____
_____
COST: _____

(16) (852 20/852-289) SIDEWALKS-Square Yards (SM) & Lineal Feet (LM)-(# Square Feet (SM) & Lineal Feet (LM); dimensions of each section & location; thickness; material used)
DESCRIPTION:

_____
_____
_____
COST: _____

(17) (871 10/871-183) STORM DRAIN DISPOSAL-Lineal Feet (LM)-(# Lineal Feet (LM) of pipe; sizes & types of pipe; # of catch basins & manholes & sizes of each)
DESCRIPTION:

_____
_____
_____
COST: _____

(18) (872 15/872-247) FENCE, SECURITY (ARMS)-Lineal Feet (LM)-(# of Lineal Feet (LM); fence material; # & type of gate(s); # strands of barbed wire on top)
DESCRIPTION:

_____
_____
_____
COST: _____

(19) (87210/12/872-248) FENCE, INTERIOR-Lineal Feet (LM)-(# of Lineal Feet (LM); fence material; # & kind of gate(s)
DESCRIPTION:

_____
_____
_____
COST: _____

(20) (890 70/890-187) UTILITY VAULT(4 or more transformers)- Square Feet (SM) (# Square Feet (SM); dimensions of vault; # of transformers)
DESCRIPTION:

_____
_____
_____
COST: _____

(21) (135 10/135-583) TEL DUCT FACILITY-Lineal Feet (LM)-(# of Lineal Feet (LM); size & type of conduit; type of wire)
DESCRIPTION:

_____
_____
_____
COST: _____

(22) (135 10/135-586) TEL POLE FACILITY-Lineal Feet (LM)-(# 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 Feet (LM) of asbestos removed, number of Lineal Feet (LM) of reinsulation, number of Square Feet (SM) 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 Feet (LM) of pipe; size & type of pipe; number and type of heads)
(2) UNDERGROUND/ABOVEGROUND STORAGE TANKS- GAL (Liters), type of tank; material stored)
(3) (833-354) DUMPSTER ENCLOSURE -Square Feet (SM) & dimensions)
(4) (890-152) UNLOADING PAD -Square Yards (SM); material)
(5) SIGNAGE-(Dimensions; material)
(6) (12580) CATHODIC PROTECTION (miles; Lineal Feet) (kilometers; LF)
(7) (87270 LIGHTNING PROTECTION- Lineal Feet (LF)
(8) (81290) POLE DUCT RISER(-Lineal Feet (LF, type of material)
(9) RAMPS-Square Feet (SM), material; Cubic Yards (CM) if concrete-use code for sidewalk if concrete)
(10) (89080/890-158) LOAD AND UNLOAD PLATFORM- Square Feet (SM)
(11) (83240/832-255) INDUSTRIAL WASTE MAIN- Lineal Feet (LM)
(12) WHEEL STOPS-(EA; size & material)
(13) (81350) OUTDOOR INTEGRAL DISTR CTR-(kVA)
(14) (45110) OUTDOOR STORAGE AREA- Square Feet (SM)
(15) (73055/730-275) BUS/WAIT SHELTER- Square Feet (SM)
(16) (690-432) FLAGPOLE- (EA; dimensions)
(17) (93210) SITE IMPROVEMENT- (JOB)
(18) (93220) LANDSCAPE PLANTING - Acre (Hectacre); EA; Square Feet (SM)
(19) (93230) LANDSCAPE BERMS/MOUNDS- Square Yards (SM)
(20) (93410) CUT AND FILL- Cubic Yards (CM)
(21) (843-315) FIRE HYDRANTS- (EA; Type)
(22) (14970) LOADING AND UNLOADING DOCKS AND RAMPS (not connected to a building)-Square Feet (SM) (23) BICYCLE RACK- (EA)
(24) (85140/812-928) TRAFFIC SIGNALS- (EA)
(25) (87210) FENCING OR WALLS- Lineal Feet (LM)
(26) (15432) RIPRAP-Lineal Feet & Square Feet (LM & SM)
(27) (75061) GRANDSTAND OR BLEACHERS- (EA; SE)
(28) 87150/871-187) RETAINING WALLS- Lineal Feet; Square Feet (LM; SM); material

NOTE: 5 Digit Codes-Army; 6 Digit Codes-Air Force

END OF SECTION

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SECTION 01705

INSTALLED BUILDING EQUIPMENT (REAL PROPERTY) AND EQUIPMENT-IN-PLACE LIST (PERSONAL PROPERTY)

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 SUBMITTAL

The final equipment lists shall be completed as two separate lists if both are required and returned to the Contracting Officer within 45 calendar days prior to the final inspection. The Contracting Officer will review all final equipment 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 INSTALLED BUILDING EQUIPMENT LIST

Contractor shall submit for approval, at the completion of construction, a list of installed building equipment. Installed building equipment (IBE) consists of items of equipment affixed and built into the facility as an integral part of the facility. It is equipment that supports the functionality of the building. 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 INSTALLED BUILDING EQUIPMENT 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 that contains a manufacturer's serial number on the name plate.
e. All Government furnished, Contractor installed equipment per a. through d. (price data excluded)

Other examples of installed building equipment are listed on 1705-5.

3.3 EQUIPMENT-IN-PLACE LIST (EIP)

Contractor shall submit for approval, at completion of construction, a list of equipment-in-place. Equipment –in-place consists of capital equipment and other non-expendable supplies of personal property which are mission essential. Equipment-in-place is not real property and may be of a movable nature or affixed to real property, but removable without destroying or reducing the usefulness of the facility. 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 if equipment-in-place is included in the construction contract. A sample form showing minimum data required is provided at the end of this section. See list on 01705-6 for items designated equipment-in-place.

INSTALLED BUILDING EQUIPMENT (IBE)
(REAL PROPERTY)

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: _____

EQUIPMENT-IN-PLACE LIST
(MISSION SUPPORT PERSONAL PROPERTY)

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: _____

INSTALLED BUILDING EQUIPMENT

a. Antenna (master antennas for non-paid	dd. Medical gas systems
subscriber entertainment television systems	ee. Medical automated box conveyors
b. Bedside headwall units	ff. Medical material handling systems
c. Bleachers (built-in)	gg. Nurse call systems
d. Benches (built-in)	hh. Paging systems
e. Boilers	ii. {Panel; boards
f. Bookcases	jj. Plumbing
g. Cabinets (built-in)	kk. Pneumatic tube systems
h. Carpet (wall to wall)	ll. Pot and pan washing equipment
i. Chapel seating, baptisteries, altars, pulpits,	mm. Protective construction features
communion rails and tables, etc. (built-in)	nn. Refrigeration equipment (built-in)
j. Closets	oo. Storm sash and doors
k. Correctional facility equipment	pp. Screens
l. Desks and tables (built-in)	qq. Shelving and racks (built-in)
m. Dishwasher equipment (built-in)	rr. Signage
n. Drinking water coolers (built-in)	ss. Sprinklers
o. Electrical components (built-in)	tt. Sterilizers (built-in)
p. Elevators and elevator doors	uu. Storage bins (built-in)
q. Escalators	vv. Telecommunication systems
r. Exhaust systems	ww. Theater & auditorium railings
s. Fire Alarm and detection system	xx. Theater stage & fire curtain
t. Food service equipment (built-in)	yy. Traffic railings
u. Gas fittings	zz. Utility monitoring & control systems
v. Hardware and fixtures for handicapped access	aaa. Vaults
w. Heating, ventilating, and air conditioning and	bbb. Wardrobes
control systems	ccc. Wardrobes
x. Hoists (crane and crane rails)	ddd. Waste disposers
y. Incinerators	
z. Key control systems	
aa. Laboratory sinks, tables, and benches (built-in)	
bb. Lockers (built-in)	
cc. Meat cutting equipment	

EQUIPMENT-IN-PLACE

PERSONAL PROPERTY (FIXED):	**PERSONAL PROPERTY (MOVABLE):**
a. Air raid alarm system	a. Automated data processing equipment
b. Bleachers (portable)	b. Dental chairs and pedestal units
c. Closed circuit television system	c. Filing cabinets and portable safes
d. Conveyor systems	d. Food service equipment (portable)
e. Electronic repair laboratory & shop equip	e. Furnishings, including rugs
f. Electronic security equipment	f. Furniture (chairs, tables, beds, desks, and partitions)
g. Fixed navigational aids	g. Office machines
h. Fixed target range system	h. Photographic equipment (portable)
i. Intrusion alarm system	i. Pre-wired workstations
j. Laundry equipment	j. Shop equipment
k. Lightening protection system	k. Training aids/equip, including simulators
l. Medical and dental equipment	l. Wall clocks
m. Organs	
n. Paint sprayers	
o. Photographic equipment	
p. Printing presses/related equipment	
q. Scientific measuring instruments	
r. Steam cleaning equipment	
s. Telescopes	
t. Testing equipment	
u. Training equipment and simulators	
v. Vats	
w. Wash tanks	
x. Watch reporting system	
y. Welding machines	
z. Woodworking equipment	

END OF SECTION

SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6	(1990) Safety Requirements for Demolition Operations

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

ARI Guideline K	(1997) Containers for Recovered Fluorocarbon Refrigerants

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 82	Protection of Stratospheric Ozone; Refrigerant Recycling
49 CFR 173.301	Shipment of Compressed Gas Cylinders

U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25	(June 2000) Storage and Handling of Liquefied and Compressed Gases and Their Full and Empty Cylinders

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M	Requisitioning and Issue Procedures
MIL-STD-129	(Rev. N) Marking for Shipment and Storage

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove debris from the project site daily; do not allow accumulations inside or outside the project area. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. All work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and

other applicable Sections. Salvage shall be pursued to the maximum extent reasonable; salvaged items and materials shall be disposed of as specified.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Work Plan; G

The procedures proposed for the accomplishment of the work. The procedures shall provide for safe conduct of the work, including procedures and methods to provide necessary supports, lateral bracing and shoring when required, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1.

SD-07 Certificates

Demolition plan; G

Notifications; G

Notification of Demolition and Renovation forms; G

SD-11 Closeout Submittals

Receipts

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations and policies. In addition to the requirements of the "Contract Clauses," safety requirements shall comply with ANSI A10.6 and the applicable version of EM-385-1-1.

1.4.1 Notifications

Furnish timely notification of demolition activities to Federal, State, regional, and local authorities in accordance with 40 CFR 61-SUBPART M. Notify the State of Montana, Department of Environmental Quality and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M.

Complete and submit Notification of Demolition and Renovation forms to Federal and State authorities and Contracting Officer, postmarked or delivered at least ten working days prior to commencement of work, in accordance with 40 CFR 61-SUBPART M.

If remediation of Asbestos Containing Materials is anticipated or required the contractor shall provide notice to Montana State Department of Environmental Quality and acquire the required permits in accordance with State of Montana regulations. Submittal and approval of plans must be complete prior to the start of field operations. Disposal shall comply with State and Federal regulations and comply with the policies and procedures of the disposal facility.

1.5 DUST CONTROL

Prevent the spread of dust, mud, debris, and soil from paved areas and roads. Avoid the creation of a nuisance dust and/or other hazard in the surrounding area. All paved areas must be mechanically swept daily while hauling or demolition activities are under way to control the spread of dirt, dust, and debris. Water may be used for dust control unless the use of water results in hazardous or objectionable conditions such as ice, mud, flooding, or pollution.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where pedestrians or drivers are endangered in the vicinity of demolition work, use traffic barricades with flashing lights in accordance with EM-385-1-1. Notify the Contracting Officer prior to beginning such work. If road or lane closures are required, a traffic control plan must be submitted and approved 14 days prior to any such closure.

1.6.2 Existing Work

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take all necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced at contractor's expense as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement must have Contracting Officer approval.

1.6.3 Trees

Trees that are indicated to be left in place within the project site shall be protected from damage by a 6-foot high chain link fence. The fence shall be securely erected a minimum of 5 feet from the trunk of small trees and at the outer perimeter of branches of larger trees. Any tree designated to remain that is damaged during the work under this contract shall be replaced in kind by the contractor and as approved by the Contracting Officer. All trees, shrubs, brush, stumps, and other items not specifically designated to remain shall be removed as necessary to complete the contract. Removal and backfill for all items removed shall be performed in accordance with specifications provided for Earthwork and Clearing and Grubbing activities.

1.6.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. The Contractor shall ensure that no elements determined to be unstable are left unsupported. The contractor shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.6.5 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site.

1.7 BURNING

Burning at the project site is not permitted.

1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated using workmen skilled in the trades involved. Repair items to be relocated that are damaged or replace damaged items with new items as approved by the Contracting Officer.

1.9 REQUIRED DATA

Demolition plan shall include procedures for careful removal and disposition of materials specified to be salvaged. All work shall be coordinated with other work in progress.

1.10 ENVIRONMENTAL PROTECTION

The work shall comply with the requirements of the specified ENVIRONMENTAL PROTECTION section and all state and Federal laws, regulations, and guidance. Demolition activities that involve asbestos containing materials shall be performed as specified in Section 13280 and in accordance with Federal and State of Montana polices, laws, and regulations.

1.11 USE OF EXPLOSIVES

Use of explosives is not permitted.

PART 2 PRODUCTS (NOT USED).

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Structures

Sidewalks, curbs, gutters, street light bases, and similar shall be removed as indicated or as necessary to complete the contractual work. Accessory structures such as clothesline brackets, storage sheds,

landscape items, sign bases, and similar structures may not be specifically indicated on the contract drawings but shall be entirely removed unless the items are specifically indicated to remain or the contractor is specifically directed in the field to preserve the item.

3.1.2 Utilities and Related Equipment

Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer. If utility lines are encountered that are not shown on drawings, contact the Contracting Officer for further instructions. Removal and disposal of asbestos concrete waterlines shall be in accordance with Section 13280 ASBESTOS ABATEMENT.

3.1.3 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs as indicated and as required to complete the work. Provide neat saw cuts at limits of pavement removal as indicated or required to accommodate new structures or equipment.

3.1.4 Masonry

Not Used.

3.1.5 Concrete

Saw concrete along straight lines to the full depth of the concrete or as required to safely remove concrete. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

3.1.6 Airfield Lighting

Not Used.

3.1.7 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible in texture and finish.

3.2 FILLING

All holes left by demolition activities or tree, stump, or plant removal operations shall be backfilled using approved soil in accordance with Section 02300, EARTHWORK. All backfill shall be mechanically compacted and tested in accordance with Section 02300, EARTHWORK unless otherwise indicated.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon the approval of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.3.2 Reuse of Materials and Equipment

Remove, store, and protect materials and equipment indicated to be reused or relocated to prevent damage, and reinstall as work progress dictates.

3.3.3 Salvaged Materials and Equipment

Materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Government shall be delivered to a storage site as directed within 10 miles of the work site.

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property within 30 days of its removal. Material salvaged for the Contractor shall not be sold on the site.

3.3.4 Unsalvageable Material

All materials removed from the project shall be disposed of off Base at contractor’s expense in accordance with all State of Montana and Federal Laws, Regulations, and guidance.

3.4 CLEANUP

Debris and rubbish shall be completely removed from basements and similar excavations. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

End of Section

SECTION 02231

CLEARING AND GRUBBING

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:

SD-03 Product Data

1.2 DELIVERY, STORAGE, AND HANDLING

Deliver materials to, store at the site, and handle in a manner, which will maintain the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

2.1 HERBICIDE

Comply with Federal Insecticide, Fungicide, and Rodenticide Act (Title 7 U.S.C. Section 136) for requirements on contractor's licensing, certification and record keeping. Contact the command Pest Control Coordinator prior to starting work.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Trees, Shrubs, and Existing Facilities

Trees and vegetation specifically designated to left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of fences and barriers as specified in Section 02220, DEMOLITION.

3.1.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repair or any damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting Officer in ample time to minimize interruption of the service. Refer to Division 1, GENERAL

REQUIREMENST and Section 01355 ENVIRONMENTAL PROTECTION for additional utility protection.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation specifically designated for removal. Clearing shall also include the removal of miscellaneous trees, shrubs, brush, stumps, and other vegetation not specifically shown to remain. This material may also include downed timber, snags, brush, minor structures, rocks, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work such as clothes line supports, storage sheds, and similar. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be completely removed except such trees and vegetation as are indicated or directed to be left standing. Trees that are left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches to the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches.

3.3 TREE REMOVAL

Where indicated, directed, or otherwise required trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 PRUNING

Prune trees designated to be left standing within the cleared areas of all dead branches 1 1/2 inches or more in diameter; and trim branches to heights and in a manner as indicated or directed. Branches and limbs to be removed shall be neatly cut close to the bole of the tree or main branches.

3.5 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 1 inch in diameter, matted roots, and sod from the designated grubbing areas. Material to be grubbed, together with logs, brush, shrubs, and other organic or metallic debris shall be removed to a depth of not less than 18 inches below the original surface level of the ground. Grubbing shall be performed as necessary in all areas indicated as construction areas under this contract. Depressions and holes left by grubbing operations shall be filled with approved material and compacted in accordance with the section “EARTHWORK” to make the surface conform to the original adjacent surface of the ground.

3.6 DISPOSAL OF MATERIALS

3.6.1 Saleable Timber

No saleable timber is anticipated to be removed under the subject contract.

3.6.2 Nonsaleable Materials

Logs, stumps, roots, brush, shrubs, rotten wood, rocks, metals, debris, and other refuse from the clearing and grubbing operations shall be disposed of in permitted facilities off base in accordance with

Federal and State of Montana laws and regulations at Contractor's expense. Burning of any materials on Government property is not permitted.

End of Section

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SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 224	(1996) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1140	(1997) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu.ft. (2,700 kN-m/cu.m.))
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 DEFINITIONS

1.2.1 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, abbreviated as percent laboratory maximum density.

1.3 SUBMITTALS

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each anticipated test should be depicted on the testing plan. The compaction plan shall be submitted for approval 14 days prior to the start of earthwork operations. Within 24 hours of conclusion of physical tests, 1 copy of test results, including calibration curves and results of calibration tests shall be submitted with the daily Quality Control Report. The compaction testing results should be keyed to the plan.

SD-06 Testing; Density, Gradation: G

SD-07 Certificates; Qualifications of the Commercial testing Laboratory; G

1.4 SUBSURFACE DATA

Subsurface soil boring logs are shown in the specification appendix. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.5 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.6 BLASTING

Blasting will not be permitted.

1.7 UTILIZATION OF EXCAVATED MATERIALS

Unsuitable materials removed from excavations shall be removed and disposed of off Base in a legal dump site. Unclassified material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders and for similar purposes. No unclassified excavated material shall be removed from the base without specific written authorization. Unclassified material authorized to be wasted shall be disposed of in designated areas approved for surplus material storage as shown on the plans or designated waste areas as directed. Newly designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. Disposal areas to be graded off to an even depth; no piles of materials shall be left. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Classified Materials

Classified materials include all imported materials as described below:

Aggregate Base Course: To meet the material and gradation requirements as defined in specification section 02722, Aggregate Base Course. Location of imported aggregate base course is indicated on the plans.

Aggregate Sub-Base Course: To meet the material and gradation requirements as defined in specification section 02721, Sub-Base Courses. Location of imported aggregate sub-base course is indicated on the plans.

2.1.2 Unclassified Materials

Unclassified materials include the following:

Pit-Run Imported Material: Approved material with a Plasticity Index (P1) less than six (6) consisting of silty or sandy gravel. Material must be free of muck, frozen material, organic material, refuse and construction debris. The maximum particle size should not exceed three (3) inches. This material is to be used as general sub-grade fill under garage slabs and patios to establish sub-grades. Use as backfill behind unbalanced stem walls or grade beams within five (5) feet of the building.

Existing Excavated On-Site Native Clays: Material to be free of debris and organics. Material should not be soft, yielding or saturated. This material may be used for general sub-grade fill five (5) feet outside of building foundations below asphalt and concrete pavement (roads, driveways and sidewalks) unless indicated otherwise in the specifications or drawings. This material may also be used as general fill in landscaped areas below the topsoil.

2.1.3 Unsuitable Materials

Materials, which do not comply with the requirements for classified or unclassified materials, are unsuitable. Unsuitable materials also include man-made fills, trash, refuse or backfills from previous construction. Unsuitable materials include classified and unclassified material which contains root and other organic matter, frozen material and stones larger than three (3) inches. The Contracting Officer shall be notified of any contaminated materials.

PART 3 - EXECUTION

3.1 STRIPPING OF TOPSOIL

Topsoil may be stripped to a depth of 4 inches. However, existing topsoil will require processing in order to meet the minimum contractual requirements for topsoil. Refer to specification sections 02921 Seeding, 02922 Sodding, 02930 Exterior Planting and 02935 Exterior Plant Material Maintenance. Any surplus of topsoil from excavations and grading shall be transported to the Base soil stock pile.

3.2 GENERAL EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Unclassified excavated materials shall be transported to and placed in fill or embankment within the limits of the work. Unsuitable materials encountered within the limits of the work shall be excavated below grade and replaced with unclassified materials as

directed. Such excavated material and the unclassified material ordered as replacement shall be included in excavation. Surplus unclassified excavated material free of debris, or organics not required for fill or embankment shall be disposed of in areas approved for surplus material storage as shown on the plans or designated waste areas. Unsuitable excavated material shall be disposed of off site in legal dump sites. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Excavation of ditches, gutters, and channel changes shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Ditches and gutters shall not be excavated below grades shown. Excessive open ditch or gutter excavation shall be backfilled with unclassified, thoroughly compacted, material to grades shown. Material excavated shall be disposed of as shown or as directed, except that in no case shall material be deposited less than 4 feet from the edge of a ditch. The Contractor shall maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Drainage Structures

Excavations shall be made to the lines, grades, and elevations shown, or as directed. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm, level, stepped, or serrated surface. Loose disintegrated rock and thin strata shall be removed. When concrete is to be placed in an excavated area, the bottom of the excavation shall not be disturbed. Excavation to the final grade level shall not be made until just before the concrete is to be placed.

3.3 OPENING AND DRAINAGE OF EXCAVATION

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. The Contractor shall ensure that excavation of any area, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.4 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. If borrow material is required to meet the specified finished grades shown on the plans, then borrow material shall be obtained from an off-base location approved by the Contractor's Officer. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval.

3.5 GRADING AREAS

Where indicated, work will be divided into grading areas within which unclassified excavated material shall be placed in embankments, fills, and required backfills. The Contractor shall not

haul unclassified material excavated in one grading area to another grading area except when so directed in writing.

3.6 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and compacted to at least 95 percent laboratory maximum density to prevent wedging action or eccentric loading upon or against the structure. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph PREPARATION OF GROUND SURFACE FOR EMBANKMENTS. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraphs PREPARATION OF GROUND SURFACE FOR EMBANKMENTS, EMBANKMENTS, and SUBGRADE PREPARATION, and Section 02630a STORM-DRAINAGE SYSTEM; and Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.7 PREPARATION OF GROUND SURFACE FOR EMBANKMENTS

3.7.1 General Requirements

Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsuitable material; plowed, disked, or otherwise broken up to a depth of 12 inches; pulverized; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 95 percent laboratory maximum density. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment materials to assure adequate bond between embankment material and the prepared ground surface.

3.7.2 Frozen Material

Embankment shall not be placed on a foundation which contains frozen material, or which has been subjected to freeze-thaw action. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrades (whether in an excavation or on an embankment) and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill. All material that freezes or has been subjected to freeze-thaw action during the construction work, or during periods of temporary shutdowns, such as, but not limited to, nights, holidays, weekends, winter shutdowns, or earthwork operations, shall be removed to a depth that is acceptable to the Contracting Officer and replaced with new material. Alternatively, the material will be thawed, dried, reworked, and recompacted to the specified criteria before additional material is placed. The Contracting Officer will determine when placement of fill shall cease due to cold weather. The Contracting Officer may elect to use average daily air temperatures, and/or physical observation of the soils for his determination. Embankment material shall not contain frozen clumps of soil, snow, or ice.

3.8 EMBANKMENTS

3.8.1 Earth Embankments

Earth embankments shall be constructed from unclassified or classified materials free of organic or frozen material and rocks with any dimension greater than 3 inches. The material shall be placed in successive horizontal layers of loose material not more than 8 inches in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 92 percent laboratory maximum density. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.9 SUBGRADE PREPARATION

3.9.1 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsuitable material shall be removed and replaced with unclassified excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsuitable material or excavation of rock shall be brought up to required grade with unclassified materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. The elevation of the finish subgrade shall not vary more than 0.05 foot from the established grade and cross section.

3.9.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas, each layer of the embankment shall be compacted to at least 92 percent of laboratory maximum density.

3.9.2.1 Subgrade for Pavements

Subgrade below pavement areas shall be compacted to 95 percent of the maximum density, and with a moisture content at or above optimum, as determined by ASTM D 1557.

3.9.2.2 Subgrade for Shoulders

Subgrade for shoulders shall be compacted to at least 95 percent laboratory maximum density for the full depth of the shoulder.

3.10 FINISHING

The surface of excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown.

The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

3.11 TESTING

An approved commercial testing laboratory shall perform testing. Field in-place density shall be determined in accordance with ASTM D 2922. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.11.1 Fill and Backfill Material Gradation

One test per stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C 136.

3.11.2 In-Place Densities

a. One test per 2,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 1,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

c. One test per 300 linear feet, or fraction thereof, of each lift of embankment or backfill for roads

3.11.3 Moisture Contents

In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

3.11.4 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material to determine the optimum moisture and laboratory maximum density values. One representative test when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.11.5 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.12 SUBGRADE AND EMBANKMENT PROTECTION

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

END OF SECTION

SECTION 02315

EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS

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 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 2937	(1994) Density of Soil in Place by the Drive-Cylinder Method
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 DEGREE OF COMPACTION

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, abbreviated as percent laboratory maximum density.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each

anticipated test should be depicted on the testing plan. The compaction testing results should be keyed to the plan and submitted to the government prior to the final inspection and BOD.

SD-06 Test Reports

Testing; G

Copies of all laboratory and field test reports within 24 hours of the completion of the test

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Classified Materials

Classified materials include all imported materials as described below:

Aggregate Base Course: To meet the material and gradation requirements as defined in specification section 02722 - AGGREGATE BASE COURSE. Location of imported aggregate base course is indicated on the plans.

Aggregate Sub-Base Course: To meet the material and gradation requirements as defined in specification section 02721 - SUBBASE COURSES. Location of imported aggregate sub-base course is indicated on the plans.

2.1.2 Unclassified Materials

Unclassified materials include the following:

Pit-Run Imported Material: Approved material with a Plasticity Index (P1) less than six (6) consisting of silty or sandy gravel. Material must be free of muck, frozen material, organic material, refuse and construction debris. The maximum particle size should not exceed three (3) inches. This material is to be used as general sub-grade fill under garage slabs, patios and stoops to establish sub-grades. Use as backfill behind or grade beams within five (5) feet of the building.

Existing Excavated On-Site Native Clays: Material to be free of debris and organics. Material should not be soft, yielding or saturated. This material may be used for general sub-grade fill five (5) feet outside of building foundations below asphalt and concrete pavement (roads, driveways and sidewalks) unless indicated otherwise in the specifications or drawings. This material may also be used as general fill in landscaped areas below the topsoil. On-site native clay material to be used for general sub-grade fill and sub-grade below asphalt and concrete pavements shall have moisture content suitable to meet the compaction requirements outlined in FILLING AND BACKFILLING.

2.1.3 Unsuitable Materials

Materials, which do not comply with the requirements for classified or unclassified materials, are unsuitable. Unsuitable materials also include man-made fills, trash, refuse or backfills from

previous construction. Unsuitable materials also include classified and unclassified material which contains root and other organic matter, frozen material and stones larger than three (3) inches. The Contracting Officer shall be notified of any contaminated materials.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

Clearing and grubbing is specified in Section 02230 CLEARING AND GRUBBING. The areas within lines 5 feet outside of each building and structure line shall be cleared and grubbed of trees, stumps, roots, brush and other vegetation, debris, existing foundations, pavements, utility lines, structures, fences, and other items that would interfere with construction operations. Stumps, logs, roots, and other organic matter shall be completely removed and the resulting depressions shall be filled with unclassified material, placed and compacted in accordance with paragraph FILLING AND BACKFILLING. Materials removed shall be disposed of outside the limits of Government-controlled property at the Contractor's responsibility.

3.2 TOPSOIL

Topsoil may be stripped to a depth of 4 inches. However, existing topsoil will require processing in order to meet the minimum contractual requirements for topsoil. Refer to specification sections 02921 Seeding, 02922 Sodding, 02930 Exterior Planting and 02935 Exterior Plant Material Maintenance. Any surplus of topsoil from excavations and grading shall be transported to the Base soil stock pile.

3.3 EXCAVATION

Excavation shall be a minimum of 2'-0" below the bottom depth of the new foundations and conform to the dimensions and elevations indicated for each building, structure, and footing except as specified, and shall include trenching for utility and foundation drainage systems to a point 5 feet beyond the building line of each building and structure and all work incidental thereof. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms. Excavations below indicated depths will not be permitted except to remove unsuitable material. Unsuitable material encountered below the grades shown shall be removed as directed and replaced with unclassified material; and payment will be made in conformance with the CHANGES clause of the CONTRACT CLAUSES. Unclassified material removed below the depths indicated, without specific direction of the Contracting Officer, shall be replaced, at no additional cost to the Government, with unclassified materials to the indicated excavation grade; except that concrete footings shall be increased in thickness to the bottom of the over depth. Classified and unclassified material shall be placed and compacted as specified in paragraph FILLING AND BACKFILLING. Determination of elevations and measurements of approved over depth excavation of unsuitable material below grades indicated shall be done under the direction of the Contracting Officer.

3.4 DRAINAGE AND DEWATERING

3.4.1 Important Elements of Construction Techniques

Construction techniques shall be used that promote a constant moisture regime in the foundation soils during and following construction. The following elements of construction are

important in obtaining adequate foundation performance in expansive soils and should be incorporated into the specifications.

3.4.1.1 Excavations

During excavation and construction operations foundation materials under buildings and structures shall not be disturbed by heavy construction equipment or other traffic that may cause pumping or rutting of the foundation materials below finished grade. The excavation shall be completed as quickly as possible to the design depth to protect the foundation soils from drying or infiltration of additional moisture. If the excavation is to remain open for more than 3 days for foundations or 7 days for paving areas, an impervious moisture barrier shall be applied to the newly exposed surfaces of the excavation to prevent moisture content change of the foundation soils. This may consist of sprayed-on emulsion or cutback asphalt, white pigmented curing compound, or plastic sheeting. Sprayed-on asphalt or curing compound shall be applied at a rate of 0.01 gallons per square foot over the entire surface of the subgrade including excavation back slopes, trenches and foundations of structures. Sides of the excavation shall be constructed on a 1 vertical on 1 horizontal slope or an appropriate angle that will not transmit intolerable swelling pressures from the expansive soil to the foundation. The foundation shall be constructed in the excavation as quickly as practical.

3.4.1.2 Drainage During Construction

The site shall be prepared to avoid ponding of water in low areas. Consideration shall be given to compaction of 6 inches to 12 inches or more of imported structural fill on the site prior to construction of the foundation to promote drainage and trafficability on the site. Sumps and pumps shall be provided at the bottom of excavations if necessary to remove rainwater or subsurface drainage, which has entered the excavation. Provision for after normal duty operation f the pumps shall be made also.

3.4.2 Drainage

Surface water shall be directed away from excavation and construction sites to prevent erosion and undermining of foundations. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3.4.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made.

3.5 SHORING

Shoring, including sheet piling, shall be furnished and installed as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Shoring, bracing, and sheeting shall be removed as excavations are backfilled, in a manner to prevent caving.

3.6 CLASSIFICATION OF EXCAVATION

Excavation will be unclassified regardless of the nature of material encountered.

3.7 BLASTING

Blasting will not be permitted.

3.8 UTILITY AND DRAIN TRENCHES

Trenches for underground utilities systems and drain lines shall be excavated to the required alignments and depths. The bottoms of trenches shall be graded to secure the required slope and shall be tamped if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe, and the over depth shall be backfilled with unclassified material placed and compacted in conformance with paragraph FILLING AND BACKFILLING.

3.9EXCAVATED MATERIALS

unclassified excavated material required for fill or backfill shall be placed in the proper section of the permanent work required under this section or shall be separately stockpiled if it cannot be readily placed. Unclassified material in excess of that required for the permanent work and all unsuitable material shall be disposed of as specified in Section 02300 EARTHWORK.

3.10 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Excavation to final grade shall not be made until just before concrete is to be placed. Approximately level surfaces shall be roughened, and sloped surfaces shall be cut as indicated into rough steps or benches to provide a satisfactory bond. Shales shall be protected from slaking and all surfaces shall be protected from erosion resulting from ponding or flow of water.

3.11 SUBGRADE PREPARATION

Unsuitable material in surfaces to receive fill or in excavated areas shall be removed and replaced with unclassified material as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers,

steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary minus one percent to plus three percent of optimum moisture and to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Minimum subgrade density shall be as specified in paragraph FILLING AND BACKFILLING.

3.12 FILLING AND BACKFILLING

Classified and unclassified materials shall be used in bringing fills and backfills to the lines and grades indicated and for replacing unsuitable materials. Classified and unclassified materials shall be placed in horizontal layers not exceeding 8 inches in loose thickness, or 6 inches when hand-operated compactors are used. After placing, each layer shall be plowed, disked, or otherwise broken up, moistened or aerated as necessary, thoroughly mixed and compacted as specified. Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested and approved, forms removed, and the excavation cleaned of trash and debris. Backfill shall be brought to the indicated finish grade. Backfill shall not be placed in wet or frozen areas. Where pipe is coated or wrapped for protection against corrosion, the backfill material up to an elevation 2 feet above sewer lines and 1 foot above other utility lines shall be free from stones larger than 1 inch in any dimension. Heavy equipment for spreading and compacting backfill shall not be operated closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing; the area remaining shall be compacted in layers not more than 4 inches in compacted thickness with power-driven hand tampers suitable for the material being compacted. Backfill shall be placed carefully around pipes or tanks to avoid damage to coatings, wrappings, or tanks. Backfill shall not be placed against foundation walls prior to 7 days after completion of the walls. As far as practicable, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall. Each layer of fill and backfill shall be compacted to not less than the percentage of maximum density specified below:

	Percent Laboratory maximum density	
Fill, embankment and backfill	Classified material	Unclassified material
Under structures, building slabs, steps, paved areas, around footings adjacent of stem walls and in trenches	95	95
Under grassed areas, except for landscape areas	90	90
Subgrade		
Under building slabs, steps, and paved areas, top 12 inches	95	95
Under sidewalks, top 6 inches	95	95

Proof roll to the subgrade line. Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified herein before to the required density prior to further construction thereon. Recompaction over underground utilities and heating lines shall be by hand tamping.

3.13 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. An approved commercial testing laboratory shall perform testing. Field in-place density shall be determined in accordance with ASTM D 1557. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. The following number of tests, if performed at the appropriate time, shall be the minimum acceptable for each type operation.

3.13.1 In-Place Densities

In-place density and moisture content test results shall be included with the Contractor's daily construction quality control reports.

3.13.1.1 In-Place Density of Subgrades

One test per 750 square foot or fraction thereof

3.13.1.2 In-Place Density of Fills and Backfills

One test per 750 square foot or fraction thereof of each lift for fill or backfill areas compacted by other than hand or hand-operated machines. The density for each lift of fill or backfill materials for trenches, pits, building perimeters or other structures or areas less than 13 feet in width, which are compacted with hand or hand-operated machines shall be tested as follows: One test per each area less than 170 square feet or one test for each 65 linear foot of long narrow fills 330 feet or more in length. If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 698 as follows: One check per lift for each 65 linear feet of long narrow fills, and a minimum of 2 checks per lift for other fill and backfill areas.

3.13.2 Moisture Content

In the stockpile, excavation or borrow areas, a minimum of two tests per day per type of material or source of materials being placed is required during stable weather conditions. During unstable weather, tests shall be made as dictated by local conditions and approved moisture content shall be tested in accordance with ASTM D 2216.

3.13.3 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material, including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 100 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density will be made.

3.14 CAPILLARY WATER BARRIER

Capillary water barrier under concrete floor and area way slabs on grade shall be placed directly on the subgrade and shall be compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.15 GRADING

Areas within 5 feet outside of each building and structure line shall be constructed true-to-grade, shaped to drain, and shall be maintained free of trash and debris until final inspection has been completed and the work has been accepted.

3.16 PROTECTION

Settlement or washing that occurs in graded, top soiled, or backfilled areas prior to acceptance of the work, shall be repaired and grades reestablished to the required elevations and slopes.

END OF SECTION

SECTION 02316

EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS

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 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 1556	(1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)

1.2 DEGREE OF COMPACTION

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, abbreviated as percent laboratory maximum density.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each anticipated test should be depicted on the testing plan. The compaction testing results should be keyed to the plan and submitted to the government prior to the final inspection and BOD.

SD-06 Test Reports

Field Density Tests
Testing of Backfill Materials

Copies of all laboratory and field test reports within 24 hours of the completion of the test

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Classified Materials

Classified materials include all imported materials as described below:

Aggregate Base Course: To meet the material and gradation requirements as defined in specification section 02722 - AGGREGATE BASE COURSE. Location of imported aggregate base course is indicated on the plans.

Aggregate Sub-Base Course: To meet the material and gradation requirements as defined in specification section 02721 - SUBBASE COURSES. Location of imported aggregate sub-base course is indicated on the plans.

2.1.2 Unclassified Materials

Unclassified materials include the following:

Pit-Run Imported Material: Approved material with a Plasticity Index (PI) less than six (6) consisting of silty or sandy gravel. Material must be free of muck, frozen material, organic material, refuse and construction debris. The maximum particle size should not exceed three (3) inches. This material is to be used as general sub-grade fill under garage slabs, patios and stoops to establish sub-grades. Use material as backfill behind unbalanced stem walls or grade beams.

Existing Excavated On-Site Native Clays: Material to be free of debris and organics. Material should not be soft, yielding or saturated. This material may be used for general sub-grade fill five (5) feet outside of building foundations below asphalt and concrete pavement (roads, driveways and sidewalks) unless indicated otherwise in the specifications or drawings. This material may also be used as general fill in landscaped areas below the topsoil. On-site native clay material to be used for general sub-grade fill and sub-grade below asphalt and concrete pavements shall have moisture content suitable to meet the compaction requirements outlined in FILLING AND BACKFILLING.

2.1.3 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

Where unstable material is encountered in the bottom of the trench, such material shall be removed and replaced with pit run import material, as described above.

2.1.4 Initial Backfill Material

Initial backfill shall consist of classified or unclassified material free from rocks 1 inch or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 1 inch in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

2.2 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in TABLE 1 and shall bear a continuous printed inscription describing the specific utility.

TABLE 1. Tape Color

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone, Telegraph, Television, Police, and Fire Communications
Blue:	Water Systems
Green:	Sewer Systems

2.3 LOCATOR PEGS

Locator pegs (passive underground utilities) shall be of a type specifically manufactured for electronic making of underground utilities. The transponder pegs shall have a polyethylene shell. The frequency of the pegs shall be as below: Locator Peg Frequency Requirements 83.0 KHz Gas, Oil, Dangerous Materials 101.4 KHz Telephone, Telegraph, Television, Police and Fire communications 145.7KHz: Water Systems 121.6 KHz: Sanitary Sewer Systems. Locator pegs should be placed at 50-foot intervals on straight-line utility runs and at every utility bend or tee connection. Locator pegs shall be placed directly on the utility in the vertical position. Maximum depth of reading for utility pegs is 9'-0". If utility is deeper than 9'-0", measured from top of utility to finished grade, place utility locator peg at 9'-0" in the vertical position.

PART 3 - EXECUTION

3.1 EXCAVATION

Excavation shall be performed to the lines and grades indicated. Rock excavation shall include removal and disposition of material defined as rock in paragraph MATERIALS. Earth excavation shall include removal and disposal of material not classified as rock excavation. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than 2 feet. Excavated material not required or not satisfactory for backfill shall be removed from the site. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating shall be removed to maintain the stability of the bottom and sides of the excavation. Unauthorized over excavation shall be backfilled in accordance with paragraph BACKFILLING AND COMPACTION at no additional cost to the Government.

3.1.1 Trench Excavation Requirements

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 4 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 4 feet high shall be shored. Trench walls, which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes, which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, then the Contractor shall utilize redesign, stronger pipe or special installation procedures. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.1.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.1.1.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 4 inches below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.1.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.1.1.4 Excavation for Appurtenances

Excavation for manholes, catch basins, inlets, or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.1.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.1.2 Stockpiles

Stockpiles of unclassified material shall be placed and graded as specified. Stockpiles shall be kept in a neat and well-drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated unclassified materials shall be separately stockpiled. Stockpiles of unclassified materials shall be protected from contamination, which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government. Locations of stockpiles of satisfactory materials shall be subject to prior approval of the Contracting Officer.

3.2 BACKFILLING AND COMPACTION

Backfill material shall consist of unclassified material or subbase as required. Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for cohesionless soils and 90 percent maximum density for cohesive soils, unless otherwise specified.

3.2.1 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall not be backfilled until all specified tests are performed.

3.2.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.2.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with pit run material placed in layers not exceeding 6 inches loose thickness.

3.2.1.3 Bedding and Initial Backfill

Granular bedding for utility pipes shall consist of material meeting the following gradation requirements: 100 percent by weight passing the 1-inch sieve; 40 percent to 80 percent by weight passing the No. 4 sieve; and 0 percent to 10 percent by weight passing the No. 200 sieve, or as recommended by the utility pipe manufacturer. Initial backfill material shall be non-plastic (PI<6). Initial backfill material shall be placed and compacted with approved tampers to a height of at least one-foot above the utility pipe or conduit. The backfill shall be brought up

evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.2.1.4 Final Backfill

The remainder of the trench, except for special materials for roadways, shall be filled with unclassified material. Backfill material shall be placed and compacted as follows: Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 12 inch loose thickness, and compacted to 90 percent maximum density, under sidewalks: 95 percent maximum density. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.2.2 Backfill for Appurtenances

After the manhole, catch basin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 3 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.3 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.3.1 Gas Distribution

Trenches shall be excavated to a depth that will provide not less than 18 inches of cover. Trenches shall be graded as specified for pipe-laying requirements in Section 02556a GAS DISTRIBUTION SYSTEM.

3.3.2 Water Lines

Trenches shall be of a depth to provide a minimum cover of 6 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. For fire protection yard mains or piping, an additional 6 inches of cover is required.

3.3.3 Electrical Distribution System

Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.

3.3.4 Plastic Marking Tape

Warning tapes shall be installed directly above the pipe, at a depth of 18" below finished grade unless otherwise shown.

3.4 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.4.1 Testing Facilities

An approved commercial testing laboratory shall perform tests

3.4.2 Testing of Backfill Materials

Classification of backfill materials shall be determined in accordance with ASTM D 2487 and the moisture-density relations of soils shall be determined in accordance with ASTM D 698. A minimum of one soil classification and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3.4.3 Field Density Tests

Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one field density test per lift of backfill for every 200 feet of installation shall be performed. One moisture density relationship shall be determined for every 1500 cubic yards of material used. Field in-place density shall be determined in accordance with ASTM D 1556. Copies of calibration curves, results of calibration tests, and field and laboratory density tests shall be furnished to the Contracting Officer. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

3.4.4 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to the finished grade surface, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer. Pipe sizes larger than 36 inches shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

END OF SECTION

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SECTION 02466

DRILLED FOUNDATION CAISSONS (PILES)

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 A 615/A 615M	(2001b) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 706M	(2001) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM D 1143	(1981; R 1994e1) Piles Under Static Axial Compressive Load

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(1998) Structural Welding Code - Steel
AWS D1.4	(1998) Structural Welding Code - Reinforcing Steel

1.2 BASIS OF BID

1.2.1 Bids

The bid shall be based on the number and total length of caissons, established by top and bottom elevations and diameters, as indicated and specified. Adjustment of the contract will be made in accordance with the CONTRACT CLAUSES, should the total length of caissons installed and approved be greater or less than the total length shown. The Contractor will not be allowed payment for rejected caissons or for those not conforming to specifications.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Caissons; G, RE

Detailed records in an approved form, for each caisson, showing shaft diameters, depths of test holes, top and bottom elevations, bearing strata description, casing description, water conditions, concrete strength, concrete volume, rock elevations, dates of excavation and

concrete placement, and other pertinent information. Upon completion of caisson work, the Contractor shall provide a record of centerline locations based on the survey of the registered surveyor or engineer provided by the Contractor. In addition, corrective measures shall be similarly recorded. A complete tabulation of all records pertaining to approved caissons shall be delivered to the Contracting Officer.

SD-07 Certificates

Caissons; G, RE

A certified copy of the survey. Lines and levels shall be established and caisson centerline locations staked and maintained by a registered surveyor or engineer provided by the Contractor.

Qualifications; G, RE

Qualifications of the foundation system Contractor shall show that he has been engaged in the successful installation of drilled foundation caissons for at least 5 years.

1.4 QUALIFICATIONS

1.4.1 Specialty Subcontractor

A specialty subcontractor, specializing in the specified foundation system and having experience installing the specified foundation system under similar subsurface conditions shall perform the work.

1.4.2 Welding

Detail and field welding shall be in accordance with AWS D1.1. Qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1, Section 5. Records of test results of welding procedures not prequalified and copies of records for each qualified welding operator, containing records on positions of welding and types of electrode qualifications, shall be kept by the Contractor and be available for examination by the Contracting Officer.

1.5 PROJECT/SITE CONDITIONS

1.5.1 Subsurface Data

Subsurface soil data logs are included in the geotechnical report. The subsurface investigation report and soil data logs are included in Appendix 1 of these specifications.

1.5.2 Caisson Drilling Equipment

Caisson drilling equipment shall have the minimum torque capacity and downward force capacity for the contract site conditions.

1.6 SEQUENCE OF WORK

1.6.1 Caisson Excavation

Excavation of caissons or groups of caissons shall be performed so that reinforcing steel and concrete placement is a continuous operation performed the same day that the excavation is completed. Excavations shall not be left open overnight.

1.6.2 Acceptance

Concrete shall be placed within 3 hours after approval of the completed excavation.

1.7 SUPERVISION, INSPECTION, AND SAFETY

1.7.1 Contractor Supervision

The Contractor shall provide for the supervision of all phases of drilled pile construction. Supervision shall be the Contractor's responsibility as outlined in Quality Control provisions of the SPECIAL CONTRACT REQUIREMENTS. The Contractor shall check each drilled shaft for its depth, water removal, cleanup, workmanship and for all tolerance requirements before any concrete is placed..

1.7.2 Government Inspection

The Contracting Officer’s representative will inspect each drilled shaft excavation. Concrete shall not be placed until the Contracting Officer approves excavation in writing. The Contractor shall furnish the Contracting Officer all necessary equipment required for proper inspection of drilled shaft excavations.

1.7.3 Safety Precautions for Workmen and Inspectors

1.7.3.1 Life Line

Each person entering a drilled shaft excavation shall be provided with a lifeline rigged so that the person can be immediately hoisted out of the excavation in an emergency. The lifeline shall be suitable for instant rescue, securely fastened to a shoulder harness, and separated from any line used to remove excavated materials. No person shall be lowered into a drilled shaft excavation prior to casing the shaft through the overburden.

1.7.3.2 Ventilation

Each drilled shaft excavation shall be provided with a ventilating device of sufficient capacity to assure a safe and healthy atmosphere before workmen and inspectors are permitted to enter the drilled shaft excavation and during all work periods.

PART 2 - PRODUCTS

2.1 CONCRETE WORK

Concrete work shall be in accordance with requirements of Section 03301 CAST-IN-PLACE CONCRETE, as modified herein:

2.1.1 Reinforcing Steel

Reinforcing steel shall conform to ASTM A 615 Grade 60. Reinforcing steel that is welded shall conform to ASTM A 706 Grade 60. Steel shall be welded into cages in accordance with AWS D1.4 and inserted securely in the caissons, in position and alignment, as shown, prior to concrete placement.

2.1.2 Strength

Concrete strength shall be 4000 psi at 28 days. Slump shall be from 3 to 5 inches.

PART 3 - EXECUTION

3.1 PREPARATION

a. Caissons shall be excavated to established depths and dimensions shown. Bottoms of caissons shall be cleaned of loose or soft material and leveled. Excavated material shall be disposed of in accordance with Section 02300 EARTHWORK.

b. In drilling caissons, the surrounding soil and the earth walls shall be adequately and securely protected against cave-ins, displacement of the surrounding earth, and retention of ground water, by means of temporary steel casings. Casings shall have outside diameters not less than indicated shaft sizes, shall be a minimum of 3/16 inch thick, and shall not be removed if the structural integrity of the caisson will be impaired, as determined by the Contracting Officer. Temporary steel casings shall be withdrawn, as the concrete is being placed, maintaining sufficient head of concrete within the casing to prevent extraneous material from falling in from the sides and mixing with the concrete. Casings may be jerked upward a maximum of 4 inches to break the bottom seal, but thereafter shall be removed with a smooth, continuous motion.

c. The inside of steel casings shall be thoroughly cleaned and oiled before reuse.

d. The temporary casing shall be in place from the caisson top to the ground surface until the concrete has set if the elevation of the top of the caisson is below the adjacent ground surface.

e. Water that flows into the excavations shall be continuously removed and all water shall be removed from the excavation bottom, to the extent possible, prior to concrete placement. The maximum permissible depth of water will be 2 inches. In the event of a severe water condition that makes it impossible or impractical to de-water the excavation, concrete shall be placed using underwater tremie after water movement has stabilized.

f. Each caisson excavation will be inspected and approved by the Contracting Officer’s Representative prior to placing concrete. The Contractor shall keep a record of all inspections, with related construction changes. The Contractor shall provide support personnel for inspection and testing procedures.

3.2 INSTALLATION

a. Concrete shall be continuously placed by methods that ensure against segregation and dislodging of excavation sidewalls, and shall completely fill the shaft. Concrete shall be

placed by pumping or drop chutes in dry holes and by tremie or pumping in wet holes. The discharge shall be kept a minimum of 3’-0” below the fresh concrete surface during placement. Drilling of caissons or driving of casings shall not be within 12’-0” of concrete placed within the last 3 days.

b. Concrete shall be brought to a true level surface inside the shaft and a full width cross key formed, or dowels installed, should it become necessary to interrupt placing concrete in any caisson. Prior to placing additional concrete, surfaces shall be cleaned of laitance and slush with one-to-one portland cement grout. The grout shall have a water-cement ratio not exceeding that of the concrete.

c. Concrete in dry batter caissons shall be placed with a drop chute extending within 1 m of the concrete surface in the excavation.

d. Concrete shall be vibrated for full height of caisson.

3.3 TOLERANCES

a. Any caisson out of center or plumb beyond the tolerance specified shall be corrected as necessary to comply with the tolerances and the Contractor shall bear any cost of correction.

b. Cross sections of shafts shall not be less than design dimensions.

c. Caissons shall be installed with top location deviating a maximum of 2 ½ inches from centerline locations.

d. Vertical caissons shall be installed plumb within a maximum of 3 inches for the first 10’-0” and within 3 inches for each 10’-0” of additional depth.

3.4 PROTECTION

Protection shall be provided around top of the excavation to prevent debris from being dislodged into the excavation and concrete.

END OF SECTION

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SECTION 02510

WATER DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1784	(1999a) Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1999) Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(1996b) Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2464	(1999) Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1999) Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(1999) Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(1996a) Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASME INTERNATIONAL (ASME)

ASME B1.20.1	(1983; R 1992) Pipe Threads, General Purpose (Inch)

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(1992) Hypochlorites
AWWA B301	(1992) Liquid Chlorine
AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

AWWA C110	(1993) Ductile-Iron and Gray-Iron Fittings, 3 Inch Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
AWWA C111	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	(1996) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153	(1994; Errata Nov 1996) Ductile-Iron Compact Fittings, 3 In. Through 24 In. (76 mm through 610 mm) and 54 In. through 64 In. (1,400 mm through 1,600 mm) for Water Service
AWWA C500	(1993; C500a) Metal-Sealed Gate Valves for Water Supply Service
AWWA C509	(1994; Addendum 1995) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(1993) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1997) Grooved and Shouldered Joints
AWWA C900	(1997; C900a) Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution
AWWA M23	(1980) Manual: PVC Pipe - Design and Installation

ASBESTOS CEMENT PIPE PRODUCERS ASSOCIATION (ACPPA)

ACPPA Work Practices	(1988) Recommended Work Practices for A/C Pipe

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

DIPRA-Restraint Design	(1997) Thrust Restraint Design for Ductile Iron Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances

1.2 PIPING

This section covers water and lines, and connections to building service at a point approximately 5 feet outside buildings and structures to which service is required. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.2.1 Service Lines

Piping for water service lines shall be copper tubing.

1.2.2 Distribution Lines 4 Inches or Larger

Piping for water distribution lines 4 inches or larger shall be polyvinyl chloride (PVC).

1.2.3 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be in accordance with the applicable provisions of Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation

The manufacturer's recommendations for each material or procedure to be utilized.

Waste Water Disposal Method

The method proposed for disposal of wastewater from hydrostatic tests and disinfection prior to performing hydrostatic tests.

Satisfactory Installation

A statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

SD-06 Test Reports

Bacteriological Disinfection

Test results from commercial laboratory verifying disinfection.

SD-07 Certificates

Installation

A statement signed by the manufacturer's field representative certifying that the Contractor's personnel are capable of properly installing the pipe on the project.

Meters

Manufacturers certificate stating that each meter furnished has been tested for accuracy of registration and compliance with the accuracy and capacity requirements of the appropriate AWWA standard.

1.4 HANDLING

Pipe and accessories shall be handled to ensure delivery to the trench in sound, undamaged condition, including no injury to the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the Contractor shall make the repair in a satisfactory manner, at no additional cost to the Government. No other pipe or material shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective, before or after laying, shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

1.4.1 Miscellaneous Plastic Pipe and Fittings

Polyvinyl Chloride (PVC) pipe and fittings shall be handled and stored in accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Plastic Pipe

2.1.1.1 PVC Plastic Pipe

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B. Pipe 4 through 12 inch Diameter: Pipe, couplings and fittings shall conform to AWWA C900, Class 150, CIOD pipe dimensions, elastomeric-gasket joint, unless otherwise shown or specified.

2.1.2 Copper Tubing

Copper tubing shall conform to ASTM B 88, Type K, annealed.

2.2 FITTINGS AND SPECIALS

2.2.1 PVC Pipe System

a. For pipe less than 4 inch diameter, fittings for threaded pipe shall conform to requirements of ASTM D 2464, threaded to conform to the requirements of ASME B1.20.1 for use with Schedule 80 pipe and fittings; fittings for solvent cement jointing shall conform to ASTM D 2466 or ASTM D 2467; and fittings for elastomeric-gasket joint pipe shall be iron conforming to AWWA C110 or AWWA C111. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104.

b. For pipe 4 inch diameter and larger, fittings and specials shall be iron, bell end in accordance with AWWA C110, 150 psi pressure rating unless otherwise shown or specified, except that profile of bell may have special dimensions as required by the pipe manufacturer; or fittings and specials may be of the same material as the pipe with elastomeric gaskets, all in conformance with AWWA C900. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104. Fittings shall be bell and spigot or plain end pipe, or as applicable. Ductile iron compact fittings shall be in accordance with AWWA C153.

2.2.2 Copper Tubing System

Fittings and specials shall be flared and conform to ASME B16.26.

2.3 JOINTS

2.3.1 Plastic Pipe Jointing

2.3.1.1 PVC Pipe

Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer.

2.3.2 Bonded Joints

For all ferrous pipe, a metallic bond shall be provided at each joint, including joints made with flexible couplings, caulking, or rubber gaskets, of ferrous metallic piping to effect continuous conductivity. The bond wire shall be Size 1/0 copper conductor suitable for direct burial shaped to stand clear of the joint. The bond shall be of the thermal weld type.

2.3.3 Copper Tubing Jointing

Joints shall be compression-pattern flared and shall be made with the specified fittings.

2.4 VALVES

2.4.1 Gate Valves

Gate valves shall be designed for a working pressure of not less than 150 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

a. Valves smaller than 3 inches shall be all bronze and shall conform to MSS SP-80, Type 1, Class 150.

b. Resilient-Seated Gate Valves: Valves 3 inches and larger shall be resilient-seated gate valves shall conform to AWWA C509.

2.4.2 Vacuum and Air Relief Valves

Vacuum and air relief valves shall be of the size shown and shall be of a type that will release air and prevent the formation of a vacuum. The valves shall automatically release air when the lines are being filled with water and shall admit air into the line when water is being withdrawn in excess of the inflow. Valves shall be iron body with bronze trim and stainless steel float.

2.5 VALVE BOXES

Valve boxes shall be cast iron. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch. The word "WATER" shall be cast in the cover. The box length shall adapt, without full extension, to the depth of cover required over the pipe at the valve location.

2.6 MISCELLANEOUS ITEMS

2.6.1 Service Clamps

Service clamps shall have a pressure rating not less than that of the pipe to be connected and shall be double flattened stainless steel strap type. Clamps shall have a bronze body with double stainless steel straps and nuts. Clamps shall have a rubber gasket cemented to the body.

2.6.2 Corporation Stops

Corporation stops shall have standard corporation stop thread conforming to AWWA C800 on the inlet end, with flanged joints, compression pattern flared tube couplings, or wiped joints for connections to goosenecks.

2.6.3 Goosenecks

Copper tubing for gooseneck connections shall conform to the applicable requirements of ASTM B 88, Type K, annealed. Length of cable requirement connections shall be in accordance with standard practice.

2.6.4 Service Stops

Service stops shall be ball valve curb stop-Minneapolis pattern. Pipe connections shall be suitable for the type of service pipe used. All parts shall be of bronze with compression-pattern flared tube couplings and shall be designed for a hydrostatic test pressure not less than 200 psi.

2.6.5 Service Boxes

Service boxes shall be cast iron and shall be extension service boxes of the length required for the depth of the line, with either screw or slide-type adjustment. The boxes shall have housings of sufficient size to completely cover the service stop or valve and shall be complete with identifying covers.

2.6.6 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed. Squeeze type mechanical cutters shall not be used for ductile iron.

3.1.2 Adjacent Facilities

3.1.2.1 Sewer Lines

Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe, for a distance of at least 10 feet each side of the crossing, shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewage force mains or inverted siphons and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete.

3.1.2.2 Water Lines

Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

3.1.2.3 Casing Pipe

Water pipe shall be encased in a sleeve of rigid conduit for the lengths shown. Where sleeves are required, the pipe sleeve shall be steel and conform to AWWA C200 with dimensional requirements as given in ASME B36.10M for pipe 6 inches in diameter and larger and ASTM A 53 for smaller sizes. A minimum clearance of at least 2 inches between the inner wall of the sleeve and the maximum outside diameter of the sleeved pipe and joints shall be provided. Sand bedding or suitable pipe support shall be provided for the water pipe through the sleeve. Sleeves of ferrous material shall be provided with corrosion protection as required in Section 13110 CATHODIC PROTECTION BY GALVANIC ANODES.

3.1.3 Joint Deflection

3.1.3.1 Offset for Flexible Plastic Pipe

Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

3.1.4 Placing and Laying

Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Water-line materials shall not be dropped or dumped into the trench. Abrasion of the pipe coating shall be avoided. Except where necessary in making connections with other lines or as authorized by the Contracting Officer, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joints are complete. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by and at the Contractor's expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored, as shown.

3.1.4.1 Plastic Pipe Installation

PVC pipe shall be installed in accordance with AWWA M23.

3.1.4.2 Piping Connections

Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. When made under pressure, these connections shall be installed using standard methods as approved by the Contracting Officer. Connections to existing asbestos-cement pipe shall be made in accordance with ACPPA Work Practices.

3.1.4.3 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.4.4 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.5 Jointing

3.1.5.1 PVC Plastic Pipe Requirements

a. Pipe less than 4 inch diameter: Threaded joints shall be made by wrapping the male threads with approved thread tape or applying an approved lubricant, then threading the joining members together. The joint shall be tightened using strap wrenches to prevent damage to the pipe and/or fitting. To avoid excessive torque, joints shall be tightened no more than one thread past hand-tight. Preformed rubber-ring gaskets for elastomeric-gasket joints shall be made in accordance with ASTM F 477 and as specified. Pipe ends for push-on joints shall be beveled to facilitate assembly and marked to indicate when the pipe is fully seated. The gasket shall be pre-lubricated to prevent displacement. The gasket and ring groove in the bell or coupling shall match. The manufacturer of the pipe or fitting shall supply the elastomeric gasket. Couplings shall be provided with stops or centering rings to assure that the coupling is centered on the joint. Solvent cement joints shall use sockets conforming to ASTM D 2467. The solvent cement used shall meet the requirements of ASTM D 2564; the joint assembly shall be made in accordance with ASTM D 2855 and the manufacturer's specific recommendations.

b. Pipe 4 through 12-inch diameter: Joints shall be elastomeric gaskets as specified in AWWA C900. Jointing procedure shall be as specified for pipe less than 4-inch diameter with configuration using elastomeric ring gasket.

3.1.5.2 Transition Fittings

Connections between different types of pipe and accessories shall be made with transition fittings approved by the Contracting Officer.

3.1.6 Setting of Meters, Valves and Valve Boxes

3.1.6.1 Location of Valves

After delivery, valves, including those in hydrants, shall be drained to prevent freezing and shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and hydrants and valves shall be fully opened and fully closed to ensure that all parts are in working condition. Check, pressure reducing, vacuum, and air relief valves shall be installed in valve pits. Valves and valve boxes shall be installed where shown or specified, and shall be set plumb. Valve boxes shall be centered on the valves. Boxes shall be installed over each outside gate valve unless otherwise shown. Where feasible, valves shall be located outside the area of roads and streets. Earth fill shall be tamped around each valve box or pit to a distance of 4 feet on all sides of the box, or the undisturbed trench face if less than 4 feet.

3.1.6.2 Location of Fire Hydrants

Fire hydrants shall be located and installed as shown. Each hydrant shall be connected to the main with a 6 inch branch line having at least as much cover as the distribution main. Hydrants shall be set plumb with pumper nozzle facing the roadway, with the center of the lowest outlet not less than 18 inches above the finished surrounding grade, and the operating nut not more than 48 inches above the finished surrounding grade. Except where approved otherwise, the backfill around hydrants shall be thoroughly compacted to the finished grade immediately after installation to obtain beneficial use of the hydrant as soon as practicable. Not less than 7 cubic feet of free-draining broken stone or gravel shall be placed around and beneath the waste opening of dry barrel hydrants to ensure drainage.

3.1.6.3 Location of Service Boxes

Where water lines are located below paved streets having curbs, the boxes shall be installed directly back of the curbs. Where no curbing exists, service boxes for water mains shall be installed in accessible locations, beyond the limits of street surfacing, walks and driveways. Curb stops, for new water service lines to the buildings, shall be located in the center of the driveway, in front of the houses, as shown on the plans.

3.1.7 Tapped Tees and Crosses

Tapped tees and crosses for future connections shall be installed where shown.

3.1.8 Thrust Restraint

Plugs, caps, tees and bends deflecting 11.25 degrees or more, either vertically or horizontally, on waterlines 4 inches in diameter or larger, and fire hydrants shall be provided with thrust restraints. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Thrust restraints shall be either thrust blocks or, for ductile-iron pipes, restrained joints.

3.1.8.1 Thrust Blocks

Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 2,000 psi after 28 days. Blocking shall be placed between solid ground and the hydrant or fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.1.8.2 Restrained Joints

For ductile-iron pipe, the Contractor or the pipe manufacturer, in accordance with DIPRA-Restraint Design, shall design restrained joints.

3.2 HYDROSTATIC TESTS

Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking, unless otherwise approved.

3.2.1 Pressure Test

After the pipe is laid, the joints completed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of 200 psi. Water supply lines designated on the drawings shall be subjected for 1 hour to a hydrostatic pressure test of 200 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants, and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The Contracting Officer may waive requirement for the joints to remain exposed for the hydrostatic tests when one or more of the following conditions is (are) encountered:

a. Wet or unstable soil conditions in the trench.

b. Compliance would require maintaining barricades and walkways around and across an open trench in a heavily used area that would require continuous surveillance to assure safe conditions.

c. Maintaining the trench in an open condition would delay completion of the project.

The Contractor may request a waiver, setting forth in writing the reasons for the request and stating the alternative procedure proposed to comply with the required hydrostatic tests. Backfill placed prior to the tests shall be placed in accordance with the requirements of Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.2.2 Leakage Test

Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not less than 200-psi pressure. Water supply lines designated on the drawings shall be subjected to a pressure equal to 200 psi. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

L = 0.0001351ND(P raised to 0.5 power)

L = Allowable leakage in gallons per hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, in psi gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the Government.

3.2.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipelines jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

3.2.4 Concurrent Hydrostatic Tests

The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be as specified. The Contractor at no additional cost to the Government shall accomplish replacement, repair or retesting required.

a. Pressure test and leakage test may be conducted concurrently.

b. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

3.3 BACTERIAL DISINFECTION

3.3.1 Bacteriological Disinfection

Before acceptance of potable water operation, each unit of completed waterline shall be disinfected as specified. After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite, conforming to paragraph MISCELLANEOUS ITEMS. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the water lines in an approved manner. Polyvinyl Chloride (PVC) pipelines shall be chlorinated using only the above-specified chlorinating material in solution. The agent shall not be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. Valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each fire hydrant on the line shall be opened and closed several times. From several points in the unit, the Contracting Officer will take samples of water in proper sterilized containers for bacterial examination. The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

3.4 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

END OF SECTION

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SECTION 02531

SANITARY SEWERS

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(1999ael) Concrete Aggregates
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 270	(2000) Mortar for Unit Masonry
ASTM C 478	(1997) Pre-Cast Reinforced Concrete Manhole Sections
ASTM C 478M	(1997) Pre-Cast Reinforced Concrete Manhole Sections (Metric)
ASTM C 828	(1998) Low-Pressure Air Test of Vitrified Clay Pipe Lines
ASTM C 924	(1998) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
ASTM C 972	(2000) Compression-Recovery of Tape Sealant
ASTM D 412	(1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 624	(2000) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1784	(1999a) Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D 2680	(1995a) Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 3034	(1998) Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ASTM D 3753	(1999) Glass-Fiber-Reinforced Polyester Manholes
ASTM F 402	(1993; R 1999) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	(1990) Recommended Practice for the Low-Pressure Air Testing of Installed Sewer Pipe

1.2 GENERAL REQUIREMENTS

The construction required herein shall include appurtenant structures and building sewers to points of connection with the building drains 5 feet outside the building to which the sewer system is to be connected. The Contractor shall replace damaged material and redo unacceptable work at no additional cost to the Government. Excavation and backfilling is specified in Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. The Contracting Officer shall accomplish Backfilling after inspection. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Portland Cement

Certificates of compliance stating the type of cement used in manufacture of concrete pipe, fittings and pre-cast manholes.

PART 2 - PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Plastic Pipe

Polyvinyl chloride (PVC) composite sewer piping shall conform to ASTM D 2680. Size 8 inch through 15-inch diameter.

2.1.1.1 PVC Pipe

ASTM D 3034, Type PSM with a maximum SDR of 35, Size 15 inches or less in diameter. PVC shall be certified by the compounder as meeting the requirements of ASTM D 1784, cell Class 12454B. The pipe stiffness shall be greater than or equal to 735/D for cohesionless material pipe trench backfills.

2.2 REQUIREMENTS FOR FITTINGS

Fittings shall be compatible with the pipe supplied and shall have a strength not less than that of the pipe. Fittings shall conform to the respective specifications and other requirements specified below.

2.2.1 Fittings for Plastic Pipe

PVC composite sewer pipefittings shall conform to ASTM D 2680.

2.3 JOINTS

Joint installation shall comply with the manufacturer's instructions. Manufacturer shall certify that fittings and gaskets, utilized for waste drains or industrial waste lines, are oil resistant.

2.3.1 Plastic Pipe Jointing

Flexible plastic pipe (PVC or high-density polyethylene pipe) gasketed joints shall conform to ASTM D 3212.

2.4 BRANCH CONNECTIONS

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

2.5 FRAMES AND COVERS

Frames and covers shall be cast iron, ductile iron or reinforced concrete. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 400 pounds. Reinforced concrete frames and covers shall be as indicated or shall conform to ASTM C 478

or ASTM C 478M. Sanitary sewer manhole covers should be identified with a raised "S" on the cover.

2.6 STEEL LADDER

A steel ladder shall be provided in all manholes. The ladder shall not be less than 16 inches in width, with 3/4-inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123.

2.7 CEMENT MORTAR

Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

2.7.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type II for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalis shall be used.

2.7.2 Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94/C 94M, compressive strength of 4000 psi at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 2500-psi minimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.

2.8 STRUCTURES

2.8.1 Pre-Cast Reinforced Concrete Manhole Sections

Pre-cast reinforced concrete manhole sections shall conform to ASTM C 478, except that portland cement shall be as specified herein. Joints shall be cement mortar, an approved mastic, rubber gaskets, a combination of these types; or the use of external preformed rubber joint seals and extruded rolls of rubber with mastic adhesive on one side.

2.8.2 Glass-Fiber-Reinforced Polyester Manholes

Glass-fiber-reinforced polyester manholes shall conform to ASTM D 3753.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Adjacent Facilities

3.1.1.1 Water Lines

Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be closer horizontally than 10 feet to a water-supply main or service line, except that where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, the horizontal spacing may be a minimum of 6 feet. Where gravity-flow sewers cross above water lines, the sewer pipe for a distance of 10 feet on each side of the crossing shall be fully encased in concrete or shall be acceptable pressure pipe with no joint closer horizontally than 3 feet to the crossing. The thickness of the concrete encasement including that at the pipe joints shall be not less than 4 inches.

3.1.1.2 Structural Foundations

Where sewer pipe is to be installed within 3 feet of an existing or proposed building or structural foundation such as a retaining wall, control tower footing, water tank footing, or any similar structure, the sewer pipe shall be sleeved as specified above. Contractor shall ensure there is no damage to these structures, and no settlement or movement of foundations or footing.

3.1.2 Pipe Laying

a. Pipe shall be protected during handling against impact shocks and free fall; the pipe interior shall be free of extraneous material.

b. Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow. Each pipe shall be laid accurately to the line and grade shown on the drawings. Pipe shall be laid and centered so that the sewer has a uniform invert. As the work progresses, the interior of the sewer shall be cleared of all superfluous materials.

c. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted to obtain the degree of water tightness required.

d. ABS composite pipe ends with exposed truss and filler material shall be coated with solvent weld material before making the joint to prevent water or air passage at the joint between the inner and outer wall of the pipe.

e. Installations of solvent weld joint pipe, using ABS or PVC pipe and fittings shall be in accordance with ASTM F 402. The Contractor shall ensure adequate trench ventilation and protection for workers installing the pipe.

3.1.2.1 Caulked Joints

The packing material shall be well packed into the annular space to prevent the entrance of lead into the pipe. The remainder of the space shall be filled with molten lead that is hot enough to show a rapid change in color when stirred. Scum shall be removed before pouring. The lead shall be caulked to form a tight joint without overstraining the bell and shall have a minimum depth of 1 inch after caulking.

3.1.2.2 Trenches

Trenches shall be kept free of water and as dry as possible during bedding, laying, and jointing and for as long a period as required. When work is not in progress, open ends of pipe and fittings shall be satisfactorily closed so that no trench water or other material will enter the pipe or fittings.

3.1.2.3 Backfill

As soon as possible after the joint is made, sufficient backfill material shall be placed along the pipe to prevent pipe movement off line or grade. Plastic pipe shall be completely covered to prevent damage from ultraviolet light.

3.1.2.4 Width of Trench

If the maximum width of the trench at the top of the pipe, as specified in Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, is exceeded for any reason other than by direction, the Contractor shall install, at no additional cost to the Government, concrete cradling, pipe encasement, or other bedding required to support the added load of the backfill.

3.1.2.5 Jointing

Joints between different pipe materials shall be made as specified, using approved jointing materials.

3.1.2.6 Handling and Storage

Pipe, fittings and joint material shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities for plastic pipe, fittings, joint materials and solvents shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

3.1.3 Leakage Tests

Lines shall be tested for leakage by low-pressure air testing, infiltration tests or exfiltration tests, as appropriate. Low-pressure air testing for vitrified clay pipes shall be as prescribed in ASTM C 828. Low-pressure air testing for concrete pipes shall be as prescribed in ASTM C 828. Low-pressure air testing for PVC pipe shall be as prescribed in UBPPA UNI-B-6. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 and ASTM C 924, after consultation with the pipe manufacturer. Prior to infiltration or exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe

movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 2 feet or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. When the Contracting Officer determines that infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2 feet is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 25 gal per inch diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Government.

3.1.4 Test for Deflection

When flexible pipe is used, a deflection test shall be made on the entire length of the installed pipeline not less than 30 days after the completion of all work including the leakage test, backfill, and placement of any fill, grading, paving, concrete, or superimposed loads. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. The ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 92.5 percent of the inside diameter of the pipe, but 95 percent for RPMP and RTRP. A tolerance of plus 0.5 percent will be permitted. The ball, cylinder, or circular sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 1/4-inch minimum diameter steel shaft having a yield strength of 70,000 psi or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on the opposite end of the shaft shall produce compression throughout the remote end of the ball, cylinder or circular section. Circular sections shall be spaced so that the distance from the external faces of the front and back sections shall equal or exceed the diameter of the circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through or by being flushed through with water, shall be cause for rejection of that run. When a deflection device is used for the test in lieu of the ball, cylinder, or circular sections described, such device shall be approved prior to use. The device shall be sensitive to 1.0 percent of the diameter of the pipe being measured and shall be accurate to 1.0 percent of the indicated dimension. Installed pipe, showing deflections greater than 7.5 percent of the normal diameter of the pipe, or 5 percent for RTRP and RPMP, shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.2 CONCRETE CRADLE AND ENCASEMENT

The pipe shall be supported on a concrete cradle, or encased in concrete where indicated or directed.

3.3 INSTALLATION OF WYE BRANCHES

Wye branches shall be installed where sewer connections are indicated or where directed. Cutting into piping for connections shall not be done except in special approved cases. When the connecting pipe cannot be adequately supported on undisturbed earth or tamped backfill, the pipe shall be encased in concrete backfill or supported on a concrete cradle as directed. Concrete required because of conditions resulting from faulty construction methods or negligence by the Contractor shall be installed at no additional cost to the Government. The installation of wye branches in an existing sewer shall be made by a method, which does not damage the integrity of the existing sewer. One acceptable method consists of removing one pipe section, breaking off the upper half of the bell of the next lower section and half of the running bell of wye section. After placing the new section, it shall be rotated so that the broken half of the bell will be at the bottom. The two joints shall then be made with joint packing and cement mortar.

3.4 MANHOLE DETAILS

3.4.1 General Requirements

Manholes shall be constructed of glass-fiber-reinforced polyester, prefabricated plastic, concrete, or pre-cast concrete manhole sections. The invert channels shall be smooth and semicircular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels shall be formed directly in the concrete of the manhole base, or shall be built up with brick and mortar, or shall be half tile laid in concrete, or shall be constructed by laying full section sewer pipe through the manhole and breaking out the top half after the surrounding concrete has hardened. Pipe connections shall be made to manhole using water stops, standard O-ring joints, special manhole coupling, or shall be made in accordance with the manufacturer's recommendation. The Contractor's proposed method of connection, list of materials selected, and specials required, shall be approved prior to installation. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than 1 inch per foot or more than 2 inches per foot. Free drop inside the manholes shall not exceed 18 inches, measured from the invert of the inlet pipe to the top of the floor of the manhole outside the channels; drop manholes shall be constructed whenever the free drop would otherwise be greater than 1 foot 6 inches.

3.4.2 Steel Ladder Anchorage

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet apart vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.4.3 Jointing, Plastering and Sealing

Mortar joints shall be completely filled and shall be smooth and free from surplus mortar on the inside of the manhole. Mortar and mastic joints between Pre-Cast rings shall be full-bedded in jointing compound and shall be smoothed to a uniform surface on both the interior and exterior of the manhole. Installation of rubber gasket joints between Pre-Cast rings shall be in accordance with the recommendations of the manufacturer. Pre-Cast rings may also be sealed by the use of extruded rolls of rubber with mastic adhesive on one side.

3.4.4 Setting of Frames and Covers

Unless otherwise indicated, tops of frames and covers shall be set flush with finished grade in paved areas or 2 inches higher than finished grade in unpaved areas. Frame and cover assemblies shall be sealed to manhole sections using external preformed rubber joint seals that meet the requirements of ASTM D 412 and ASTM D 624, or other methods specified in paragraph Jointing, Plastering and Sealing, unless otherwise specified.

3.4.5 External Preformed Rubber Joint Seals

External preformed rubber joint seals and extruded rolls of rubber with mastic adhesive shall meet the requirements of ASTM D 412 and ASTM C 972 to ensure conformance with paragraph Leakage Tests. The seal shall be multi-section with neoprene rubber top section and all lower sections made of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and a bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. One unit shall seal a casting and up to six, 2-inch adjusting rings. The bottom section shall be 12 inches in height. A 6-inch high top section will cover up to two, 2 inch adjusting rings. A 12-inch high bottom section will cover up to six, 2 inch adjusting rings. Extension sections shall cover up to two more adjusting rings. Each extension shall overlap the bottom section by 2 inches and shall be overlapped by the top section by 2 inches.

3.5 CONNECTING TO EXISTING MANHOLES

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls. Existing grout at manhole bottoms shall be removed sufficiently to reform channel for new pipe invert to match the existing flow channel.

3.6 BUILDING CONNECTIONS

Building connections shall include the lines to and connection with the building waste drainage piping at a point approximately 5 feet outside the building, unless otherwise indicated. Where building drain piping is not installed, the Contractor shall terminate the building connections approximately 5 feet from the site of the building at a point and in a manner designated.

3.7 CLEANOUTS AND OTHER APPURTENANCES

Clean-outs and other appurtenances shall be installed where shown on the drawings or as directed by the Contracting Officer, and shall conform to the detail of the drawings.

END OF SECTION

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SECTION 02531-B

SANITARY SEWERS - PIPE BURSTING

PART 1 - GENERAL

1.1 DESCRIPTION:

Pipe bursting is a system by which the pneumatic burster unit splits the existing pipe while simultaneously installing a new polyethylene pipe of the same size or larger size pipe where the old pipe existed, then reconnect existing sewer service house connections, television inspection of the Polyethylene Pipe and complete the installation in accordance with the contract documents. Only pneumatically operated equipment with either front or rear expanders for the proper connection to the Polyethylene Pipe will be allowed for use. The pneumatic tool must be used in conjunction with a constant tension hydraulic twin Capstain Winch of either 20, 10 or 5 tons, the size of the winch depends on the diameter of the pipe to be replaced. In no case is the constant tension on the winch to exceed 20 tons.

1.2 QUALIFICATIONS

1. The contractor shall be certified by the particular Pipe Bursting System Manufacturer as is a fully trained user of the pipe bursting system.

2. Polyethylene pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the polyethylene pipe. Training shall be performed by qualified representative.

1.3 SUBMITTALS

Submit the following Contractor’s Drawings:

1. Shop drawings, catalog data, and manufacturer’s technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer’s recommendations for handling, storage, and repair of pipe and fittings damaged.

2. Method of construction and restoration of existing sewer service connections. This shall include: Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewage flow and reconnection of sewer service connections.

3. Certification of workmen training for installing pipe.

4. Television inspection reports and video tapes made after new pipe installation.

1.4 DELIVERY, STORAGE, AND HANDLING

1. Transport, handle, and store pipe and fittings as recommended by manufacturer.

2. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required at the Contractor’s expense, before proceeding further.

3. Deliver, store and handle other materials as required to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS

Polyethylene Plastic Pipe shall be high density polyethylene pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, ASTM D 1248, ASTM D 3550.

1. Sizes of the insertions to be used shall be such to renew the sewer to its original or greater than flow capacity.

2. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer’s own production of the same formulation shall be used.

3. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

4. Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall meet the following:

Depth of Cover (Feet)	Minimum SDR of Pipe
0 - 16.0	19
> 16.1	17

5. Material color shall be white, black or whatever is specified with interior of pipe having a light reflective color to allow easier/better viewing for television inspection.

2.2 TESTS

Tests for compliance with this specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate with this specification shall be furnished, upon request, by the manufacturer for all material furnished under this specification. Polyethylene plastic pipe and fittings may be rejected to meet any requirements of this specification.

2.3 EQUIPMENT

The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall be pneumatic and shall generate sufficient force to burst and compact the existing pipe line. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed.

The pipe bursting tool shall be pulled through the sewer by a winch located at the upstream manhole. The bursting unit shall pull the polyethylene pipe with it as it moves forward. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the PE pipe insertion. The pipe bursting unit shall be remotely controlled.

The pipe bursting tool shall be pneumatic. The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the

surrounding ground. This action shall not only break the pipe but also create the void into which the burster can be winched and enables forward progress to be made. At the same time the polyethylene pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.

The burster shall have its own forward momentum while being assisted by winching. A hydraulic winch shall give the burster friction by which it can be moved forward. To form a complete operating system, the burster must be matched to a constant tension hydraulic winching system.

2.4 WINCH UNIT

A winch shall be attached to the front of the bursting unit. The winch shall provide a constant tension to the burster in order that it may operate in an efficient manner. The winch shall ensure directional stability in keeping the unit on line.

The winch shall be hydraulically operated providing a constant tension throughout the operation.

The winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure the winching load.

The winch must automatically maintain a constant tension at a set tonnage reading.

The constant tension winch shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.

The winch, cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.

The contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.

The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

PART 3 - EXECUTION

3.1 SEWER SERVICE CONNECTIONS

1. All sewer service connections shall be identified and located prior to the pipe insertion to expedite reconnection. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the engineer and/or his representative. Upon completion of insertion of the new pipe, the contractor shall expedite the reconnection of services so as to minimize any inconvenience to the customers.

2. Sewer service connections shall be connected to the new pipe by various methods. The saddles should be made of a material compatible with that of the pipe.

a. Electrofusion saddles shall be installed in accordance with the manufactures recommended procedures.

b. Conventional Fusion saddles shall be installed in accordance with the manufacturers

recommended procedures.

c. Connection of the new service lateral* to the mainline shall be accomplished by means of a compression-fit service connection. The service connection shall be specifically designed for connection to the sewer main being installed, such as INSERTA TEE as manufactured by Fowler Manufacturing Co. Hillsboro, Oregon, (503)357-2110, or its equal. Install using procedures and equipment as referenced in manufacturer's written installation instructions.

* TYPES AVAILABLE FOR ALL MAINLINES:

TYPES	GASKETTED BELL SDR 35	GASKETTED BELL IPS/SCH 40
PVC Hub	ASTM D3034 SDR 35	ASTM D3034 SDR 26
Rubber Boot	ASTM C443	ASTM C443
Band	301 SS	301 SS
Screw	305 SS	305 SS
Housing	301 SS	301 SS
Gasket	ASTM F477	ASTM F477

PREPARATION

BYPASSING SEWAGE:

a. By-Pass Pumping: The Contractor, when and where required, shall provide diversion for the pipe bursting/replacement process. The pumps and by-pass lines shall be of adequate capacity and size to handle all flows. All costs for by-pass pumping, required during installation of the pipe shall be subsidiary to the pipe reconstruction item.

b. The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during the execution of the work.

c. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, repair, property damage cost and claims.

3.2 TELEVISION INSPECTION

Television inspection of the existing pipelines has been performed. Television inspection video tapes shall be provided to the Contractor prior to commencement of work.

1. Post construction video tape upon completion of reconstruction of each reach of sewer with voice description, as appropriate with stationing of services indicated. Video tape shall be provided to the Government.

2. Should any portion of the inspection tapes be of inadequate quality or coverage, as determined by the Contracting Officer, Contractor will have the portion re-inspected and re-video taped at no additional expense to the Government.

3.3 CONSTRUCTION METHOD

1. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe from damage during

installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit. Winch line is to be centered in pipe to be burst with adjustable boom.

2. The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe, but not less than four (4) inches, shall be allowed to protrude into the manhole to provide for occurrence. Restraint of pipe ends shall be achieved by means of electrofusion couplings. The electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of electrofusion couplings shall be done in accordance with the manufacturers recommended procedures.

3. Following the relaxation period, the annular space may be sealed. Sealing shall be made with material approved by the Contracting Officer or his/her representative and shall extend a minimum of eight (8) inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint. The terminating pipe ends in manholes shall be connected by electrofusion couplings to eliminate ground water infiltration. Installations of electrofusion couplings shall be done in accordance with the manufacturers recommended procedures.

4. Pit Placement Issues

a. Windowing Method
Up to 12" diameter PE pipe, the Contractor shall use the "windowing" method where necessary, to prevent damage to surrounding infrastructure.

Underground utility locates must be performed prior to determining the necessity and feasibility of the "windowing" method.

b. Tool Removal Back to Starting Pipe via Being Pulled Back Out of the Newly Installed PE Pipe
The tool must have the ability to operate in reverse to prevent damage to the HDPE during removal.

3.4 FIELD TESTING

1. After the existing sewer is completely replaced, internally inspect with television camera and video tape as required. The finished tape shall be continuous over the entire length of the sewer between two manholes. The entire length is to be free of any visual defects.

2. Defects which may affect the integrity or strength of the pipe in the opinion of the Contracting Officer shall be repaired or the pipe replaced at the Contractor's expense.

3.5 PIPE JOINING

1. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted.

All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

2. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the engineer and/or his representative prior to insertion.

All defective joints shall be cut out and replaced at no cost to the Government. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Contracting Officer or his/her representative shall be discarded and not used.

3. Terminal sections of pipe that are joined within the insertion pit shall be connected with electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.

END OF SECTION

SECTION 02531-C

SANITARY SEWERS, CURED-IN-PLACE PIPE

PART 1 — GENERAL

1.1 THE REQUIREMENT

This Specification covers the work necessary to furnish and install complete, the curediIn-place pipe (CIPP). The Contractor shall provide all materials, labor, equipment, and services necessary for bypass pumping and/or diversion of sewage flows, cleaning of sewer to be lined, liner installation, reconnection of service connections, and final television inspection and testing of lined pipe system.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

The following references are part of this Specification, in case of conflict between the requirements of this Specification and those of the listed documents, the requirements of this Specification shall prevail. The latest edition of the following references shall be used:

ASTM D543	Standard Test Methods for Resistance of Plastics to Chemical Reagents
ASTM D790	Standard Test Methods for Un-Reinforced and Reinforced Insulating Materials Flexural Properties of Plastics and Electrical
ASTM F1216	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of Resin-impregnated Tube

1.3 CONTRACTOR SUBMITTALS

a. The Contractor shall provide submittals on all lining materials and resins, and shall furnish manufacturer certification that the liner materials are in compliance with the specifications, codes, and standards referenced herein. The submittals shall include details of all component materials and construction details including complete manufacturers recommendations for storage procedures and temperature control, handling and inserting the liner, curing details, service connection methods, and trimming and finishing. The Contractor shall also provide manufacturers certification, field measurements and pipe sizing calculations which demonstrate that the liner has been properly undersized to avoid the creation of wrinkles or folds.

b. The Contractor shall submit bypass pumping and/or diversion plans for review by the Contracting Officer at least 10 working days prior to the work. The Contractor shall notify the Contracting Officer 24 hours prior to commencing with the bypass pumping operation. The Contractor's plan for bypass pumping shall be satisfactory to the Contracting Officer before the Contractor shall be allowed to commence bypass pumping.

c. The Contractor shall submit shop drawings that identify the liner insertion and bypass pumping locations and methods with sufficient detail to assure that the work can be

accomplished without sewage spill. The bypass pumping plan shall include an emergency response plan to be followed in the event of a failure of the bypass pumping system.

d. The Contractor shall submit the resin manufacture's heating requirements. Additionally, the Contractor shall conceptually discuss with the Contracting Officer the general curing guidelines.

1.4 QUALITY ASSURANCE

a. The finished liner shall be continuous over the entire length of an insertion run between two manholes or access points and shall be free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination.

b. Wrinkles in the finished liner pipe that cause a backwater of 1/4 inch or more or reduce the hydraulic capacity of the pipe are unacceptable and shall be removed and repaired by the Contractor at the Contractor's expense. The Contractor shall remove a section of pipe, if so directed by the Contracting Officer, to determine if a void between the wrinkle and pipe wall exists. If so proven that a void does exist, the Contractor shall repair and replace that section of pipe at the Contractor's expense. If a void does not exist, the Contractor shall repair and replace that section of pipe at the Government's expense. Methods of repair shall be proposed by the Contractor and submitted to the Contracting Officer for review.

PART 2— PRODUCTS

2.1 MATERIALS

a. Liner Tube

1. The liner tube shall consist of one or more layers of flexible needled felt or an equivalent woven and/or non-woven material capable of carrying resin, withstanding installation pressures and curing temperatures, and is compatible with the resin system used. The liner shall be fabricated to a size that, when installed, will fit the internal circumference of the existing pipe without any annular space between the liner and existing pipe wall.

2. The resin used shall be compatible with the rehabilitation process, shall be able to cure in the presence or absence of water and the initiation temperature for cure shall be as recommended by the resin manufacturer.

3. The liner shall be fabricated from materials which when cured, will be chemically resistant to withstand internal exposure to sewage gases containing quantities of hydrogen sulfide, carbon monoxide, methane, petroleum hydrocarbons, saturation with moisture, diluted sulfuric acid, and other chemical reagents determined by the Contracting Officer.

4. The minimum tube length shall be that deemed necessary by the Contractor to effectively span the distance from the inlet to the outlet of the respective manholes, or access points, unless otherwise specified. The Contractor shall verify the lengths in the field before impregnation of the tube with resin. Individual insertion runs may be made over one or more manhole sections as determined in the field by the Contractor.

Prior to insertion, the liner shall be free of all visible tears, holes, cuts, foreign materials, and other defects.

Prior to insertion, the Contractor shall provide data on the maximum allowable stresses and elongation of the tube. The exterior of the manufactured tube shall be marked along its length at regular intervals not to exceed five feet. These marks shall be used as a gauge to measure elongation during insertion. Should the overall elongation of a reach exceed five percent the liner tube shall be rejected and replaced.

b. Resin

1. Unless otherwise specified, provide a general purpose, unsaturated, thermosetting, polyester, vinylester, or epoxy resin able to cure in the presence or absence of water, and a catalyst system compatible with the insertion process.

2. Resin shall not be subjected to ultraviolet light and shall form no excessive bubbling or wrinkling during lining.

2.2 PHYSICAL PROPERTIES

a. The CIPP system shall conform to and comply with the minimum standards listed below.

Characteristic	Test Method	Polyester Resin	Vinyhlester & Epoxy Resins
Flexural Strength	ASTM D 790	4,500 psi	5,000 psi
Flexural Modulus (short term)	ASTM D 790	250,000 psi	300,000 psi
Flexural Modulus (long term)		125,000 psi	150,000 psi

b. The liner thicknesses should be industry standard for rehabilitation of the pipe diameters shown on the plans and the physical properties shown in Section 2.2.a. If the Contractor uses resins having different physical properties, the Contractor shall submit detailed calculations of the proposed liner thickness for review by the Contracting Officer.

PART 3— EXECUTION

3.1 PREPARATION

a. Bypass Pumping: The Contractor, when and where required, shall provide diversion for the pipe bursting/replacement process. The pumps and by-pass lines shall be of adequate capacity and size to handle all flows. All costs for by-pass pumping, required during installation of the pipe, shall be subsidiary to the pipe reconstruction item.

b. The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during the execution of the work.

c. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, repair, property damage cost and claims.

d. Television Inspection: Television inspection of the existing pipelines has been performed. Television inspection video tapes shall be provided to the Contractor prior to commencement of

work.

1. Post construction video tape upon completion of reconstruction of each reach of sewer with voice description, as appropriate with stationing of services indicated. Video tape shall be provided to the Government.

2. Should any portion of the inspection tapes be of inadequate quality or coverage, as determined by the Contracting Officer, Contractor will have the portion re-inspected and re-video taped at no additional expense to the Government.

e. Point Repairs

It shall be the responsibility of the Contractor to clear the line of obstructions such as solids, offset joints, protruding service connections or collapsed pipe that will prevent liner Insertion. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment or by remotely performed point repair methods acceptable to the Contracting Officer, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Before any point repair excavation is pursued, the Contractor shall give the Contracting Officer three (3) working days notice, Point repair excavation shall proceed only with the Contracting Officer's authorization. Protruding laterals shall be removed either internally with a hydro-jet cutter or by external point repair. The type and location of the repairs are included with the Project Documents.

f. Grouting of Severe Defects

It shall be the responsibility of the Contractor to grout severe open joints and cracks in the pipeline. The Contractor shall be required to grout all open joints and cracks, which in the Contractor's opinion, will impede the specified performance of the liner except that all open joints greater than 1-inch shall be grouted irrespective of the Contractor's assessment. An estimate of the number of locations to be grouted is provided in the bid schedule. The locations shall be determined by the Contractor based on video tapes provided with the Project Documents.

g. Manholes

The Contractor shall protect the manholes to withstand forces generated by equipment, water or air pressure used while inserting the tube.

3.2 INSTALLATION

a. Resin Impregnation

1. The uncured resin in the original containers and the un-impregnated fiber-felt tube shall be impregnated by vacuum or other means prior to installation. The materials and 'wet-out^{0} procedure shall be subject to inspection by the Contracting Officer. A resin and catalyst system compatible with the requirements of the method shall be used.

2. The impregnated liner bag shall be transported to and stored at the site in such a manner that it will not be damaged, exposed to direct sunlight, or result in any public safety hazard. The impregnated liner bag shall be kept cool during shipment and storage. All materials shall be subject to inspection and review prior to installation.

b. Liner Installation

1. The impregnated tube shall be inserted through an existing manhole or other access approved by the Contracting Officer by means of the installation process. The application of hydrostatic head, compressed air, or other means shall fully extend the liner to the next designated manhole or termination point and inflate and firmly adhere the liner to the pipe wall.

2. The liner shall be installed at a rate less than 10 feet per minute at all times.

c. Curing

1. After placement is completed, a suitable heat source and distribution equipment shall be provided. The equipment shall be capable of circulating hot water, air, and/or steam throughout the section by means of a pre-strung hose which has been perforated in accordance with the manufacturer's recommendations or other methods acceptable by the Contracting Officer to raise the temperature uniformly above the temperature required to effect resin cure. This temperature shall be determined by the manufacturer based on the resin/catalyst system employed.

2. The heat source piping shall be fitted with continuous monitoring thermocouples to gauge the temperature of the incoming and outgoing water, steam, and/or air supply. Water, steam, or air temperature during the cure period shall meet the requirements of the resin manufacturer as measured at the heat source inflow and outflow return lines. At the direction of the Contracting Officer, the Contractor shall provide standby equipment to maintain the heat source supply. An additional continuous monitoring thermocouple shall be placed between the impregnated felt tube and the pipe invert at the remote manhole and at a point midway between the upstream and downstream manholes to determine the temperature during the cure. The temperature during the cure shall not be less than 130 degrees F at the boundary between the pipe wall and the liner unless otherwise directed by the Contracting Officer because of the resin system used.

3. The initial cure shall be deemed to be completed when Inspection of the exposed portions of the liner appear hard and Sound and the remote temperature sensors indicate that an exotherm has occurred, The cure period shall be of duration recommended by the resin manufacturer during which time the recirculation of the water, steam, and/or air and cycling of the heat exchanger continuously maintain the required temperature.

4. Temperature shall be maintained during the curing period as recommended by the resin manufacturer, and shall follow the healing schedule supplied by the manufacturer.

d. Cool Down

1. The hardened liner shall be cooled to a temperature below 100 degrees F before relieving the static head or pressure in the lined pipe and returning normal flow back into the system. The cool down may be accomplished by introducing cool water or air into the lined pipe. Care shall be taken in the release of the static head or pressure so that a vacuum will not develop which could damage the newly installed liner.

2. If the liner fails to make a tight seal at the manhole walls, a seal consisting of a resin mixture compatible with the liner/resin system shall be applied in accordance with manufacturer specifications.

3.3 SERVICE LINE CONNECTION

The Contractor shall be responsible for connecting new service connections to the lined pipe. Location of new service connections are shown on the plans.

3.4 TESTING

a. Material Testing

1. All material testing shall be performed by a registered independent, third-party laboratory.

2. The Contractor shall provide certified test results of the short term properties of the cured lining material from the actual installed liner at a minimum of one location per each liner insertion setup.

3. The cured liner shall be sampled and tested for flexural strength and flexural modulus (short term). Flexural strength and modulus shall be tested in accordance with the requirements of ASTM D790. The liner shall be in compliance with the physical properties stated under Section 2.02 of this specification. A certificate of compliance shall be provided for long term flexural modulus.

4. Corrosion resistance requirements shall be as stated in ASTM Fl 216, Section X2, Chemical Resistance Tests.

5. Delamination testing shall be in accordance with ASTM F121 6, Section 8.4 if required by the Contracting Officer.

b. Field Testing

1. Test line for exfiltration in accordance with ASTM F1216, Section 8.2 prior to service line reconnections. Testing shall exclude maximum pressure limitation (4.3 psi) at lowest end. Leakage testing shall be performed after all dry and non-bondable hoses and tubes are completely removed from the pipe.

2. After completion of all liner insertions, service reconnections, and finish work at the manholes, the sewer shall be televised with a color CCTV tilt-head camera recorded in VHS format. The original tape shall be provided to the Contracting Officer.

END OF SECTION

SECTION 02556

GAS DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN GAS ASSOCIATION (AGA)

AGA Manual	(1994; addenda/correction Jan 1996) A.G.A. Plastic Pipe Manual for Gas Service

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B109.2	(2000) Diaphragm Type Gas Displacement Meters (500 Cubic Feet per Hour Capacity and Over)

AMERICAN PETROLEUM INSTITUTE (API)

API Spec 6D	(1994; Supple 1 Jun 1996; Supple 2 Dec 1997) Pipeline Valves (Gate, Plug, Ball, and Check Valves)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 181/A 181M	(2000) Carbon Steel Forgings, for General-Purpose Piping
ASTM D 2513	(2000) Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
ASTM D 2683	(1998) Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
ASTM D 3261	(1997) Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM D 3308	(1997) PTFE Resin-Skived Tape
ASTM D 3350	(1999) Polyethylene Plastics Pipe and Fittings Materials

ASME INTERNATIONAL (ASME)

ASME B1.20.1	(1983; R 1992) Pipe Threads, General Purpose (Inch)
ASME B16.5	(1996; B16.5a) Pipe Flanges and Flanged Fittings NPS 1/2 thru NPS 24
ASME B16.9	(1993) Factory-Made Wrought Steel Buttwelding Fittings

ASME B16.11	(1996) Forged Fittings, Socket-Welding and Threaded
ASME B16.21	(1992) Nonmetallic Flat Gaskets for Pipe Flanges
ASME B16.34	(1997) Valves - Flanged, Threaded, and Welding End
ASME B16.40	(1985; R 1994) Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems
ASME B31.8	(1995) Gas Transmission and Distribution Piping Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-2962	(Rev A) Enamel, Alkyd (Metric)

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-25	(1998) Standard Marking System for Valves, Fittings, Flanges and Unions

NACE INTERNATIONAL (NACE)

NACE RP0185	(1996) Extruded, Polyolefin Resin Coating Systems with Soft Adhesives for Underground or Submerged Pipe

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 7/NACE 4	(1994) Brush-Off Blast Cleaning

UNDERWRITERS LABORATORIES (UL)

UL Gas&Oil Dir	(1999) Gas and Oil Equipment Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G"

designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Pipe, Fittings, and Associated Materials

Drawings shall contain complete schematic and piping diagrams and any other details required demonstrating that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of the system and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

SD-03 Product Data

Materials and Equipment

A complete list of equipment and materials, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions, including, but not limited to the following:

a. Meters.

b. Regulators

Spare Parts Data

Spare parts lists for each different item of material and equipment specified, after approval of the detail drawings and not later than 3 months prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

Connections to Existing Lines

Notification of the Contractor's schedule for making connections to existing gas lines, at least 10 days in advance.

Jointing Polyethylene and Fiberglass Piping; G, ED

A copy of qualified jointing procedures, training procedures, qualifications of trainer, and training test results for joiners and inspectors.

Connection Plan; G, ED

A copy of procedures for gas line tie in and hot taps, as applicable in accordance with ASME B31.8.

SD-06 Test Reports

Pressure and Leak Tests; G

Data from all pressure tests of the distribution system

SD-07 Certificates

Utility Work

Certification from the Operating Agency/Utility Company that work for which the Utility is responsible has been completed.

Training

A copy of each inspector and jointer's training certificate with respective test results.

SD-10 Operation and Maintenance Data

Gas Distribution System; G, ED

Six copies, in booklet form and indexed, of site specific natural gas operation and maintenance manual for each gas distribution system including system operation, system maintenance, equipment operation, and equipment maintenance manuals described below. If operation and maintenance manuals are provided in a common volume, they shall be clearly differentiated and separately indexed.

The System Operation Manual shall include but not be limited to the following:

a. Maps showing piping layout and locations of all system valves and gas line markers.

b. Step-by-step procedures required for system startup, operation, and shutdown. System components and equipment shall be indexed to the gas maps.

c. Isolation procedures and valve operations to shut down or isolate each section of the system. Valves and other system components shall be indexed to the gas maps.

d. Descriptions of Site Specific Standard Operation Procedures including permanent and temporary pipe repair procedures, system restart and test procedures for placing repaired lines back in service, and procedures for abandoning gas piping and system components.

e. Descriptions of Emergency Procedures including: isolation procedures including required valve operations with valve locations indexed to gas map, recommended emergency equipment, checklist for major emergencies and procedures for connecting emergency gas supply.

The Equipment Operation Manual shall include, but not be limited to, detail drawings, equipment data, and manufacturer supplied operation manuals for all equipment, valves and system components.

The System Maintenance Manuals shall include, but not be limited to:

a. Maintenance check list for entire gas distribution system.

b. Descriptions of site specific standard maintenance procedures

c. Maintenance procedures for installed cathodic protection systems.

d. Piping layout, equipment layout, and control diagrams of the systems as installed.

e. Identification of pipe materials and manufacturer by location, pipe repair procedures, and jointing procedures at transitions to other piping materials or piping from different manufacturer.

The Equipment Maintenance Manuals shall include but not be limited to the following:

a. Identification of valves and other equipment by materials, manufacturer, vendor identification and location

b. Maintenance procedures and recommended maintenance tool kits for all valves and equipment.

c. Recommended repair methods, either field repairs, factory repair, or whole-item replacement for each valve component or piece of equipment or component item.

d. Routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide.

1.3 GENERAL REQUIREMENTS

1.3.1 Jointing Polyethylene Piping

Piping shall be joined by performance qualified joiners using qualified procedures in accordance with AGA Manual. Manufacturer's prequalified joining procedures shall be used. Joints shall be inspected by an inspector qualified in the joining procedures being used and in accordance with AGA Manual. Joiners and inspectors shall be qualified at the job site by a person who has been trained and certified by the manufacturer of the pipe, to train and qualify joiners and inspectors in each joining procedure to be used on the job. Training shall include use of equipment, explanation of the procedure, and successfully making joints that pass tests specified in AGA Manual. The Contracting Officer shall be notified at least 24 hours in advance of the date to qualify joiners and inspectors.

1.3.2 Standard Products

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Asbestos or products containing asbestos shall not be used. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site. Valves, flanges, and fittings shall be marked in accordance with MSS SP-25.

1.3.3 Verification of Dimensions

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

1.3.4 Handling

Pipe and components shall be handled carefully to ensure a sound, undamaged condition. Particular care shall be taken not to damage pipe coating. No pipe or material of any kind shall be placed inside another pipe or fitting after the coating has been applied, except as specified in paragraph INSTALLATION. Plastic pipe shall be handled in conformance with AGA Manual.

PART 2 - PRODUCTS

2.1 PIPE, FITTINGS, AND ASSOCIATED MATERIALS

2.1.1 Small Fittings

Fittings 1-1/2 inch and smaller shall conform to ASME B16.11.

2.1.2 Fittings, 2 Inches and Larger

Pipe flanges and flanged fittings including bolts, nuts, and bolt patterns shall be in accordance with ASME B16.5. Buttweld fittings shall be in accordance with ASME B16.9. Weld neck flanges shall be used.

2.1.3 Steel Forged Branch Connections

Connections shall conform to ASTM A 181/A 181M, Class 60, carbon steel.

2.1.4 Flange Gaskets

Gaskets shall be non-asbestos compressed materials in accordance with ASME B16.21, 1/16-inch minimum thickness, full face or self-centering flat ring type. The gaskets shall contain aramid fibers bonded with nitrile butadiene rubber (NBR), or glass fibers bonded with polytetrafluoroethylene, suitable for maximum 600 degrees F service and meeting applicable requirements of ASME B31.8.

2.1.5 Pipe Threads

Pipe threads shall conform to ASME B1.20.1.

2.1.6 Polyethylene Pipe, Fittings and Joints

Polyethylene pipe, fittings and joints shall conform to ASTM D 3350 and ASTM D 2513, pipe designations PE 2406 and PE 3408, rated SDR 17 or less, as specified in ASME B31.8. Pipe sections shall be marked as required by ASTM D 2513. Butt fittings shall conform to ASTM D 3261 and socket fittings shall conform to ASTM D 2683. Fittings shall match the service rating of the pipe.

2.1.7 Sealants for Steel Pipe Threaded Joints

2.1.7.1 Sealing Compound

Joint sealing compound shall be as listed in UL Gas & Oil Dir, Class 20 or less.

2.1.7.2 Tape

Polytetrafluoroethylene tape shall conform to ASTM D 3308.

2.1.8 Identification

Pipe flow markings and metal tags for each valve, meter, and regulator shall be provided as required by the Contracting Officer.

2.1.9 Insulating Joint Materials

Insulating joint materials shall be provided between flanged or threaded metallic pipe systems where shown to isolate galvanic or electrolytic action.

2.1.9.1 Threaded Joints

Joints for threaded pipe shall be steel body nut types, dielectric waterways with insulating gaskets.

2.1.9.2 Flanged Joints

Joints for flanged pipe shall consist of full-face sandwich-type flange insulating gasket of the dielectric type, insulating sleeves for flange bolts and insulating washers for flange nuts.

2.1.10 Gas Transition Fittings

Gas transition fittings shall be manufactured steel fittings approved for jointing steel and polyethylene pipe. Approved transition fittings are those that conform to AGA Manual requirements for transition fittings.

2.2 VALVES

Valves shall be suitable for shutoff or isolation service and shall conform to the following:

2.2.1 Steel Valves

Steel valves 1-1/2 inches and smaller installed underground shall conform to ASME B16.34, carbon steel, socket weld ends, with square wrench operator adapter. Steel valves 1-1/2 inches and smaller installed aboveground shall conform to ASME B16.34, carbon steel, socket weld or threaded ends with hand wheel or wrench operator. Steel valves 2 inches and larger installed underground shall conform to API Spec 6D, carbon steel, buttweld ends with square wrench operator adapter. Steel valves 2 inches and larger installed aboveground shall conform to API Spec 6D, carbon steel, buttweld or flanged ends with hand wheel or wrench operator.

2.2.2 Polyethylene Valves

Polyethylene valves shall conform to ASME B16.40. Polyethylene valves, in sizes 1/2 inch to 6 inches, may be used with polyethylene distribution and service lines, in lieu of steel valves, for underground installation only.

2.3 PRESSURE REGULATORS

Regulators shall have ferrous bodies, shall provide backflow and vacuum protection, and shall be designed to meet the pressure, load and other service conditions.

2.3.1 Service Line Regulators

Pressure regulators for individual service lines shall have ferrous bodies. Regulator shall be capable of reducing distribution line pressure to pressures required for users. Regulators shall be provided where gas will be distributed at pressures in excess of 10 inches of water column. Pressure relief shall be set at a lower pressure than would cause unsafe operation of any connected user. Regulator shall have single port with orifice diameter no greater than that recommended by the manufacturer for the maximum gas pressure at the regulator inlet. Regulator valve vent shall be of resilient materials designed to withstand flow conditions when pressed against the valve port. Regulator shall be capable of regulating downstream pressure within limits of accuracy and shall be capable of limiting the buildup of pressure under no-flow conditions to 50 percent or less of the discharge pressure maintained under flow conditions. Regulator shall have a self-contained service regulator. Regulator pipe connections shall not exceed 2-inch size.

2.4 PROTECTIVE COVERING MATERIALS

Continuously extruded polyethylene and adhesive coating system materials shall conform to NACE RP0185, Type A.

2.5 ANODELESS SERVICE RISER

Anodeless service risers shall be Uponor Aldyl or approved equal and shall have integral stainless steel tracer wire connectors. Anodeless risers shall meet applicable DOT requirements and shall be C.S.A. approved and IAPMO listed. Risers shall have threaded or slip-on moisture seals and no loose parts. Risers shall have thin film epoxy coating and individual serialization of each riser.

PART 3 - EXECUTION

3.1 TITAN SITE

The Government owns the natural gas system at the Titan site. Civil (ref civil) will provide the service piping and master shutoff. A single service riser will serve both residences within each duplex.

3.2 EXCAVATION AND BACKFILLING

Earthwork shall be as specified in Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.3 GAS MAINS

Pipe for gas mains shall be polyethylene. New steel pipe and fittings shall be coated with protective covering as specified. Polyethylene mains shall not be installed aboveground.

3.4 SERVICE LINES SUPPLY CONNECTION

Service lines shall be constructed of materials specified for gas mains and shall extend from a gas main to and including the point of delivery within 5 feet of the building. The point of delivery is the meter set assembly. The service lines shall be connected to the gas mains as indicated. Where indicated, service line shall be provided with an isolation valve of the same size as the service line. The service lines shall be as short and as straight as practicable between the point of delivery and the gas main and shall not be bent or curved laterally unless necessary to avoid obstructions or otherwise permitted. Service lines shall be laid with as few joints as practicable using standard lengths of pipe. Shorter lengths shall be used only for closures. Polyethylene service lines shall not be installed aboveground except as permitted in ASME B31.8.

3.5 WORKMANSHIP AND DEFECTS

Pipe, tubing, and fittings shall be clear and free of cutting burrs and defects in structure or threading and shall be thoroughly brushed and blown free of chips and scale. Defective pipe, tubing, or fittings shall be replaced and shall not be repaired.

3.6 PROTECTIVE COVERING

3.6.1 Protective Covering for Aboveground Piping Systems

Finish painting shall conform to the applicable paragraphs of Section 09912 PAINTING and as follows:

3.6.1.1 Ferrous Surfaces

Shop primed surfaces shall be touched up with ferrous metal primer same type paint as the shop primer. Surfaces that have not been shop primed shall be solvent-cleaned in accordance with SSPC SP 1. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be mechanically cleaned by power wire brushing in accordance with SSPC SP 3 or brush-off blast cleaned in accordance with SSPC SP 7/NACE 4 and primed with ferrous metal primer in accordance with SSPC Paint 25. Primed surfaces shall be finished with two coats of exterior alkyd paint conforming to CID A-A-2962 Type I, Class A, Grade B.

3.6.1.2 Nonferrous Surfaces

Nonferrous surfaces shall not be painted.

3.6.2 Protective Covering for Piping in Valve Boxes

Piping in valve boxes shall receive protective coating as specified for underground steel pipe.

3.7 INSTALLATION

Gas distribution system and equipment shall be installed in conformance with the manufacturer's recommendations and applicable sections of ASME B31.8, AGA Manual and 49 CFR 192. Pipe shall be cut without damaging the pipe. Unless otherwise authorized, an approved type of mechanical cutter shall do cutting. Wheel cutters shall be used where practicable. On steel pipe 6 inches and larger, an approved gas-cutting-and-beveling machine

may be used. Cutting of plastic pipe shall be in accordance with AGA Manual. Valve installation in plastic pipe shall be designed to protect the plastic pipe against excessive torsional or shearing loads when the valve is operated and from other stresses which may be exerted through the valve or valve box.

3.7.1 Installing Pipe Underground

Gas mains and service lines shall be graded. Service lines shall have 36-inch minimum cover; shall be placed on firmly compacted select material for the full length. Gas mains shall have 42-inches of cover. Trench shall be excavated below pipe grade, bedded with bank sand, and compacted to provide full-length bearing. Laying the pipe on blocks to produce uniform grade will not be permitted. The pipe shall be clean inside before it is lowered into the trench and shall be kept free of water, soil, and all other foreign matter that might damage or obstruct the operation of the valves, regulators, meters, or other equipment. When work is not in progress, open ends of pipe or fittings shall be securely closed by expandable plugs or other suitable means. Minor changes in line or gradient of pipe that can be accomplished through the natural flexibility of the pipe material without producing permanent deformation and without overstressing joints may be made when approved. Changes in line or gradient that exceed the limitations specified shall be made with fittings. When cathodic protection is furnished, electrically insulated joints or flanges shall be provided. When polyethylene or fiberglass piping is installed underground, #12 copper tracer wire shall be taped to the pipe to permit locating with a magnetic detector. Where pipes surface, provide exposed pigtails. After lying of pipe and testing, trench shall be backfilled in accordance with Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS.

3.7.2 Installing Pipe Aboveground

Aboveground piping shall be protected against dirt and other foreign matter as specified for underground piping. Joints in steel pipe shall be welded; however, joints in pipe 1-1/2 inches in diameter and smaller may be threaded; joints may also be threaded to accommodate the installation of valves. Flanges shall be of the weld neck type to match wall thickness of pipe.

3.8 PIPE JOINTS

Pipe joints shall be designed and installed to effectively sustain the longitudinal pullout forces caused by the contraction of piping or superimposed loads.

3.8.1 Threaded Steel Joints

Threaded joints in steel pipe shall have tapered threads evenly cut and shall be made with UL approved graphite joint sealing compound for gas service or polytetrafluoroethylene tape applied to the male threads only. Caulking of threaded joints to stop or prevent leaks will not be permitted.

3.8.2 Welded Steel Joints

Gas pipe weldments shall be as indicated. Changes in direction of piping shall be made with welding fittings only; mitering or notching pipes to form elbows and tees or other similar type construction will not be permitted. Branch connection may be made with either welding tees or forged branch outlet fittings. Branch outlet fittings shall be forged, flared for improvement of flow where attached to the run, and reinforced against external strains. Beveling, alignment,

heat treatment, and inspection of weld shall conform to ASME B31.8. Weld defects shall be removed and repairs made to the weld, or the weld joints shall be entirely removed and rewelded. After filler metal has been removed from its original package, it shall be protected or stored so that its characteristics or welding properties are not affected adversely. Electrodes that have been wetted or have lost any of their coating shall not be used.

3.8.3 Polyethylene Pipe Jointing Procedures

Jointing procedures shall conform to AGA Manual. Indiscriminate heat fusion joining of plastic pipe or fittings made from different polyethylene resins by classification or by manufacturer shall be avoided if other alternative joining procedures are available. If heat fusion joining of dissimilar polyethylenes is required, special procedures are required. The method of heat fusion joining dissimilar polyethylene resins shall be tested in accordance with paragraph TESTS, subparagraph Destructive Tests of Plastic Pipe Joints.

3.8.4 Connections Between Metallic and Plastic Piping

Connections shall be made only outside, underground, and with approved transition fittings.

3.9 VALVE BOXES

Valve boxes of cast iron not less than 3/16 inch thick shall be installed at each underground valve except where concrete or other type of housing is indicated. Valve boxes shall be provided with locking covers that require a special wrench for removal. Wrench shall be furnished for each box. The word "gas" shall be cast in the box cover. When the valve is located in a roadway, the valve box shall be protected by a suitable concrete slab at least 3 square feet. When in a sidewalk, the top of the box shall be in a concrete slab 2 feet square and set flush with the sidewalk. Boxes shall be adjustable extension types with screw or slide-type adjustments. Valve boxes shall be separately supported, not resting on the pipe, so that no traffic loads can be transmitted to the pipe. Valves shall only be located in valve boxes or inside of buildings.

3.10 PRESSURE REGULATOR INSTALLATION

3.10.1 Service Line Regulators

A shutoff valve, meter set assembly, and service regulator shall be installed on the service line outside the building, 18 inches above the ground on the riser. An insulating joint shall be installed on the inlet side of the meter set assembly and service regulator and shall be constructed to prevent flow of electrical current. A 3/8 inch tapped fitting equipped with a plug shall be provided on both sides of the service regulator for installation of pressure gauges for adjusting the regulator. All service regulator vents and relief vents shall terminate in the outside air in rain and insect resistant fittings. The open end of the vent shall be located where gas can escape freely into the atmosphere, away from any openings into the building and above areas subject to flooding.

3.11 CONNECTIONS TO EXISTING LINES

Connections between new work and existing gas lines, where required, shall be made in accordance with ASME B31.8, using proper fittings to suit the actual conditions. When

connections are made by tapping into a gas main, the connecting fittings shall be the same size as the pipe being connected.

3.11.1 Connections to Government Owned Utilities

Contractor shall provide materials for the connections to the existing gas lines. The Contractor shall make final connections and turn on the gas. Existing lines that are to be a abandoned or taken out of service shall be disconnected, purged and capped, plugged or otherwise effectively sealed by the Contractor. The Contractor shall notify the Contracting Officer, in writing, 10 days before final connections and turning on of gas lines. The Contractor shall make necessary arrangements with the Contractor for tie in and activation of new gas lines. Only the Operating Agency/Contractor may reactivate the system after tie in. The Contractor shall furnish a certification by the Operating Agency that all Utility work has been satisfactorily completed.

3.11.2 Connection to Government Owned/Operated Gas Lines

The Contractor shall provide connections to the existing gas lines in accordance with approved procedures. Deactivation of any portion of the existing system shall only be done at the valve location shown on the drawings. Only the Government shall reactivate any existing gas lines. The Contractor's Connection and Abandonment Plan shall be submitted and approved prior to making any connections to existing gas lines. This plan shall include the Operating Agency's required procedures, which may be obtained from the Contracting Officer. The Contractor shall notify the Contracting Officer, in writing, 10 days before connections to existing lines are to be made.

a. If facilities are abandoned in place, they shall be physically disconnected from the piping system. The open ends of all abandoned facilities shall be purged, capped, plugged or otherwise effectively sealed. Abandonment shall not be completed until it has been determined that the volume of gas or liquid hydrocarbons contained within the abandoned section poses no potential hazard. Air or inert gas may be used for purging, or the facility may be filled with water or other inert material. If air is used for purging, the Contractor shall ensure that a combustible mixture is not present after purging.

b. When a main is abandoned, together with the service lines connected to it, only the customer's end of such service lines must be sealed as stipulated above.

c. Service lines abandoned from the active mains shall be disconnected as close to the main as practicable.

d. All valves left in the abandoned segment shall be closed.

e. All above grade valves, risers, and vault and valve box covers shall be removed. Vault and valve box voids shall be filled with suitable compacted backfill material.

3.12 TESTS

3.12.1 Destructive Tests of Plastic Pipe Joints

Each day, prior to making polyethylene heat fusion joints or fiberglass adhesive joints, a joint of each size and type to be installed that day shall be made by each person performing joining of plastic pipe that day and destructively tested. At least 3 longitudinal straps shall be cut from

each joint. Each strap shall be visually examined, shall not contain voids or discontinuities on the cut surfaces of the joint area, and shall be deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area. If a joint fails the visual or deformation test, the qualified joiner who made that joint shall not make further field joints in plastic pipe on this job until that person has been retrained and requalified. The results of the destructive tests shall be recorded to include the date and time of the tests, size and type of the joints, ambient conditions, fusion iron temperature and names of inspectors and joiners.

3.12.2 Pressure and Leak Tests

The system of gas mains and service lines shall be tested after construction and before being placed in service using air as the test medium. Prior to testing the system, the interior shall be blown out, cleaned and cleared of all foreign materials. All meters, regulators, and controls shall be removed before blowing out and cleaning and reinstalled after clearing of all foreign materials. Testing of gas mains and service lines shall be done with due regard for the safety of employees and the public during the test. Persons not working on the test operations shall be kept out of the testing area while testing is proceeding. The test shall be made on the system as a whole or on sections that can be isolated. Joints in sections shall be tested prior to backfilling when trenches must be backfilled before the completion of other pipeline sections. The test shall continue for at least 24 hours from the time of the initial readings to the final readings of pressure and temperature. The initial test readings of the instrument shall not be made for at least 1 hour after the pipe has been subjected to the full test pressure, and neither the initial nor final readings shall be made at times of rapid changes in atmospheric conditions. The temperatures shall be representative of the actual trench conditions. There shall be no indication of reduction of pressure during the test after corrections have been made for changes in atmospheric conditions in conformity with the relationship T(1)P(2)=T(2)P(1), in which T and P denote absolute temperature and pressure, respectively, and the numbers denote initial and final readings. During the test, the entire system shall be completely isolated from all compressors and other sources of air pressure. Each joint shall be tested by means of soap and water or an equivalent nonflammable solution prior to backfilling or concealing any work. The Contracting Officer shall approve the testing instruments. All labor, materials and equipment for conducting the tests shall be furnished by the Contractor and shall be subject to inspection at all times during the tests. The Contractor shall maintain safety precautions for air pressure testing at all times during the tests.

END OF SECTION

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SECTION 02630

STORM-DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 198	(1998) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 48/A 48M	(1994a) Gray Iron Castings
ASTM A 536	(1999el) Ductile Iron Castings
ASTM B 26/B 26M	(1998) Aluminum-Alloy Sand Castings
ASTM C 76	(1999) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 139	(1999) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 231	(1997el) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 270	(1997) Mortar for Unit Masonry
ASTM C 425	(1998b) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(1998) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM D 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM C 789	(1998) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers

ASTM C 850	(1998) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Ft. of Cover Subjected to Highway Loadings
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2321	(1989; R 1995) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	(1998) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-07 Certificates

Resin Certification
Pipeline Testing
Hydrostatic Test on Watertight Joints
Determination of Density
Frame and Cover for Gratings

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 - PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

ASTM C 76, Class I.

2.1.2 PVC Pipe

The pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, shall be submitted prior to installation of the pipe.

2.1.2.1 Type PSM PVC Pipe

ASTM D 3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.2 DRAINAGE STRUCTURES

2.2.1 Precast Reinforced Concrete Box

For highway loadings with 2 feet of cover or more or subjected to dead load only, ASTM C 789; for less than 2 feet of cover subjected to highway loading, ASTM C 850.

2.2.2 Trench Drains

2.2.2.1 The trench drain bodies shall be manufactured from polymer concrete with minimum properties as follows:

a. Compressive Strength: 14,000 psi
b. Flexural Strength: 3,000 psi
c. Water Absorption: 0.1% or less
d. Nominal Opening: 4.0 inches with overall width of 6.1 inches
e. Wall Thickness: Minimum to be 0.5 inch
f. Invert: Manufactured as neutral (3.35 inches)
g. Other: Frost and salt proof. Dilute acid and alkali resistant
h. Anchoring: Cast into outside walls to ensure maximum mechanical bonding to surrounding pavement.

2.2.2.2 Grates

a. For accessible buildings:
   1. DIN 19580 Load Class E600 – 135,000 lbs.
   2. Ductile Iron: ASTM A 536-84 – Grade 64-45-12
   3. Intake Area: 26.6 inches per half meter of grate
   4. Width: 4.84”
   5. Slots: 48 Regular slots 1.77 by 0.35 inches per half meter of grate
b. For all other buildings:
   1. DIN 19580 Load Class C250 – 56,000 lbs.
   2. Gray Iron: ASTM A 48/A 48M-00 Grade 35B
   3. Intake Area: 26.4 inches per half meter of grate
   4. Width: 4.84”
   5. Slots: 17 Regular slots 3.94 by 0.39 inches per half meter of grate

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 3000 psi concrete under Section 03301 CAST-IN-PLACE CONCRETE (LIMITED APPLICATIONS). The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or

ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.3 Precast Concrete Segmental Blocks

Precast concrete segmental block shall conform to ASTM C 139, not more than 8 inches thick, less than 8 inches long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

2.3.4 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure.

2.3.5 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans. Storm sewer manhole covers should have "storm" in raised letters on the cover.

2.3.6 Joints

2.3.6.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.

b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.3.6.2 PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.4 STEPS

All manholes with a depth of 12' or greater small have steps. The manhole wall along the line of the steps shall be vertical for its entire height. Steps are to be uniformly spaced at 12". Width of treads shall be 16" minimum clearance. A minimum toe clearance of 4" is required to the outside face of the step with minimum toe clearance at the center of the steps outside facing the wall. (This takes into account the curvature of the manhole.) Must be designed to keep feet from slipping off the ends. Steps must be protected from corrosion. Slip resistant surfaces with knurled or dimpled surfaces are required.

2.5 HYDROSTATIC TEST ON WATERTIGHT JOINTS

2.5.1 Concrete PVC Pipe

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures, which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and non-reinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443. Test requirements for joints in PVC plastic pipe shall conform to ASTM D 3212.

PART 3 - EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 02316 "Excavation, Trenching, and Backfilling for Utilities Systems" and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 300 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not over excavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock, in either ledge or boulder formation, shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not

more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 02316 "Excavation, Trenching, and Backfilling for Utilities Systems".

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.2.2 Plastic Pipe

Bedding for PVC pipe shall meet the requirements of ASTM D 2321. Bedding, haunching and initial backfill shall be either Class IB or II material.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Plastic	7.5

Not less than 30 days after the completion of backfilling, the Government may perform a deflection test on the entire length of installed flexible pipe using a mandrel or other suitable device. Installed flexible pipe showing deflections greater than those indicated above shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.3.1 Concrete and PVC

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4.1 Concrete

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established grade line, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 8 inches apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.1.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe shall be bedded carefully to the established grade line with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

3.4.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 1/2 inch, thick and the width of the diaper band shall be at least 8 inches. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.

3.4.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious

agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If non-mastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.7 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.4.1.8 External Sealing Band Joint for Noncircular Pipe

Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, precast reinforced concrete; complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.5.3 Trench Drain Systems

Install as per manufacturer’s instructions and recommendations.

3.6 STEP INSTALLATION

The steps are anchored to the wall with an insert that is cast into the wall section at the time of manufacture of the pre-casting. It is important that the manufacturing method of the precast sections be the wet cast method (as opposed to the dry cast method) in order that good anchorage is provided and pull-out does not occur.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 6 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used are left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 150 inches.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under non-traffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 698 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167. Test results shall be furnished to the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

END OF SECTION

SECTION 02721

SUBBASE COURSES

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each anticipated test should be depicted on the testing plan. The compaction testing results

should be keyed to the plan and submitted to the government prior to the final inspection and BOD.

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all aggregates actually used.

SD-06 Test Reports

Sampling and Testing

Copies of initial and in-place test results.

1.3 DEGREE OF COMPACTION

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 698. In this specification, degree of compaction shall be a percentage of laboratory maximum density.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved testing laboratory in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Tests shall be performed at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the Contracting Officer will observe the sampling.

1.4.2 Tests

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The maximum density and optimum moisture shall be determined in accordance with ASTM D 698.

1.4.2.4 Density Tests

Density shall be field measured in accordance with ASTM D 1556.

1.4.2.5 Wear Test

Wear tests shall be made on subbase course material in conformance with ASTM C 131.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

a. Sieve Analysis including 0.02-mm size material
b. Liquid limit and plasticity index moisture-density relationship

1.4.3.2 In-Place Tests

One of each of the following tests shall be performed on samples taken from the placed and compacted subbase course. Samples shall be taken for each 250 square yards of each layer of material placed in each area.

a. Sieve Analysis including 0.02-mm size material
b. Field Density
c. Moisture liquid limit and plasticity index

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted subbase course.

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 EQUIPMENT

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Subbase Course

Aggregates shall consist of crushed stone or slag, gravel, shell, sand, or other sound, durable, approved materials processed and blended or naturally combined. Aggregates shall be durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 3 inches and shall be within the limits specified as follows:

Maximum Allowable Percentage by Weight
Passing Square-Mesh Sieve

Sieve Designation	No. 1	No.2	No. 3	No.4
No. 10	50	80	--	85
No. 200	5	5	5	5

Particles having diameters less than 0.0008 inches shall not be in excess of 3 percent by weight of the total sample tested as determined in accordance with ASTM D 422. The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 - EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

All clearing, stripping and excavating work involved in the opening or operation of aggregate sources shall be performed by the Contractor. Aggregate sources shall be opened to working depth in a manner that produces excavation faces that are as nearly vertical as practicable for the materials being excavated. Materials excavated from aggregate sources shall be obtained in successive cuts extending through all exposed strata. All pockets or strata of unsuitable materials overlying or occurring in the deposit shall be wasted as directed. The methods of operating aggregate sources and the processing and blending of the material may be changed or modified by the Contracting Officer, when necessary, in order to obtain material conforming to specified requirements. Upon completion of work, aggregate sources on Government reservations shall be conditioned to drain readily, and shall be left in a satisfactory condition. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be

stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer so as to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.3 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the subbase course, the underlying course or subgrade shall be cleaned of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the subbase course is placed.

3.4 GRADE CONTROL

The finished and completed subbase course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

3.5 MIXING AND PLACING MATERIALS

The materials shall be mixed and placed to obtain uniformity of the subbase material at the water content specified. The Contractor shall make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated. When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

3.7 COMPACTION

Each layer of the subbase course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer is compacted through the full depth to at least 95 percent of laboratory maximum density. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.8 PROOF ROLLING

Areas designated on the drawings to be proof rolled shall receive an application of 30 coverages with a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 30,000 pounds and inflated to a minimum of 150 psi. Coverage is defined as the application of one tire print over the designated area. In the areas designated, proof rolling shall be applied to the top layer of the subbase course. Water content of the top layer of the subbase course shall be maintained such that the water content is within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. Any material in the subbase courses or underlying materials indicated to be unsatisfactory by the proof rolling shall be removed, dried, and recompacted, or removed and replaced with satisfactory materials.

3.9 EDGES

Approved material shall be placed along the edges of the subbase course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

3.10 SMOOTHNESS TEST

The surface of each layer shall not show deviations in excess of 3/8 inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding this amount shall be corrected by removing material, replacing with new material, or reworking existing material and compacting, as directed.

3.11 THICKNESS CONTROL

The completed thickness of the subbase course shall be in accordance with the thickness and grade indicated on the drawings. The thickness of each course shall be measured at intervals providing at least one measurement for each 500 square yards or part thereof of subbase course. The thickness measurement shall be made by test holes, at least 3 inches in diameter through the course. The completed subbase course shall not be more than 1/2 inch deficient in thickness nor more than 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, the Contractor shall correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 1/2 inch or more than shown, the course will be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness shown.

3.12 MAINTENANCE

The subbase course shall be maintained in a satisfactory condition until accepted.

END OF SECTION

SECTION 02722

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29/C 29M	(1997) Bulk Density ("Unit Weight") and Voids in Aggregates
ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(1988; R 1993el) Specific Gravity and Absorption of Course Aggregate
ASTM C 128	(1997) Specific Gravity and Absorption of Fine Aggregate
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each anticipated test should be depicted on the testing plan. After completion of the aggregate base course installation, the compaction testing results should be keyed to the plan and submitted to the government prior to the final inspection and BOD.

SD-06 Test Reports

Sampling and testing
Field Density Tests

Calibration curves and related test results prior to using the device or equipment being calibrated. Copies of field-test results within 24 hours after the tests are performed. Certified copies of test results for approval not less than 30 days before material is required for the work.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Contracting Officer may specify the time and location of the tests. Copies of

test results shall be furnished to the Contracting Officer within 24 hours of completion of the tests.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the Contracting Officer will observe the sampling.

1.4.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The maximum density and optimum moisture content shall be determined in accordance with ASTM D 698.

1.4.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 1556

1.4.2.5 Wear Test

Wear tests shall be made on ABC course material in conformance with ASTM C 131.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis including No. 635 size material.

b. Liquid limit and plasticity index.

c. Moisture-density relationship

d. Wear.

1.4.3.2 In Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Sieve Analysis including No. 635 size material shall be performed for every 500 tons, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted ABC.

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 - PRODUCTS

2.1 AGGREGATES

The ABC shall consist of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, crushed recycled concrete, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregate

Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.

c. Crushed Recycled Concrete: Crushed recycled concrete shall consist of previously hardened portland cement concrete or other concrete containing pozzolanic binder material. The recycled material shall be free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and shall be crushed and processed to meet the required gradations for coarse aggregate. Crushed recycled concrete shall meet all other applicable requirements specified below.

d. Crushed Slag: Crushed slag shall be an air-cooled blast-furnace product having an air dry unit weight of not less than 65 pcf as determined by ASTM C 29/C 29M, and shall meet all the requirements specified below.

2.1.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

The specified gradation requirements shall apply to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2	No. 3
2 inch	100	----	----
1-1/2 inch	70-100	100	----
1 inch	45-80	60-100	100
1/2 inch	30-60	30-65	40-70
No. 4	20-50	20-50	20-50
No. 10	15-40	15-40	15-40
No. 40	5-25	5-25	5-25
No. 200	0-5	0-5	0-5

NOTE 1: Particles having diameters less than 0.0008 inch shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.1.4 Liquid Limit and Plasticity Index

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Aggregates shall be obtained from offsite sources.

3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the ABC, the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the ABC, the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the ABC. Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the ABC is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

The coarse and fine aggregates shall be mixed in a stationary plant. The Contractor shall make adjustments in equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory ABC meeting all requirements of this specification.

3.5.2 Placing

The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall exceed 6 inches or less than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the ABC is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable ABC.

3.5.3 Grade Control

The finished and completed ABC shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required ABC thickness so that the finished ABC with the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The ABC shall be placed so that the completed section will be a minimum of 5 feet wider, on all sides, than the next layer that will be placed above it. Additionally, approved fill material shall be placed along the outer edges of ABC in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of ABC. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Each layer of the ABC shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in paragraph SAMPLING AND TESTING. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least 95 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory ABC. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Compacted thickness of the aggregate course shall be as indicated. No individual layer shall exceed 6 inches or be less than 3 inches in compacted thickness. The total compacted thickness of the ABC course shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2-inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the ABC course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3-inch diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of ABC shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of ABC is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12-foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50-foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Traffic shall not be allowed on the completed ABC course.

3.7 MAINTENANCE

The ABC shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any ABC that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of ABC that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of as directed. No additional payments will be made for materials that must be replaced.

END OF SECTION

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SECTION 02741

HOT-MIX ASPHALT (HMA) FOR ROADS

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 ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO MP 1	(1998) Provisional Specification for Performance Graded Asphalt Binder
AASHTO MP 2	(1998; Interim 1999) Superpave Volumetric Mix Design
AASHTO TP53	(1998; Interim 1999) Determining Asphalt Content of Hot Mix Asphalt by the Ignition Method

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29/C 29M	(1997) Bulk Density ("Unit Weight") and Voids in Aggregates
ASTM C 88	(1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	(1995) Materials Finer than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 566	(1997) Evaporable Total Moisture Content of Aggregate by Drying
ASTM C 1252	(1998) Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)
ASTM D 140	(1998) Sampling Bituminous Materials
ASTM D 242	(1995) Mineral Filler for Bituminous Paving Mixtures
ASTM D 1461	(1985)) Moisture or Volatile Distillates in Bituminous Paving Mixtures

ASTM D 1559	(1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2041	(1995) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	(1995) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	(1995) Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	(1984; R 1994el) Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	(1996el) Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixture
ASTM D 2950	(1997) Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 3381	(1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3665	(1999) Random Sampling of Construction Materials
ASTM D 3666	(1998) Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
ASTM D 4125	(1994el) Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867/D 4867M	(1996) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	(1998) Mechanical Size Analysis of Extracted Aggregate
ASTM D 6307	(1998) Asphalt Content of Hot Mix Asphalt by Ignition Method

ASPHALT INSTITUTE (AI)

AI MS-2	(1997) Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types
AI MS-22	(1998; 2nd Edition) Construction of Hot-Mix Asphalt Pavements

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CDT)

CDT Test 526	(1978) Operation of California Profilograph and Evaluation of Profiles

CORPS OF ENGINEERS (COE)

COE CRD-C 171	(1995) Test Method for Determining Percentage of Crushed Particles in Aggregate

1.2 DESCRIPTION OF WORK

The work shall consist of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses and typical cross sections shown on the drawings. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mix Design; G

Proposed JMF.

SD-06 Test Reports

Aggregates; G

Aggregate and QC test results.

1.4 HAULING EQUIPMENT

Trucks used for hauling hot-mix asphalt shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened.

1.5 ASPHALT PAVERS

Asphalt pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable of spreading and finishing courses of hot-mix asphalt which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

1.5.1 Receiving Hopper

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

1.5.2 Automatic Grade Controls

If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A transverse slope controller shall not be used to control grade. The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet in length

b. Taut string line set to grade.

c. Short ski or shoe for joint matching.

d. Laser control.

1.6 ROLLERS

Rollers shall be in good condition and shall be operated at slow speeds to avoid displacement of the asphalt mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. Equipment, which causes excessive crushing of the aggregate, shall not be used.

1.7 WEATHER LIMITATIONS

The hot-mix asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The Contracting Officer may waive the temperature requirements, if requested; however, all other requirements, including compaction, shall be met.

Table 1. Surface Temperature Limitations of Underlying Course

Mat Thickness, inches	Degrees F
3 or greater	40
Less than 3	45

PART 2 - PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The portion of material retained on the No. 4 sieve is coarse aggregate. The portion of material passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate. The portion passing the No. 200 sieve is defined as mineral filler. All aggregate test results and samples shall be submitted to the Contracting Officer at least 14 days prior to start of construction.

2.1.1 Coarse Aggregate

Coarse aggregate shall consist of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. All individual coarse aggregate sources shall meet the following requirements:

a. The percentage of loss shall not be greater than 40 percent after 500 revolutions when tested in accordance with ASTM C 131.

b. The percentage of loss shall not be greater than 18 percent after five cycles when tested in accordance with ASTM C 88 using magnesium sulfate.

c. At least 75 percent by weight of coarse aggregate shall have at least two or more fractured faces when tested in accordance with COE CRD-C 171. Crushing shall produce fractured faces.

d. The particle shape shall be essentially cubical and the aggregate shall not contain more than 20% percent, by weight, of flat and elongated particles (3:1 ratio of maximum to minimum) when tested in accordance with ASTM D 4791.

e. Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than 75 lb/cu ft when tested in accordance with ASTM C 29/C 29M.

2.1.2 Fine Aggregate

Fine aggregate shall consist of clean, sound, tough, durable particles. The aggregate particles shall be free from coatings of clay, silt, or any objectionable material and shall contain no clay balls. All individual fine aggregate sources shall have a sand equivalent value not less than 45 when tested in accordance with ASTM D 2419.

The fine aggregate portion of the blended aggregate shall have an uncompacted void content not less than 43.0 percent when tested in accordance with ASTM C 1252 Method A.

2.1.3 Mineral Filler

Mineral filler added, as well as naturally occurring material in the pre-blended stockpile passing the #200 sieve, shall be nonplastic material meeting the requirements of ASTM D 242.

2.1.4 Aggregate Gradation

The combined aggregate gradation shall conform to gradations specified in Table 2, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table 2. Aggregate Gradations

Sieve Size, inch	Gradation 1 Percent Passing by Mass	Gradation 2 Percent Passing by Mass	Gradation 3 Percent Passing by Mass	by Mass
1	100	---	---	
3/4	76-96	100	---	
1/2	68-88	76-96	100	
3/8	60-82	69-89	76-96	
No. 4	45-67	53-73	58-78	
No. 8	32-54	38-60	40-60	
No. 16		22-44	26-48	28-48
No. 30		15-35	18-38	-38
No. 50		9-25	11-27	11-27
No. 100		6-18	6-18	6-18
No. 200		3-6	3-6	3-6

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to AASHTO MP 1 Performance Grade (PG) 58-28. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer may sample and test the binder at the mix plant at any time before or during mix production. The Contractor, in accordance with ASTM D 140 and in the presence of the Contracting Officer, shall obtain samples for this verification testing. These samples shall be furnished to the Contracting Officer for the verification testing, which shall be at no cost to the Contractor. Samples of the asphalt cement specified shall be submitted for approval not less than 14 days before start of the test section.

2.3 MIX DESIGN

The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using procedures contained in AI MS-2 and the criteria shown in Table 3. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867/D

4867M is less than 75, the aggregates shall be rejected or the asphalt mixture treated with an approved anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an anti-strip agent is required, the Contractor shall provide it, at no additional cost. Sufficient materials to produce 200 pound of blended mixture shall be provided to the Contracting Officer for verification of mix design at least 14 days prior to construction of test section.

At the option of the contractor a currently used DOT super pave hot mix may be used in lieu of developing a new hot mix design study as described herein. The super pave volumetric mix shall be designed in accordance with AASHTO MP 2.

2.3.1 JMF Requirements

The job mix formula shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

a. Percent passing each sieve size.

b. Percent of asphalt cement.

c. Percent of each aggregate and mineral filler to be used

d. Asphalt viscosity grade, penetration grade, or performance grade.

e. Number of blows of hammer per side of molded specimen.

f. Laboratory mixing temperature.

g. Lab compaction temperature

h. Temperature-viscosity relationship of the asphalt cement.

i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.

j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-2.

k. Specific gravity and absorption of each aggregate

l. Percent natural sand.

m. Percent particles with 2 or more fractured faces (in coarse aggregate)

n. Fine aggregate angularity.

o. Percent flat or elongated particles (in coarse aggregate)

p. Tensile Strength Ratio (TSR)

q. Anti-strip agent (if required) and amount.

r. List of all modifiers and amount.

s. Percentage and properties (asphalt content, binder properties, and aggregate properties) of reclaimed asphalt pavement (RAP) in accordance with paragraph RECYCLED HOT-MIX ASPHALT, if RAP is used.

Table 3. Marshall Design Criteria

Test Property	75 Blow Mix	50 Blow Mix
Stability, pounds minimum	*1800	*1000
Flow, 0.01 inch	8-16	8-18
Air voids, percent	3-5	3-5
Percent Voids in mineral aggregate VMA, (minimum)		
Gradation 1	13.0	13.0
Gradation 2	14.0	14.0
Gradation 3	15.0	15.0
TSR, minimum percent	75	75

* This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.
** Calculate VMA in accordance with AI MS-2, based on ASTM D 2726 bulk specific gravity for the aggregate.

2.3.2 Adjustments to Field JMF

The Laboratory JMF for each mixture shall be in effect until the Contracting Officer approves a new formula in writing. Should a change in sources of any materials be made, a new laboratory jmf design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the Laboratory JMF within the limits specified below to optimize mix volumetric properties with the approval of the Contracting Officer. Adjustments to the Laboratory JMF shall be applied to the field (plant) established JMF and limited to those values as shown. Adjustments shall be targeted to produce or nearly produce 4 percent voids total mix (VTM).

TABLE 4. Field (Plant) Established JMF Tolerances

Sieves	Adjustments (plus or minus), percent
No. 4	3
No. 8	3
No. 200	1
Binder Content	0.40

If adjustments are needed that exceed these limits, a new mix design shall be developed. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; while not desirable, this is acceptable.

2.4 RECYCLED HOT MIX ASPHALT

Recycled HMA shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt cement. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 2 inches. The recycled HMA mix shall be designed using procedures contained in AI MS-2 and AI MS-22. The job mix shall meet the requirements of paragraph MIX DESIGN. The amount of RAP shall not exceed 30 percent.

2.4.1 RAP Aggregates and Asphalt Cement

The blend of aggregates used in the recycled mix shall meet the requirements of paragraph AGGREGATES. The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D 2172 using the appropriate dust correction procedure.

2.4.2 RAP Mix

The blend of new asphalt cement and the RAP asphalt binder shall meet the viscosity or dynamic shear rheometer at high temperature and bending beam at low temperature requirements in paragraph ASPHALT CEMENT BINDER. The virgin asphalt cement shall not be more than two standard asphalt material grades different than that specified in paragraph ASPHALT CEMENT BINDER.

PART 3 - EXECUTION

3.1 PREPARATION OF ASPHALT BINDER MATERIAL

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates. Modified asphalts shall be no more than 350 degrees F when added to the aggregates.

3.2 PREPARATION OF MINERAL AGGREGATE

The aggregate for the mixture shall be heated and dried prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F when the asphalt cement is

added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D 1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of dust and debris. A prime coat and/or tack coat shall be applied in accordance with the contract specifications.

3.5 TEST SECTION

Prior to full production, the Contractor shall place a test section for each JMF used. The contractor shall construct a test section 50 feet long and 8 feet wide. The test section shall be of the same depth as the course, which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment and personnel used in construction of the test section shall be the same equipment to be used on the remainder of the course represented by the test section. The test section shall be placed as part of the project pavement as approved by the Contracting Officer.

3.5.1 Sampling and Testing for Test Section

One random sample shall be taken at the plant, triplicate specimens compacted, and tested for stability, flow, and laboratory air voids. A portion of the same sample shall be tested for aggregate gradation and asphalt content. Four randomly selected cores shall be taken from the finished pavement mat, and four from the longitudinal joint, and tested for density. Random sampling shall be in accordance with procedures contained in ASTM D 3665. The test results shall be within the tolerances shown in Table 5 for work to continue. If all test results meet the specified requirements, the test section shall remain as part of the project pavement. If test results exceed the tolerances shown, the test section shall be removed and replaced at no cost to the Government and another test section shall be constructed. The test section shall be paid for with the first lot of paving

Table 5. Test Section Requirements for Material and Mixture Properties

Property	Specification Limit
Aggregate Gradation-Percent Passing (Individual Test Result)	
No. 4 and larger	JMF plus or minus 8
No. 8, No. 16, No. 30, and No. 50	JMF plus or minus 6
No. 100 and No. 200	JMF plus or minus 2.0
Asphalt Content, Percent (Individual Test Result)	JMF plus or minus 0.5
Laboratory Air Voids, Percent (Average of 3 specimens)	JMF plus or minus 1.0
VMA, Percent (Average of 3 specimens)	13 minimum
Stability, pounds (Average of 3 specimens)	1000 minimum
Flow, 0.01 inches (Average of 3 specimens)	8 - 18
Mat Density, Percent of Marshall (Average of 4 Random Cores)	97.0 - 100.5
Joint Density, Percent of Marshall (Average of 4 Random Cores)	95.5 - 100.5

3.5.2 Additional Test Sections

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Full production shall not begin until an acceptable section has been constructed and accepted.

3.6 TESTING LABORATORY

The laboratory used to develop the JMF shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians

b. A listing of equipment to be used in developing the job mix

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.7 TRANSPORTING AND PLACING

3.7.1 Transporting

The hot-mix asphalt shall be transported from the mixing plant to the site in clean, tight vehicles. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F. To deliver mix to the paver, the Contractor shall use a material transfer vehicle, which shall be operated to produce continuous forward motion of the paver.

3.7.2 Placing

The mix shall be placed and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, the mixture shall be placed to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.8 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.9 JOINTS

The formation of joints shall be made ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.9.1 Transverse Joints

The roller shall not pass over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing material at the joint. The cutback material shall be removed from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.9.2 Longitudinal Joints

Longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing adjacent lanes), or otherwise defective, shall be cut back a minimum of 2 inches from the edge with a cutting wheel to expose a clean, sound vertical surface for the full depth of the course. All cutback material shall be removed from the project. All contact surfaces shall be given a light tack coat of asphalt material prior to placing any fresh mixture against the joint. The Contractor will be allowed to use an alternate method if it can be demonstrated that density, smoothness, and texture can be met.

3.10 CONTRACTOR QUALITY CONTROL

3.10.1 General Quality Control Requirements

The Contractor shall develop an approved Quality Control Plan. Hot-mix asphalt for payment shall not be produced until the quality control plan has been approved. The plan shall address all elements, which affect the quality of the pavement including, but not limited to:

a. Mix Design

b. Aggregate Grading

c. Quality of Materials

d. Stockpile Management

e. Proportioning

f. Mixing and Transportation

g. Mixture Volumetrics

h. Moisture Content of Mixtures

i. Placing and Finishing

j. Joints

k. Compaction

l. Surface Smoothness

3.10.2 Testing Laboratory

The Contractor shall provide a fully equipped asphalt laboratory located at the plant or job site. The laboratory shall meet the requirements as required in ASTM D 3666. The effective working area of the laboratory shall be a minimum of 150 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 75 degrees F plus or minus 5 degrees F. Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Contracting Officer shall be permitted unrestricted access to inspect the Contractor's laboratory facility, to witness quality control activities, and to perform any check testing desired. The Contracting Officer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to adversely affect test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are corrected.

3.10.3 Quality Control Testing

The Contractor shall perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but shall not be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, moisture in the asphalt mixture, laboratory air voids, stability, flow, in-place density, grade and smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

3.10.3.1 Asphalt Content

A minimum of two tests to determine asphalt content will be performed per lot (a lot is defined in paragraph MATERIAL ACCEPTANCE AND PERCENT PAYMENT) by one of the following methods: the extraction method in accordance with ASTM D 2172, Method A or B, the ignition method in accordance with the AASHTO TP53or ASTM D 6307 or the nuclear method in accordance with ASTM D 4125, provided the nuclear gauge is calibrated for the specific mix being used. For the extraction method, the weight of ash, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

3.10.3.2 Gradation

Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of recovered aggregate in accordance with ASTM D 5444. When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch

plants, or from the cold feed on drum mix plants. For batch plants, aggregates shall be tested in accordance with ASTM C 136 using actual batch weights to determine the combined aggregate gradation of the mixture.

3.10.3.3 Temperatures

Temperatures shall be checked at least four times per lot, at necessary locations, to determine the temperature at the dryer, the asphalt cement in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

3.10.3.4 Aggregate Moisture

The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

3.10.3.5 Moisture Content of Mixture

The moisture content of the mixture shall be determined at least once per lot in accordance with ASTM D 1461 or an approved alternate procedure.

3.10.3.6 Laboratory Air Voids, Marshall Stability and Flow

Mixture samples shall be taken at least four times per lot and compacted into specimens, using 50 blows per side with the Marshall hammer as described in ASTM D 1559. After compaction, the laboratory air voids of each specimen shall be determined, as well as the Marshall stability and flow.

3.10.3.7 In-Place Density

The Contractor shall conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge may be used to monitor pavement density in accordance with ASTM D 2950.

3.10.3.8 Additional Testing

Any additional testing, which the Contractor deems necessary to control the process, may be performed at the Contractor's option.

3.10.3.9 QC Monitoring

The Contractor shall submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

3.10.4 Sampling

When directed by the Contracting Officer, the Contractor shall sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.10.5 Control Charts

For process control, the Contractor shall establish and maintain linear control charts on both individual samples and the running average of last four samples for the parameters listed in Table 6, as a minimum. These control charts shall be posted as directed by the Contracting Officer and shall be kept current at all times. The control charts shall identify the project number, the test parameter being plotted, the individual sample numbers, the Action and Suspension Limits listed in Table 6 applicable to the test parameter being plotted, and the Contractor's test results. Target values from the JMF shall also be shown on the control charts as indicators of central tendency for the cumulative percent passing, asphalt content, and laboratory air voids parameters. When the test results exceed either applicable Action Limit, the Contractor shall take immediate steps to bring the process back in control. When the test results exceed either applicable Suspension Limit, the Contractor shall halt production until the problem is solved. The Contractor shall use the control charts as part of the process control system for identifying trends so potential problems can be corrected before they occur. Decisions concerning mix modifications shall be made based on analysis of the results provided in the control charts. The Quality Control Plan shall indicate the appropriate action, which shall be taken to bring the process into control when certain parameters exceed their Action Limits.

Table 6. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts

Parameter to be Plotted	Running Average of Individual Samples: Action Limit	Running Average of Individual Samples: Suspension Limit	Last Four Samples: Action Limit	Last Four Samples: Suspension Limit
No. 4 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	6	8	4	5
No. 30 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	4	6	3	4
No. 200 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	1.4	2.0	1.1	1.5
Stability, pounds (minimum)				
75 Blow JMF	1800	1700	1900	1800
50 Blow JMF	1000	900	1100	1000
Flow, 0.01 inches				
75 Blow 8 min.	7 min.	9 min.	8 min.	
16 max.	17 max.	15 max.	16 max.	
50 Blow 8 min.	7 min.	9 min.	8 min.	
18 max.	19 max.	17 max.	18 max.	
Asphalt content, % deviation from JMF target; plus or minus value	0.4	0.5	0.2	0.3
Laboratory Air Voids, % deviation from JMF target value used to determine percent payment	No specific action and suspension limits set since this parameter is			
In-place Mat Density, % of Marshall density used to determine percent payment	No specific action and suspension limits set since this parameter is			
In-place Joint Density, % of Marshall density used to determine percent payment	No specific action and suspension limits set since this parameter is			

3.11 MATERIAL ACCEPTANCE AND PERCENT PAYMENT

An independent laboratory, hired by the Contractor, will perform testing for acceptability of work. Test results and payment calculations shall be forwarded daily to the Contracting Officer.

Acceptance of the plant produced mix and in-place requirements will be on a lot to lot basis. A standard lot for all requirements will be equal to 2000 tons. Where appropriate, adjustment in payment for individual lots of hot-mix asphalt will be made based on in-place density, laboratory air voids, grade and smoothness in accordance with the following paragraphs. Grade and surface smoothness determinations will be made on the lot as a whole. Exceptions or adjustments to this will be made in situations where the mix within one lot is placed as part of both the intermediate and surface courses, thus grade and smoothness measurements for the entire lot cannot be made. In order to evaluate laboratory air voids and in-place (field) density, each lot will be divided into four equal sublots.

3.11.1 Sublot Sampling

One random mixture sample for determining laboratory air voids, theoretical maximum density, and for any additional testing the Contracting Officer desires, will be taken from a loaded truck delivering mixture to each sublot, or other appropriate location for each sublot. All samples will be selected randomly, using commonly recognized methods of assuring randomness conforming to ASTM D 3665 and employing tables of random numbers or computer programs. Laboratory air voids will be determined from three laboratory compacted specimens of each sublot sample in accordance with ASTM D 1559. The specimens will be compacted within 2 hours of the time the mixture was loaded into trucks at the asphalt plant. Samples will not be reheated prior to compaction and insulated containers will be used as necessary to maintain the temperature.

3.11.2 Additional Sampling and Testing

The Contracting Officer reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. The Government will pay for the cost of any additional testing. Testing in these areas will be in addition to the lot testing, and the requirements for these areas will be the same as those for a lot.

3.11.3 Laboratory Air Voids

Laboratory air voids will be calculated by determining the Marshall density of each lab compacted specimen using ASTM D 2726 and determining the theoretical maximum density of every other sublot sample using ASTM D 2041. Laboratory air void calculations for each sublot will use the latest theoretical maximum density values obtained, either for that sublot or the previous sublot. The mean absolute deviation of the four laboratory air void contents (one from each sublot) from the JMF air void content will be evaluated and a pay factor determined from Table 7. All laboratory air void tests will be completed and reported within 24 hours after completion of construction of each lot.

3.11.4 In-place Density

3.11.4.1 General Density Requirements

For determining in-place density, one random core will be taken by the Government from the mat (interior of the lane) of each sublot, and one random core will be taken from the joint (immediately over joint) of each sublot. Each random core will be full thickness of the layer being placed. When the random core is less than 1 inch thick, it will not be included in the analysis. In this case, another random core will be taken. After air drying to a constant weight, cores obtained from the mat and from the joints will be used for in-place density determination.

3.11.5 Grade

The final wearing surface of pavement shall conform to the elevations and cross sections shown and shall vary not more than 0.05 foot from the plan grade established and approved at site of work. Finished surfaces at juncture with other pavements shall coincide with finished surfaces of abutting pavements. Deviation from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. The final wearing surface of the pavement will be tested for conformance with specified plan grade requirements. The grade will be determined by running lines of levels at intervals of 25 feet, or less, longitudinally and transversely, to determine the elevation of the completed pavement surface. Within 5 working days, after the completion of a particular lot incorporating the final wearing surface, the Contracting Officer will inform the Contractor in writing, of the results of the grade-conformance tests. When more than 5 percent of all measurements made within a lot are outside the 0.05-foot tolerance, the pay factor based on grade for that lot will be 95 percent. In areas where the grade exceeds the tolerance by more than 50 percent, the Contractor shall remove the surface lift full depth; the Contractor shall then replace the lift with hot-mix asphalt to meet specification requirements, at no additional cost to the Government. Diamond grinding may be used to remove high spots to meet grade requirements. Skin patching for correcting low areas or planing or milling for correcting high areas will not be permitted.

3.11.6 Surface Smoothness

All testing shall be performed in the presence of the Contracting Officer. Detailed notes of the results of the testing shall be kept and a copy furnished to the Government immediately after each day's testing. Where drawings show required deviations from a plane surface (crowns, drainage inlets, etc.), the surface shall be finished to meet the approval of the Contracting Officer.

3.11.6.1 Smoothness Requirements

a. Straightedge Testing: The finished surfaces of the pavements shall have no abrupt change of 1/4 inch or more, and all pavements shall be within the tolerances specified in Table 9 when checked with an approved 12 foot straightedge.

Table 9. Straightedge Surface Smoothness—Pavements

Pavement Category	Direction of Testing	Tolerance, inches
All	Longitudinal	1/4
paved areas	Transverse	1/4

3.11.6.2 Testing Method

After the final rolling, but not later than 24 hours after placement, the surface of the pavement in each entire lot shall be tested by the Contractor in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. Separate testing of individual sublots is not required. If any pavement areas are ground, these areas shall be retested immediately after grinding. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines. The transverse lines shall be 25 feet or less apart, as directed. The

longitudinal lines shall be at the centerline of each paving lane for lines less than 20 feet and at the third points for lanes 20 feet or greater. Other areas having obvious deviations shall also be tested. Longitudinal testing lines shall be continuous across all joints. Straightedge Testing: The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points.

END OF SECTION

SECTION 02748

BITUMINOUS TACK AND PRIME COATS

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 40	(1978; R 1996) Sampling Bituminous Materials

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 140	(200) Sampling Bituminous Materials
ASTM D 977	(1998) Emulsified Asphalt
ASTM D 2027	(1976; R 1997) Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	(1976; R 1997) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	(1998) Cationic Emulsified Asphalt
ASTM D 2995	(1999) Determining Application Rate of Bituminous Distributors

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Waybills and Delivery Tickets

Waybills and delivery tickets, during progress of the work.

SD-06 Test Reports

Sampling and Testing

Copies of all test results for bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

1.3 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.3.1 General Requirements

Plant, equipment, machines and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times.

1.3.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.3.3 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 WEATHER LIMITATIONS

Bituminous coat shall be applied only when the surface to receive the bituminous coat is dry. Bituminous coat shall be applied only when the atmospheric temperature in the shade is 50 degrees F or above and when the temperature has not been below 35 degrees F for the 12 hours prior to application.

PART 2 - PRODUCTS

2.1 TACK COAT

Unless otherwise directed or required, bituminous material shall be cutback asphalt conforming to the requirements of ASTM D 2028, designation RC-70 or RC-250; emulsified asphalt conforming to the requirements of ASTM D 977, designation SS-1 or SS-1h; or cationic emulsified asphalt conforming to the requirements of ASTM D 2397, designation CSS-1 or CSS-1h.

2.2 PRIME COAT

Bituminous prime coat shall be: liquid asphalt conforming to the requirements of ASTM D 2027, designation MC-30 or MC-70, at the Contractor's option, except that only MC-30 shall be used on dense graded base courses if MC-70 does not adequately penetrate the base course material; cationic emulsified asphalt conforming to the requirements of ASTM D 2397,

designation CSS-1 or CSS-1h, or emulsified asphalt conforming to the requirements of ASTM D 977, designation SS-1 or SS-1h.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Bituminous material for the tack coat shall be applied in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

Liquid Asphalts

MC-30	85-190 degrees F	
MC-70	120-225 degrees F	
RC-70	120-200 degrees F	*
RC-250	165-250 degrees F	*

Paving Grade Asphalts

Viscosity Grades

AC 10	plus 280 degrees F

Emulsions

SS-1	70-160 degrees F
SS-1h	70-160 degrees F
CSS-1	70-160 degrees F
CSS-1h	70-160 degrees F

*These temperature ranges exceed the flash point of the material and care should be taken in their heating.

3.4 APPLICATION

3.4.1 General

Following preparation and subsequent inspection of the surface, the bituminous coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment shall be permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. All traffic, except for paving equipment used in constructing the surfacing, shall be prevented from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.4.2 Prime Coat

The prime coat will be required on the underlying (base course, etc)compacted material. The type of liquid asphalt and application rate will be as specified herein. The Contractor shall protect the underlying from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven days, the choice of protection measures or actions to be taken is at the Contractor's option. Damage to the underlying material caused by lack of, or inadequate, protection shall be repaired (recompacted or replaced) by approved methods at no additional cost to the Government. If the Contractor options to use the prime coat, it shall be applied as soon as possible after consolidation of the underlying material. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper. Immediately after application, the building paper shall be removed and destroyed.

3.4.3 Tack Coat

Tack coat shall be applied at the locations shown on the drawings.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. Prime coat shall be allowed to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course.

3.6 FIELD QUALITY CONTROL

The Contractor as directed, under the supervision of the Contracting Officer shall obtain samples of the bituminous material used. The sample may be retained and tested by the Government at no cost to the Contractor.

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140 or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibration of the bituminous distributor shall be in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, three lengths of at least 100 feet for the full width of the distributor bar shall be applied to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous tack coat materials shall be applied in the amount of 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous materials shall be applied in the amount of 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Quality control sampling and testing shall be performed as required in paragraph FIELD QUALITY CONTROL.

END OF SECTION

SECTION 02763

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 REFERENCES

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

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-1952	(Rev D; Canc. Notice 1) Paint, Traffic and Airfield Marking, Waterborne (Metric)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation.

Composition Requirements

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications

Document certifying personnel are qualified for equipment operation and handling of chemicals.

SD-07 Certificates

Volatile Organic Compound (VOC)

Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

1.3 DELIVERY AND STORAGE

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.4 EQUIPMENT

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads and runways shall display low speed traffic markings and traffic warning lights.

1.4.1 Paint Application Equipment

The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall have a speed during application not less than 5 mph, and shall be capable of applying the stripe widths indicated, at the paint coverage rate specified in paragraph APPLICATION, and of even uniform thickness with clear-cut edges. Equipment used for marking streets and highways shall be capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines or a combination of solid and intermittent lines using a maximum of two different colors of paint as specified. The paint applicator shall have paint reservoirs or tanks of sufficient capacity and suitable gauges to apply paint in accordance with requirements specified. Tanks shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gauges in full view and reach of the operator. Paint strainers shall be installed in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

1.4.2 Traffic Controls

Suitable warning signs shall be placed near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.5 HAND-OPERATED, PUSH-TYPE MACHINES

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.6 MAINTENANCE OF TRAFFIC

1.6.1 Roads, Streets, and Parking Areas

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flag persons, and related equipment for the safe passage of vehicles shall be provided.

PART 2 - PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for airfields, roads, and streets shall conform to FS TT-P-1952, color as indicated. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers by the Contractor in the presence of a representative of the Contracting Officer. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved. Testing shall be performed in an approved independent laboratory. If materials are approved based on reports furnished by the Contractor, samples will be retained by the Government for possible future testing should the material appear defective during or after application.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

Surfaces to be marked shall be thoroughly cleaned before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements, a pretreatment with an aqueous solution containing 3 percent phosphoric acid and 2 percent zinc chloride shall be applied to prepared pavement areas prior to painting.

3.1.2 Cleaning Concrete Curing Compounds

On new Portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.

b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.

c. All remaining curing compound is intact; all loose and flaking material is removed.

d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.

e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. The Contractor shall provide guidelines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet per gallon. Glass spheres shall be applied uniformly to the wet paint on road and street pavement at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.

b. Non-Reflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet per gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

END OF SECTION

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SECTION 02770

CONCRETE SIDEWALKS AND CURBS AND GUTTERS

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 ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991) Burlap Cloth Made from Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 616/A 616M	(1996a) Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 617/A 617M	(1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 31/C 31M	(1996) Making and Curing Concrete Test Specimens in the Field
ASTM C 143	(1990a) Slump of Hydraulic Cement Concrete
ASTM C 171	(1997) Sheet Materials for Curing Concrete
ASTM C 172	(1997) Sampling Freshly Mixed Concrete
ASTM C 173	(1996) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	(1997) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 309	(1997) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 920	(1995) Elastomeric Joint Sealants

ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 3405	(1996) Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements

1.2 MEASUREMENT FOR PAYMENT

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1.3 BASIS FOR PAYMENT

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1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Concrete Mix Design, G

SD-06 Test Reports

Field Quality Control; Slump, Air Entrainment, Strength Tests, FIO

1.5 WEATHER LIMITATIONS

1.5.1 Placing During Cold Weather

Concrete placement shall not take place when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Provisions shall be made to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.5.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

1.6 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.6.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.6.2 Slip Form Equipment

Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in 1 pass. Slip form pavers must also be capable of placing lengths of reinforcing steel within the placement. Steel reinforcement may be automatically or hand fed.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall conform to the applicable requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE, except as otherwise specified. Concrete shall have a minimum compressive strength of 4000 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches.

2.1.1 Air Content

Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

The concrete slump shall be 4 inches plus or minus 1 inch where determined in accordance with ASTM C 143 unless the concrete placement is performed using a slip form machine. If a slip form machine is used a separate mix design shall be provided to produce a concrete mix with a slump of 2 inches or less.

2.1.3 Reinforcement Steel

Reinforcement bars shall conform to ASTM A 615/A 615M, ASTM A 616/A 616M, or ASTM A 617/A 617M. Wire mesh reinforcement shall conform to ASTM A 185.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C 309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Commercially prepared mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Contraction Joint Filler for Curb and Gutter

2.4.2 Expansion Joint Filler, Pre-molded

Expansion joint filler, pre-molded, shall conform to ASTM D 1751 or ASTM D 1752, ½ inch thick, unless otherwise indicated.

2.5 JOINT SEALANTS

2.5.1 Joint Sealant, Cold-Applied

Joint sealant, cold-applied shall conform to ASTM C 920.

2.5.2 Joint Sealant, Hot-Poured

Joint sealant, hot-poured shall conform to ASTM D 3405.

2.6 FORM WORK

Formwork shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be made of wood, steel, or composite materials. Forms shall be straight and of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight, and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4-inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for

radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms. Forms constructed of composite or Masonite materials shall doubled as needed to maintain rigidity. Composite materials shall only be used for irregular shapes or radius purposes unless otherwise approved by the COR.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Sections 02300 and 02315.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and

braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/4 inch in any 10-foot long section. After forms are set, grade and alignment shall be checked with a 10-foot straightedge. Forms shall have a transverse slope 1/8 inch per foot with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Concrete shall be placed in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straight edging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished with a sidewalk trowel or steel hand trowel to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by light brooming with a soft fiber-bristle brush in a direction transverse to that of the traffic.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/4 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible variance in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators.

3.4.2 Curb and Gutter Finishing

Approved slip formed curb and gutter machines may be used in lieu of hand placement. Should a curb machine be used, the concrete slump and/or mix design shall be adjusted to minimize deformation after placement by the curb machine. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible variance in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features, which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Sidewalks adjacent to curbs shall contain an isolation joint between the back of curb and the sidewalk. This isolation joint shall be formed using 3/8” preformed expansion joint material. This joint shall be filled with an approved sealant after curing is complete.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove.

Sawed joints are not permitted in sidewalks. Sawed joints are not permitted in other exterior slabs on grade, unless specifically approved by the COR.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2-inch joint filler strips. Joint filler shall be placed with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Reinforcement shall not be continuous through expansion joints, however alignment of sidewalk panels shall be maintained using greased 24” long by ¾” diameter smooth steel dowels placed 8” on center centered on the joint. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/4 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place supported by cured concrete dobies. If reinforcement is not otherwise specified for sidewalks a minimum of 6 x 6, W2.9 x W2.9 welded wire fabric shall be provided. Reinforcement for sidewalks shall be supported by cured concrete dobies located at intervals not exceeding 24” in the narrow dimension and 36” in the long dimension. The use of wire or plastic supports is not permitted.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting Portland cement concrete pavements and spaced so that monolithic sections between curb returns will approximately 10 feet, in no case shall they be less than 5 feet nor greater than 15 feet in length.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting Portland cement concrete, sidewalks or pavements, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut Portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not exceeding 40 feet. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Expansion joints and the top 1-inch depth of curb and gutter contraction-joints shall be sealed with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain, flowing water, and wind driven debris. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.8 FIELD QUALITY CONTROL

3.8.1 General Requirements

The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 100 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31/C 31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved.

3.8.2.2 Air Content

Air content shall be determined in accordance with ASTM C 173 or ASTM C 231. ASTM C 231 shall be used with concretes and mortars made with relatively dense natural aggregates. One test for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. If results are out of tolerance, the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Noncompliant concrete shall be rejected and removed from the project at no additional cost to the government. Additional tests for air content will be performed on each truckload of material until such time as the air content is consistently within the tolerance specified.

3.8.2.3 Slump Test

One slump test shall be made on randomly selected batches of each class of concrete for every 100 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine.

3.8.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements the deficient concrete shall be removed and replaced. Deficient concrete panels shall be removed to the nearest contraction or expansion joint.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

End of Section

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SECTION 02785

TENNIS AND BASKETBALL COURTS

PART 1 - GENERAL

1.1 GRADING

All excavating, filling and grading requirements and compacting work of subbase should be performed so that the finished subgrade is 4"-6" above surrounding ground and slopes not less than 0.83% (1:120) and not more than 1% (1:100). Each court must slope on a true plane.

1.2 WEATHER LIMITATIONS

Apply coatings only when ambient temperature is 50 degrees F and rising, and the surface temperature is not in excess of one hundred forty (140) degrees F.

All coatings are waterborne and cannot cure in cold temperatures or when subject to moisture. Care should be taken not to apply coatings when rain is forecast or sudden drop of temperature is expected. Climactic conditions such as very cool evenings and high dew points dictate that work should be completed early in the day so the coatings can be exposed to enough warm sunlight to form a film before sunset. The opposite applies during times of high heat, low humidity and drying breezes: under these conditions, work very early in the morning or very late in the day. If the product seems to be drying too fast in hot weather, mist the pavement with water to make the application easier. Care must be taken to allow each application to dry thoroughly prior to recoating.

1.3 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling. Store aggregates preventing segregation and contamination.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Aggregate Base Course

A base course of crushed aggregate should be installed over the subgrade. The specified material should meet applicable ASTM specifications. Compacted thickness should be no less than 6" of thoroughly compacted aggregate.

2.1.2 Leveling Course

A leveling course of a hot plant mix having a maximum aggregate size of 3/4", in accordance with specification Section 02741 HOT-MIX ASPHALT (HMA) FOR ROADS, should be constructed over the base course to a compacted thickness of not less than 2".

2.1.3 Asphaltic Surface Course

A surface course of a hot plant mix having a maximum aggregate size of 3/8" and a minimum aggregate size of 1/4" should be constructed over the hot mix intermediate course to a compacted thickness of not less than 1".

Mix Design:

Screen	% Passing
1/2	100
3/8	90-100
#4	55-85
#8	32-67
#50	7-23
#200	2-10

Liquid asphalt bitumen to be minimum 5.5% by weight

Aggregate type to be crushed stone, gravel, shale, limestone, etc. Foreign materials, i.e., pyrite, clay, ferrous compounds, dirt and organic material are not acceptable.

2.1.4 Coating Materials for Color Finish System

Coating materials should be 100% acrylic emulsions, formulated with acrylic resins, mineral fillers, color fast pigments and approved silica sand. Both filler and finish coats should be fully pigmented, assuring the owner a uniform finish and consistent color throughout. All coatings shall be pure acrylic, containing no asphaltic or tar emulsions, nor any vinyl, alkyd or non-acrylic resins. The color system shall be factory-mixed compounds requiring only the addition of water at the jobsite except for the addition of sand to. All materials shall be delivered to the jobsite in sealed containers with the manufacturer's label affixed.

2.2 EQUIPMENT

2.2.1 Net Posts and Sleeves

Net posts may be galvanized steel or aluminum. They may be installed in sleeves or installed permanently in foundations. Tennis post ground sleeves may be steel, aluminum or PVC. Circular posts should have an outside diameter of not less than 2 - 7/8", nor greater than 6", while square posts should not be less than 3" across, nor greater than 6". The net post shall project no more than 1" above the top of the net cord. Minimum yield stress is 1,100 lbs., with a minimum of 1,500 lbs. ensile strength. Mechanical tensioning devices (worm gear, ratchet reel or screw-type) are to be limit the amount of force applied to the net post, not to exceed 1/2 post yield strength. Posts and post sleeves should be set 42' apart for a doubles court measured from the center of one post to the center of the other. For tournament use, it is recommended that a second set of net post sleeves be supplied 33' (center to center) apart for singles play. Posts should be set plumb and true so as to support the net at a height of 42" above the court surface.

2.2.2 Center Strap Anchor

The ground anchor should be made from a strong, non-corrosive metal pipe not less than 10" in length, 1 5/8" o.d. minimum.

A non-corrosive 1/4" o.d. pin is centered through the pipe 1/4" to 3/8" below the opening for the purposes of attaching a center strap hook.

A center strap anchor should be set in concrete footings measuring 12" x 12" x 12". The base of the footing should be slightly larger (15" x 15") to avoid the possibility of heaving due to freeze/thaw action. The top of a concrete footing set in an asphalt court should be round to minimize radical cracking. The cross pin in the ground anchor should be flush with the court and parallel to the net.

2.2.3 Net

A regulation doubles net is 42' long and 3'6" high. A regulation singles net is the same height, but is only 33' long. Since according to the rules of tennis, net posts are set 42' apart for doubles and 33' apart for singles, measured from center to center this creates an obvious problem - how to install a 42' or 33' net, pulled taut with tension bars and cording, on the posts solve this problem, many net manufacturers actually offer nets slightly shorter than the regulation dimension (i.e. 41' 9" for a doubles net).

The net is composed of eight distinct parts referred to by the following names:

2.2.3.1 Body

The net body should be weather resistant synthetic netting 1 3/4" square mesh and the tensile strength of the twine should not be less than 275 lbs.

2.2.3.2. Headband (top binding)

The headband should be made of two pieces or plies, or a single ply with double thick material, and should be 2" - 2 1/2" side. The outer piece should be manufactured from a white synthetic material or white canvas, treated for resistance to sunlight and mildew. Inner and outer headbands should be folded over the cable and lock stitched with four separate rows of stitching the length of the net.

2.2.3.3 Cable

The cable should be fabricated from multi-stranded galvanized steel wire rope. It should have a minimum core diameter of 5/32" (excluding coating) and be at least 46' in length. Its tensile strength should be not less than 2,600 lbs. The cable may be vinyl coated.

2.2.3.4. Side Bindings (tapes)

Side bindings should be fabricated of black synthetic material, treated to prevent deterioration from sunlight. Five nickel or brass grommets should be placed equidistantly from top to bottom and on each side of the net to accommodate the lacing twine after forming a pocket to accept dowels.

2.2.3.5 Bottom Bindings (tapes)

Bottom bindings hs9ould be made of black abrasion-resistant synthetic materials, treated to prevent deterioration from sunlight.

2.2.3.6 Dowels

Dowels should be 3/8" - 5/8" round and a maximum of 40" in length and should be made of wood, metal or fiberglass.

2.2.3.7 Tie Strings

Tie strings should be made from black u.v. stabilized, synthetic cord, not less than 60" long, and having a breaking strain of no less than 275 lbs. One piece is required for each end of the net headband.

2.2.3.8 Lacing Twine

Lacing twine should be made from the same material as tie string but should be not less than 96" long. There should be one such piece for each side binding. Note: The tie string and lacing twine may be one continuous piece.

PART 3 - EXECUTION

3.1 APPLICATION OF AGGREGATE

The material should be spread by methods and in a manner that produces a uniform density and thickness. The material thus spread should be compacted to 95% minimum Proctor Test with equipment that provides uniform density. Surface of the base course as compacted should not vary more than from the true plane of the court.

3.2 APPLICATION OF LEVELING COURSE

This hot plant mix should be spread and compacted by methods and in a manner that produces a uniform density and thickness. The finished intermediate course should not vary more than 1/4" in 10', when measured in any direction.

3.3 APPLICATION OF ASPHALTIC SURFACE COURSE

Cure Time: Follow coating manufacturer's recommendations. (typically 14-30 days, depending on the time of years and rainfall. Asphalt will cure more slowly in cooler temperatures, i.e. the spring and fall.)

Voids Content Minimum as specified in Section 02741, but in no case should void content exceed 7%. Hot plant mix should be spread and compacted by methods and in a manner that produces a uniform density and thickness. The finished surface of the court should not vary more than 1/8" when measured in any direction.

3.4 SURFACE PREPARATION

Asphalt court areas shall be cleaned using a stiff bristle broom and power washer capable of generating 2,500 psi at nozzle tip to remove all dirt and debris. New asphalt pavement shall cure for 14 days prior to application of any surfacing materials. The surface to be coated shall be inspected and made sure to be free of grease, oil, dust, dirt and other foreign matter before starting work. The surface shall be flooded. Any ponding water remaining that is deep enough

to cover the thickness of a five-cent piece shall be corrected using a patch mix consisting of acrylic bond 50-mesh sand and Portland cement, as per manufacturers directions. Depressions must be primed with a 50% dilution of acrylic bond and water prior to patching.

3.5 ACRYLIC APPLICATION FOR COLOR FINISH SYSTEM

Application shall proceed only if the surface is dry and clean and the temperature is at least fifty degrees F and rising, and the surface temperature is not in excess of one hundred forty degrees F. Do not apply coatings when rain is imminent. Each coat in this system must dry completely before next application. Between each coat, inspect entire surface. Any defects should be repaired. Scrape surface to remove any lumps and broom or blow off all loose matter. Using a neoprene rubber squeegee, apply one coat of acrylic resurfacer as per manufacturer's instructions. Using a neoprene rubber squeegee, apply two coats of play surface acrylic (colors to be designated by Contracting Officer. Allow each application to dry thoroughly. A small (not to exceed 8 fluid ounces per gallon) quantity of water may be used in diluting these coatings, if coatings are drying too rapidly.

3.6 LINE MARKINGS

Upon completion and acceptance of the tennis surface, Contractor shall prepare and paint lines for courts. All lines are to be applied by painting between masking tape with a paintbrush or roller. Base lines should be not more than 4" line (tennis) and playing lines not more than 2" wide. Prime masked lines and allow application to dry. Paint lines with textured line paint. Allow application to dry. Remove masking tape immediately after lines are dry. Protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.), which are not to be coated. In the event that coatings are applied to above, remove immediately before drying is complete.

3.7 EQUIPMENT INSTALLATION

3.7.1 Net

Check net tautness by suspending a 24 lb. weight from the center of a singles net or a 14 lb. weight from the center of a doubles net and wind the net slowly to a center height of 36". Install the center strap and adjust it to maintain the height of 36". Remove the weight. This method produces a net cable tautness of approximately 500 - 550 lbs.

When a weight is not available, net height is commonly adjusted by winding the net to a height of about 3' 4" at the center and using the center strap to pull the net down to 36". This method is not recommended however, since it may result in significant tautness variations from court to court.

For proper maintenance of court equipment and consistent ball response on the net, a net tensioning device is recommended.

3.7.2 Center Strap

A center strap is used to hold the net at the proper height of 36" at its center. A white strap no more than 2" wide, made from canvas or synthetic material treated for resistance to sunlight and mildew, is used. A height adjusting non-corrosive buckle or buckles must prevent slippage

when fully stressed. At the bottom of the strap, a non-corrosive spring loaded hook is used to attach the center strap to the ground anchor pin.

3.8 COMPLETION

Upon completion, the contractor shall insure proper removal of all construction debris, surplus materials, empty containers and wash water and shall leave the site in a condition acceptable to the owner. The court is to be left secure so as to prevent vandalism.

End of Section

SECTION 02791

PLAYGROUND PROTECTIVE SURFACING

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2047	(1999) Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
ASTM D 2261	(1996; R 2002) Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant Rate-of-Extension Tensile Testing Machine)
ASTM D 412	(1998a; R 2002e1) Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 6112	(1997) Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes
ASTM D 648	(2001) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM E 1912	(1998) Accelerated Site Characterization for Confirmed or Suspected Petroleum Releases
ASTM F 1015	(2003) Relative Abrasiveness of Synthetic Turf Playing Surfaces
ASTM F 1292	(1999) Impact Attenuation of Surface Systems Under and Around Playground Equipment
ASTM F 1487	(2001e1) Playground Equipment for Public Use

CONSUMER PRODUCT SAFETY COMMISSION (CPSC)

CPSC Pub No 325	(1997) Handbook for Public Playground Safety

1.2 DEFINITIONS

Critical Height: The fall height at which the protective surfacing meets the requirements of ASTM F 1292.

Designated Play Surface: Any elevated surface for standing, walking, sitting, or climbing; or a flat surface a minimum 2 inches wide having up to a maximum 30 degree angle from horizontal. In some play events the platform surface will be the same as the designated play surface. However, the terms should not be interchanged as they do not define the same point of measurement according to ASTM F 1487.

Head Injury Criteria (HIC): A measure of impact severity that considers the duration over which the most critical section of the deceleration pulse persists as well as the peak level of that deceleration. Head impact injuries are not believed to be life threatening if the HIC does not exceed a value of 1,000.

Impact Attenuation: The ability of protective surfacing to reduce and dissipate the energy of an impacting body

Loose Fill: Consisting of small independent movable components such as sand, gravel, or wood chip. The percent of fine material in the loose fill affects its compression properties from rainfall.

Maximum Equipment Height: The highest point on the equipment (i.e.: roof ridge, top of support pole.

Play Event: A piece of manufactured playground equipment that supports one or more play activities.

1.3 CHILD SAFETY AND ACCESSIBILITY STANDARDS

The perimeters of the play event use zone shall be measured in accordance with the requirements of Section 02882 PLAYGROUND EQUIPMENT.

1.3.1 CHILD SAFETY

Synthetic surfacing and loose-fill surfacing systems installed in the use zones shall meet or exceed the impact attenuating performance requirements as follows. The surfacing critical height value shall yield up to both a maximum 200 G's peak deceleration, and a maximum 1,000 Head Injury Criteria (HIC) value for a head-first fall from the play event in accordance with CPSC Pub No 325 and ASTM F 1292. The protective surfacing should have a minimum critical height value equal to the height of the highest designated play surface. Measuring fall heights for play events is defined in paragraph FALL HEIGHT. Sand, gravel, and wood products shall not be installed over a concrete or bituminous subsurface per CPSC Pub No 325.

1.3.2 CHILD ACCESSIBILITY

The accessibility requirement in accordance with ASTM F 1487 includes the following: When the play event use zone consists of a protective surfacing rated as inaccessible, at least one accessible route shall be provided from the use zone perimeter to the play event. When there is more than one of the same play activity provided, only one shall meet accessibility requirements i.e.: one swing seat or one spring rocking play event). When the access and egress points are not the same for a play event, an accessible route shall be provided to both. The accessible route shall access all accessible play events and elements. The protective surfacings that meet accessibility are synthetic surfacing and engineered wood fiber per ASTM E 1912. When the accessible surface is within the use zone, it shall meet the requirements of paragraph CHILD SAFETY

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Loose Fill Surfacing; G
Geotextile Fabric; G

Manufacturer's descriptive data; catalogue cuts; and the latest edition of ASTM F 1487 and CPSC Pub No 325

Manufacturer's specifications, handling and storage requirements, installation procedures, and safety data sheets to include warnings and critical height performance standards for synthetic surfacing and loose fill surfacing.

A list to include part numbers of furnished protective surfacing materials and components for synthetic surfacing and loose fill surfacing

Delivery schedule and manufacturer name for synthetic surfacing and loose fill surfacing plus delivery, storage and handling information.

Impact attenuation and critical height performance for each thickness of synthetic surfacing and loose fill surfacing provided.

Manufacturer's Qualification

Name of the owner or user; service or preventive maintenance provider; date of the installation; point of contact and telephone number; and address for 10 sites.

Wood

Wood components obtained from managed forests.

Site Preparation

Playground equipment and site furnishings installed.

Temperature Limitation

Temperature limitation for applying adhesive

Wood By-Products; G

Composition, source; particle size; free from toxic chemicals; poisonous plant material; protrusions; or hazardous material

Wood Treatment; G

Wood treatment chemical content, toxicity level, and life-cycle durability

SD-04 Samples

Loose Fill Surfacing; G

Loose Fill Surfacing: A minimum 0.125 cu. ft sample.

SD-07 Certificates

Materials; G

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include composition and tests to which the material has been subjected.

Manufacturer's Qualification; G

Certificate of Insurance AA rated for a minimum one million dollars.

Manufacturer's Representative; G

The individual's name, company name and address, and playground safety training certificate

Installer's Qualification; G

The installer's company name and address, and training and experience certification.

Substitution; G

Technical representative's written approval.

Child Safety and Accessibility Evaluation; G

Record of measurements and findings by the certified playground safety inspector. Verification that installed protective surfacing meets manufacturer's recommendations and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

SD-10 Operation and Maintenance Data

Maintenance Instruction

Two bound copies of manufacturer's operation and maintenance manuals. The Contractor shall include manufacturer supplied spare parts.

1.5 DELIVERY, STORAGE, AND HANDLING

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery. Protective surfacing material shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. The storage area shall be as designated. The materials shall be stored in a dry, covered area until installed.

1.6 INSPECTION

Protective surfacing material shall be inspected upon arrival at the job site for meeting specified quality. Unacceptable materials shall be removed from the job site.

1.7 MANUFACTURER'S QUALIFICATION

Protective surfacing should have been installed in a minimum 10 sites and been in successful service for a minimum 5 year calendar period. The manufacturer shall provide a Certificate of Insurance AA rated for a minimum one million dollars covering both product and general liability.

1.8 INSTALLER'S QUALIFICATION

The installer shall be certified by the manufacturer for training and experience installing the protective surfacing.

1.9 WARRANTY

Furnished protective surfacing shall have a minimum 1 year calendar period warranty.

1.10 TECHNICAL REPRESENTATIVE

1.10.1 Playground Areas Other Than Child Development Centers (CDC)

The technical representative for outdoor play areas on sites other than CDCs shall be the Director of Public Works or designated representative. The design of these outdoor play areas shall be based on the play program and the age groups to be accommodated as determined by the play area committee.

1.11 MANUFACTURER'S REPRESENTATIVE

The manufacturer's certified playground safety inspector or the manufacturer's designated certified playground safety representative shall supervise the installation and adjustment of the protective surfacing to verify the installation meets the requirements of the manufacturer, this specification, and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of protective surfacing and shall be similar to surfacing in satisfactory use a minimum 5 year calendar period. Protective surfacing consists of two systems; synthetic surfacing and loose fill surfacing.

2.2 LOOSE-FILL SURFACING

Loose-fill surfacing installed in the use zone shall consist of wood by-products.

2.2.1 Wood By-Products

Wood by-products shall be engineered wood fiber. Wood by-products shall be free of sharp or foreign objects or toxic chemicals. Wood by-products manufactured from recycled pallets or lumber containing nails or metal fasteners shall be rejected.

2.2.1.1 Engineered Wood Fiber

Engineered wood fiber manufactured for the purpose of protective surfacing shall consist of particles varying from a minimum 1/8 inch wide to a maximum 1/2 inch thick; and a minimum 1 inch wide to a maximum 3 inches long.

2.3 GEOTEXTILE FABRIC

Geotextile fabric consists of the following: non-woven polypropylene sheet; non-woven 100 percent polyester sheet; or non-woven needle punched polyester sheet composed of recycled polyester resins.

2.4 CURBS

2.4.1 Concrete Curb

Concrete curbs shall conform to Section 02770A CONCRETE SIDEWALKS AND CURBS AND GUTTERS

PART 3 EXECUTION

3.1 SITE PREPARATION

Prior to installing the protective surfacing, verify the playground equipment and site furnishings are installed in accordance with Section 02882 PLAYGROUND EQUIPMENT, and Section 02870 SITE FURNISHINGS.

3.1.1 Finished Grade and Underground Utilities

The Contractor shall verify that finished grades are as indicated; the smooth grading has been completed in accordance with Section 02300 EARTHWORK; installation of the underground utilities through the area has been completed in accordance with Section 02300 EARTHWORK; installation of the storm-drainage system through the area has been completed in accordance with Section 02630 STORM DRAINAGE; and the installation of underground sprinklers through the area has been completed in accordance with Section 02811A UNDERGROUND SPRINKLER SYSTEMS. The location of underground utilities and facilities in the area of the operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.1.2 Layout

The layout of the entire use zone perimeter shall be staked before excavation begins. The location of all elements shall be staked to include the following: All play event configuration access and egress points; and use zone perimeters.

3.1.2.1 Use Zone

The use zone is defined as the area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around equipment; and on whose surface it is predicted that a user would land when falling from or exiting the equipment. Also, the use zone is associated with the following terms; "Clear Area," and "Fall Zone". The use zone shall be free of hard surfaces, objects or obstacles that a child could run into or fall on top of and be injured. Use zone perimeters shall not overlap hard surfaces. The use zone perimeter shall meet or exceed the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS. Use zone perimeters shall not overlap except for certain play events as defined in ASTM F 1487.

3.1.3 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments shall be provided.

3.1.4 Percolation Test

A test for percolation shall be done to determine positive drainage, to include the lowest elevation of the subgrade in the areas containing the following: sand; gravel; wood by-products; or synthetic surfacing installed over a pervious base. A positive percolation shall consist of a minimum 1 inch per 3 hour period. When a negative percolation test occurs, a shop drawing shall be provided to indicate the corrective measures.

3.1.5 Substitution

Under no circumstances are substitutions to be allowed or protective surfacing to be selected without written approval from the technical representative. Evaluate manufacturer substitutions for the critical height value with meeting the site conditions and paragraph FALL HEIGHT.

3.1.6 Subgrade

Subgrade irregularities shall be corrected to ensure the required depth of protective surfacing is provided. The subgrade elevation shall be as required by the manufacturer.

3.1.7 Subsurface

The subsurface shall be installed in a true, even plane, and sloped to provide positive drainage as indicated.

3.1.8 Fall Height

3.1.8.1 General Requirements

The fall height is defined as the vertical distance between the finished elevation of the designated play surface and the finished elevation of the protective surfacing beneath it. For some play events the fall height and platform height are the same, while for other play events the fall height and maximum equipment height are the same, Section 02882 PLAYGROUND EQUIPMENT. When the furnished play event fall height varies from the play event shown, shop drawings shall be provided defining the revised depth or type of protective surfacing to meet or exceed the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

3.1.8.2 Measuring Fall Height

EQUIPMENT	MEASURING FALL HEIGHT
Composite Equipment Structure:	For a platform surrounded by protective barriers, measure from the platform finished elevation. For a platform surrounded by guardrails, measure from the guardrail top elevation.
Infant Crawl Area:	A maximum 24 inch height, measured from the crawl wall or barrier finished elevation.
Playhouse, Non-climbable:	Measure from the designated play surface finished elevation.
Spring Rocking Equipment:	Measure from the seat top elevation.
Stationary Equipment, Climbable:	Measure from the maximum equipment height finished elevation.
Stationary Equipment, Non-climbable:	Measure from the designated play surface finished elevation.
Swing:	Measure from the bottom of the pivot point.

3.2 INSTALLING LOOSE FILL SURFACING SYTEM

3.2.1 Wood By-Product Surfacing System

Engineered wood fiber protective surfacing shall be installed according to manufacturer's instructions. Wood products shall meet the requirements of paragraph CHILD SAFETY.

3.2.1.1 Engineered Wood Fiber Surfacing System

Engineered wood fiber protective surfacing shall be installed according to manufacturer's instructions. The surfacing shall meet the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

3.2.1.2 Geotextile Fabric for Wood By-Product

Geotextile fabric shall cover the entire area and shall be lapped a minimum 4 inch width at the seams. Seams shall be adhered in accordance with manufacturer's recommendations. Folds, wrinkles, or loose fabric shall be smoothed. Fabric shall be protected from damage during wood product placement.

3.2.1.3 Minimum Depth for Wood By-Product

Wood by-product shall be installed at a minimum 12 inch depth throughout the use zone. The depth of wood products in high play activity areas shall be as indicated.

3.3 RESTORATION AND CLEAN UP

When the operation has been completed, the Contractor shall clean up and protect the site. Existing areas that have been damaged from the operation shall be restored to original condition at the Contractor's expense.

3.3.1 Clean Up

The site and play events shall be cleaned of all materials associated with the operation. Play events and surfaces shall be cleaned of dirt, stains, filings, and other blemishes occurring from shipment and installation. Cleaning methods and agents shall be as recommended by the manufacturer.

3.3.2 Protection

The area shall be protected as required or directed by providing barricades and signage. Signage shall be in accordance with Section 10430 EXTERIOR SIGNAGE

3.3.3 Disposal of Materials

Excess and waste material shall be removed and disposed of off Government property.

3.4 PROTECTIVE SURFACING ACCEPTANCE

3.4.1 Child Safety and Accessibility Evaluation

When the protective surfacing is installed, the play events and protective surfacing shall be thoroughly inspected and measured to verify the playground meets manufacturer's recommendations, paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS, and paragraph FALL HEIGHT as follows: 1) secure anchoring; 2) all hardware and connectors are tight and below the wear surface; 3) sharp points, edges, and protrusions; 4) entanglement; and 5) pinch, crush, and shear points. Measure use zone distances to determine the area is free of hard surfaces, objects or obstacles. Determine exceptions to use zone overlaps occur in accordance with ASTM F 1487. Measure play event fall height and compare to critical height value for the thickness of installed synthetic surfacing. Measure play event fall height and depth of loose fill protective surfacing. Ensure installed chopped tire

material is free from steel belts. Ensure the slide exit region has the required clear zone. Swing seat clearances are measured while occupied by a maximum user for the age group using the equipment. The finished installation shall have the appearance of a single covering. Protective surfacing that does not comply shall be reinstalled. Hardware that does not comply shall be replaced. Ensure positive drainage for the area and the lowest elevation of protective surfacing subgrade has been provided. A written report describing the results of the evaluation shall be provided.

3.4.2 Spare Parts

Protective surfacing spare parts provided by the manufacturer shall be furnished.

3.4.3 Maintenance Instruction

The manufacturer's operation and maintenance manual describing the recommended preventive maintenance, inspection frequency and techniques, periodic adjustments, lubricants, and cleaning requirements shall be furnished.

3.5 RE-INSTALLATION

When re-installation is required, the following shall be accomplished. Re-install the product as specified. Provide new replacement materials supplied by the manufacturer (material acquisition of replacement parts is the responsibility of the Contractor). Damage caused by the failed installation shall be repaired at the Contractor's expense.

End of Section

SECTION 02811

UNDERGROUND SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1013	(1999) Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 183	(1998) Carbon Steel Track Bolts and Nuts
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 536	(1984; R 1999el) Ductile Iron Castings
ASTM B 32	(1996) Solder Metal
ASTM B 43	(1998) Seamless Red Brass Pipe, Standard Sizes
ASTM B 88M	(1999) Seamless Copper Water Tube (Metric)
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 3261	(1997) Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM F 441/F 441M	(1999) Chlorinated Poly(Vinyl Chloride).(CPVC) Plastic Pipe, Schedules 40 and 80

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C606	(1997) Grooved and Shouldered Joints
AWWA C901	(1996) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 Inch Through 3 In., for Water Service

ASME INTERNATIONAL (ASME)

ASME B1.2	(1983; R 1991; Errata May 1992) Gages and Gaging for Unified Inch Screw Threads

ASME B16.15	(1985; R 1994) Cast Bronze Threaded Fittings Classes 125 and 250
ASME B16.18	(1984; R 1994) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(1995; B16.22a1998) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.3	(1998) Malleable Iron Threaded Fittings
ASME B40.1	(1991) Gauges - Pressure Indicating Dial Type - Elastic Element

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(1993) Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-51145	(Rev C) Flux, Soldering, Non-Electronic, Paste and Liquid

1.2 PERFORMANCE REQUIREMENTS

System shall operate with a minimum water pressure of 60 psi at connection to backflow prevention device and 40 psi at the last head in each zone.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Framed Instructions

Labels, signs, and templates of operating instructions that are required to be mounted or installed on or near the product for normal, safe operation.

Field Training

Information describing training to be provided, training aids to be used, samples of training materials to be provided, and schedules and notification of training.

Sprinkler System

Detailed procedures defining the Contractor's provisions for accident prevention, health protection, and other safety precautions for the work to be done.

Spare Parts

Spare parts data for each different item of material and equipment specified, after approval of the related submittals and not later than the start of the field-tests. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

SD-06 Test Reports

Field Tests

Performance test reports, in booklet form, showing all field tests performed to adjust each component; and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall indicate the final position of control valves.

SD-07 Certificates

Sprinkler System

The material supplier's or equipment manufacturer's statement that the supplied material or equipment meets specified requirements. Each certificate shall be signed by an official authorized to certify in behalf of material supplier or product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply.

SD-10 Operation and Maintenance Data

Sprinkler System

Six copies of operation and six copies of maintenance manuals for the equipment furnished. One complete set prior to field-testing and the remainder upon acceptance. Manuals shall be approved prior to the field-training course. Operating manuals shall detail the step-by-step procedures required for system startup, operation, and shutdown. Operating manuals shall include the manufacturer's name, model number, parts list, and brief description of all equipment and their basic operating features. Maintenance manuals shall list routine

maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. Maintenance manuals shall include piping and equipment layout, (refer to 3.3 As-builts) simplified wiring and control diagrams of the system as installed, and system programming schedule.

1.4 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be protected from the weather; excessive humidity and temperature variation; direct sunlight (in the case of plastic or rubber materials); and dirt, dust, or other contaminants.

1.5 FIELD MEASUREMENTS

The Contractor shall verify all dimensions in the field and shall advise the Contracting Officer of any discrepancy before performing the work.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT REQUIREMENTS

2.1.1 Standard Products

Materials and equipment shall be the standard products of a manufacturer who has produced similar systems, which have performed well for a minimum period of 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

2.1.2 Nameplates

Each item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

2.1.3 Extra Stock

The following extra stock shall be provided: Two sprinkler heads of each size and type, two valve keys for operating manual valves, two wrenches for removing and installing each type of head, two quick coupler keys and hose swivels, and four irrigation controller housing keys.

2.2 PIPING MATERIALS

2.2.1 Copper Tubing and Associated Fittings

Tubing shall conform to requirements of ASTM B 88M, Type K. Fittings shall conform to ASME B16.22 and ASME B16.18, solder joint. Solder shall conform to ASTM B 32 95-5 tin-antimony. Flux shall conform to CID A-A-51145, Type I. Grooved mechanical joints and fittings shall be designed for not less than 125-psi service and shall be the product of the same manufacturer. Grooved fitting and mechanical coupling housing shall be ductile iron conforming to ASTM A 536. Gaskets for use in grooved joints shall be molded synthetic polymer of pressure responsive design and shall conform to ASTM D 2000 for circulating medium up to 230 degrees F. Grooved joints shall conform to AWWA C606. Coupling nuts and bolts for use in grooved joints shall be steel and shall conform to ASTM A 183.

2.2.2 Red Brass Pipe and Associated Fittings

Pipe shall conform to requirements of ASTM B 43, regular. Fittings shall be Class 250, cast bronze threaded conforming to the requirements of ASME B16.15.

2.2.3 Galvanized Steel Pipe and Associated Fittings

Pipe shall conform to requirements of ASTM A 53/A 53M, Schedule 40. Fittings shall be Class 150 conforming to requirements of ASME B16.3.

2.2.4 Polyethylene (PE) Plastic Piping

Pipe shall conform to AWWA C901, outside diameter base with dimension ratio (DR) of 9.3 to provide 150-psi minimum pressure rating. Fittings shall conform to ASTM D 3261, DR of 9.3.

2.2.5 Dielectric Fittings

Dielectric fittings shall conform to ASTM F 441/F 441M, Schedule 80, CPVC threaded pipe nipples, 4 inch minimum length.

2.3 SPRINKLERS

2.3.1 Rotary Pop-Up Sprinklers

Sprinklers shall be capable of covering 52 feet diameter at 40 psi with a distribution rate of 2.7-gpm 4-inch pop-up, trajectory of 15 degrees, and maximum height of spray of 6 feet. Construction shall be high impact molded plastic with filter screen, reducible watering radius, and choice of 8 nozzles and have adjustable radius capabilities.

2.3.2 Pop-Up Spray Heads

Sprinkler heads shall be a conical spray with adjustable or non-adjustable coverage.

2.4 VALVES

2.4.1 Quick Coupling Valves

Quick coupling valves shall have brass parts and shall be two-piece unit consisting of a coupler water seal valve assembly and a removable upper body to allow spring and key track to be serviced without shutdown of main. Lids shall be lockable vinyl with spring for positive closure on key removal.

2.4.2 Remote Control Valves, Electrical

Remote control valves shall be solenoid actuated globe valves of 3/4 to 2-inch size, suitable for 24 volts, 60 cycle, and designed to provide for shut-off in event of power failure. Valve shall be cast bronze or brass or plastic housing suitable for service at 150 psi operating pressure with external flow control adjustment for shut-off capability, external plug at diaphragm chamber to enable manual operation, filter in control chamber to prevent valve body clogging with debris, durable diaphragm, and accessibility to internal parts without removing valve from system.

2.4.3 Pressure Regulating Master Valve

Pressure regulating master valve shall be automatic mechanical self-cleaning, self-purging control system having an adjustable pressure setting operated by a solenoid on alternating current with 0.70 amperes at 24 volts. Valve shall close slowly and be free of chatter in each diaphragm position, have manual flow stem to adjust closing speed and internal flushing, and one inlet tappings capable of being installed as a straight pattern valve. Body shall be cast bronze or brass with removable brass seat serviceable from top without removing valve body from system. Valve shall operate at 150 psi working pressure and pilot range from 10 to 125 psi.

2.5 ACCESSORIES AND APPURTENANCES

2.5.1 Backflow Preventers

Reduced Pressure Type Backflow Prevention Assembly: ASSE 1013, Shutoff valves on inlet and outlet and strainer on inlet. Include test cocks with 2 positive-seating check valves for continuous pressure application.

2.5.2 Valve Keys for Manually Operated Valves

Valve keys shall be 1/2-inch diameter by 40 inches long, tee handles and keyed to fit valves.

2.5.3 Valve Boxes and Concrete Pads

2.5.3.1 Valve Boxes

Valve boxes shall be cast iron, plastic lockable, or precast concrete for each gate valve, manual control valve and remote control valve. Box sizes shall be adjustable for valve used. Word "IRRIGATION" shall be cast on cover. Shaft diameter of box shall be minimum 5-1/4 inches. Cast iron box shall have bituminous coating.

2.5.3.2 Concrete Pads

Concrete pads shall be precast or cast-in-place reinforced concrete construction for double check valve type backflow preventers.

2.5.4 Pressure Gauges

Pressure gauges shall conform to requirements of ASME B40.1, single style pressure gauge for water with 4-1/2 inch dial brass or aluminum case, bronze tube, gauge cock, pressure snubber and siphon. Scale range shall be suitable for irrigation sprinkler systems.

2.5.5 Service Clamps

Service clamps shall be bronze flat and double strapped with neoprene gasket or "O"-ring seal.

2.6 AUTOMATIC CONTROLLERS, ELECTRICAL

Refer to drawings for specified controller.

2.7 WIRE AND ELECTRICAL MATERIALS

Wiring and rigid conduit for electrical power shall be in accordance with NFPA 70, to be Type UF-B multi-conductor, with solid-copper conductors and insulated cable; suitable for direct burial. Wire to be color-coded for each zone to facilitate service

a. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.

b. Conduit to be Schedule 80 PVC.

c. Splicing Materials: Manufacturer’s packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

2.8 CONCRETE MATERIALS

Concrete shall have a compressive strength of 2,500 psi at 28 days as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.9 WATER SUPPLY MAIN MATERIALS

Tapping sleeves, service cut off valves, and connections to water supply mains shall be in accordance with Section 02510a WATER DISTRIBUTION SYSTEM.

2.10 INSULATING JOINTS

Insulating joints and dielectric fittings shall be in accordance with Section 02510a WATER DISTRIBUTION SYSTEM.

PART 3 - EXECUTION

3.1 INSTALLATION

Sprinkler system shall be installed after site grading has been completed. Excavation, trenching, and backfilling for sprinkler system shall be in accordance with the applicable provisions of Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

3.1.1 Trenching

Trench around roots shall be hand excavated to pipe grade when roots of 2 inches diameter or greater are encountered. Trench width shall be 4 inches minimum or 1-1/2 times diameter of pipe, whichever is wider. Backfill shall be hand tamped over excavation. When rock is encountered, trench shall be excavated 4 inches deeper and backfilled with silty sand (SM) or well-graded sand (SW) to pipe grade. Trenches shall be kept free of obstructions and debris that would damage pipe. Subsoil shall not be mixed with topsoil. Existing concrete walks, drives and other obstacles shall be bored at a depth conforming to bottom of adjacent trenches. Pipe sleeves for bored pipe shall be two pipe diameters larger than sprinkler pipe.

3.1.2 Piping System

3.1.2.1 Cover

Underground piping shall be installed to meet the minimum depth of backfill cover specified.

3.1.2.2 Clearances

Minimum horizontal clearances between lines shall be 4 inches for pipe 2 inches and less; 1-foot for 2-1/2 inches and larger. Minimum vertical clearances between lines shall be 1 inch.

3.1.3 Piping Installation

3.1.3.1 Soldered Copper Tubing

Pipe shall be reamed and burrs removed. Contact surfaces of joint shall be cleaned and polished. Flux shall be applied to male and female ends. End of tube shall be inserted into fittings full depth of socket. After soldering, a solder bead shall show continuously around entire joint circumference. Excess acid flux shall be removed from tubings and fittings.

3.1.3.2 Threaded Brass

Prior to installation, pipe shall be reamed. Threads shall be cut in conformance with ASME B1.2. Pipe joint compound shall be applied to male end only.

3.1.3.3 Insulating Joints

Insulating and dielectric fittings shall be provided where pipes of dissimilar metal are joined and at connections to water supply mains as shown. Installation shall be in accordance with Section 02510a WATER DISTRIBUTION SYSTEM.

3.1.3.4 Grooved Mechanical Joints

Grooves shall be prepared according to the coupling manufacturer's instructions. Grooved fittings, couplings, and grooving tools shall be products of the same manufacturer. Pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application. Grove width and dimension of groove from end of pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with the coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations.

3.1.4 Installation of Valves

3.1.4.1 Manual Valves

Valves shall be installed in a valve box extending from grade to below valve body, with a minimum of 100 mm cover measured from finish grade to top of valve stem.

3.1.4.2 Automatic Valves

Valve shall be set plumb in a valve box extending from grade to below valve body, with minimum of 4 inches cover measured from grade to top of valve. Automatic valves shall be installed beside sprinkler heads with a valve box.

3.1.5 Sprinklers and Quick Coupling Valves

Sprinklers and valves shall be installed plumb and level with terrain.

3.1.6 Control Wire and Conduit

3.1.6.1 Wires

Low voltage wires may be buried beside pipe in same trench. Rigid conduit shall be provided where wires run under paving. Wires to be color-coded per zone to facilitate service. One control circuit shall be provided for each zone and a circuit to control sprinkler system.

3.1.6.2 Loops

A 12-inch loop of wire shall be provided at each valve where controls are connected.

3.1.6.3 Expansion and Contraction

Multiple tubes or wires shall be bundled and taped together at 3-m intervals with 12-inch loop for expansion and contraction.

3.1.6.4 Splices

Electrical splices shall be waterproof.

3.1.6.5 Provide #10 tracer wire on all laterals and mains.

3.1.7 Automatic Controller

Exact location of controllers shall be determined before installation. Coordinate the electrical service to these locations. Install in accordance with manufacturer's recommendations and NFPA 70.

3.1.8 Backfill

3.1.8.1 Minimum Cover

Depth of cover shall be 2 feet for 1-1/4 inch pipe or smaller; 40 inches for 1-1/2 to 2 inch pipe; 40 inches for 2-1/2 inch pipe or larger; 40 inches for pipes under traffic loads, farm operations, and freezing temperatures; and 18 inches for low-voltage wires. Remainder of trench or pipe cover shall be filled to within 3 inches of top with excavated soil, and compact soil with plate hand-held compactors to same density as undisturbed adjacent soil.

3.1.8.2 Restoration

Top 4 inches shall be filled with topsoil and compacted with same density as surrounding soil. Lawns and plants shall be restored in accordance with Sections 02921 SEEDING, 02922 SODDING and Section 02930 EXTERIOR PLANTING. Pavements shall be restored in accordance with Section 02741 Asphalt Paving.

3.1.9 Adjustment

After grading, seeding, and rolling of planted areas, sprinkler heads shall be adjusted flush with finished grade. Adjustments shall be made by providing new nipples of proper length or by use of heads having an approved device, integral with head, which will permit adjustment in height of head without changing piping.

3.1.10 Disinfection

Sprinkler system fed from a potable water system shall be disinfected upstream of backflow preventer in accordance with Section 02510 WATER DISTRIBUTION SYSTEM.

3.1.11 Cleaning of Piping

Prior to the hydrostatic and operation tests, the interior of the pipe shall be flushed with clean water until pipe is free of all foreign materials. Flushing and cleaning out of system pipe, valves, and components shall not be considered completed until witnessed and accepted by Contracting Officer.

3.2 FIELD TESTS

Contractor shall provide all instruments, equipment, facilities, and labor required to conduct the tests.

3.2.1 Hydrostatic Pressure Test

Piping shall be tested hydrostatically before backfilling and proved tight at a hydrostatic pressure of 150 psi without pumping for a period of one hour with an allowable pressure drop of 5 psi. If hydrostatic pressure cannot be held for a minimum of 4 hours, Contractor shall make adjustments or replacements and the tests repeated until satisfactory results are achieved and accepted by the Contracting Officer.

3.2.2 Leakage Tests

Leakage tests for service main shall be in accordance with Section 02510 WATER DISTRIBUTION SYSTEM.

3.2.3 Operation Test

At conclusion of pressure test, sprinkler heads or emitter heads, quick coupling assemblies, and hose valves shall be installed and entire system tested for operation under normal operating pressure. Operation test consists of the system operating through at least one complete programmed cycle for all areas to be sprinkled.

3.3 AS-BUILTS

Provide full-size plans (same size as contract documents) mylar reproducible indicating dimensioned locations and sizes of all heads, pipes, valves and appurtenances.

3.4 FRAMED INSTRUCTIONS

Framed instructions containing wiring and control diagrams under glass or in laminated plastic shall be posted where directed. Condensed operating instructions, prepared in typed form, shall be framed as specified above and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the system. After the Contracting Officer approves the as-built drawings, then the controller charts and programming schedule shall be prepared. One chart for each controller shall be supplied. Chart shall be a reduced drawing of actual as-built system that will fit the maximum dimensions inside controller housing. Black line print for chart and a different pastel or transparent color shall indicate each station area of coverage. After chart is completed and approved for final acceptance, chart shall be sealed between two 20-mil pieces of clear plastic.

3.5 FIELD TRAINING

A field-training course shall be provided for designated operating and maintenance staff members. Training shall be provided for a total period of 4 hours of normal working time and shall start after the system is functionally complete but prior to final acceptance tests. Field training shall cover all of the items contained in the operating and maintenance manuals.

3.6 CLEANUP

Upon completion of installation of system, all debris and surplus materials resulting from the work shall be removed.

END OF SECTION

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SECTION 02821

FENCING FOR COURT AREAS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C1	(2000) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C4	(1999) Poles - Preservative Treatment by Pressure Processes

ASTM INTERNATIONAL (ASTM)

ASTM A 116	(2000) Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A 121	(1999) Metallic-Coated Carbon Barbed Wire
ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 176	(1999) Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
ASTM A 392	(2003) Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 478	(1997; R 2002) Chromium-Nickel Stainless Steel Weaving and Knitting Wire
ASTM A 491	(2003) Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 666	(2000) Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A 702	(1989; R 2000) Steel Fence Posts and Assemblies, Hot Wrought
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 824	(2001) Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence
ASTM C 94/C 94M	(2003a) Ready-Mixed Concrete

ASTM D 4541	(2002) Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM F 1043	(2000) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
ASTM F 1083	(1997; R 2003) Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(2003) Industrial and Commercial Horizontal Slide Gates
ASTM F 626	(1996a; R 2003) Fence Fittings
ASTM F 668	(1999a) Poly(Vinyl Chloride) (PVC) and other Organic Polymer-Coated Steel Chain-Link Fence Fabric
ASTM F 883	(1997) Padlocks
ASTM F 900	(2003) Industrial and Commercial Swing Gates

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Chain Link Fence

Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

1.3 APPROVAL OF POLYVINYL CHLORIDE-COATED FENCE MATERIALS

Polyvinyl chloride-coated fence materials shall be thoroughly inspected for cracking, peeling, and conformance with the specifications by the Contracting Officer's Representative prior to installation. Any fence materials rejected by the Contracting Officer's Representative shall be replaced by the contractor with approved materials at no additional cost to the Government.

PART 2 PRODUCTS

2.1 FENCE FABRIC

Fence fabric shall conform to the following:

2.1.1 Chain Link Fence Fabric

Class 2b polyvinyl chloride-coated steel fabric with 0.3 ounces of zinc coating per square foot in accordance with ASTM F 668. Fabric shall be fabricated of 9 gauge wire woven in 2 inch mesh.

Polyvinyl chloride coating for fabric and all other fence components shall be manufacturer's standard black in color. Fabric height shall be as shown. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.2 GATES

ASTM F 900 and/or ASTM F 1184. Gate shall be the type and swing shown. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Gate frames shall be polyvinyl chloride-coated steel pipe (Group IA) with external coating Type A, a nominal pipe size (NPS) 1-1/2, conforming to ASTM F 1043. Gate fabric shall be as specified for chain link fabric. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces. Intermediate braces shall be provided on all gate frames with an electro-mechanical lock. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

2.3 POSTS

2.3.1 Metal Posts for Chain Link Fence

ASTM F 1083, zinc-coated. Post shall be either Group IA steel pipe, Group IC, Group II, roll-formed steel sections, or Group III steel H-sections and shall be zinc coated (Type A) and polyvinyl chloride coated conforming to the requirements of ASTM F 1043. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Gate post shall be for the gate type specified subject to the limitation specified in ASTM F 900 and/or ASTM F 1184.

2.4 BRACES AND RAILS

Braces and rails shall be Group IA, steel pipe, size NPS 1-1/4 or Group II, formed steel sections, size 1-21/32 inch and shall be zinc coated (Type A) and polyvinyl chloride-coated conforming to the requirements of ASTM F 1043. Group II, formed steel sections, size 1-21/32 inch, conforming to ASTM F 1043, may be used as braces and rails if Group II line posts are furnished.

2.5 WIRE

2.5.1 Tension Wire

Tension wire shall be Type I or Type II, Class 4 coating, in accordance with ASTM A 824.

2.6 ACCESSORIES

ASTM F 626. Ferrous accessories shall also be polyvinyl chloride-coated, minimum thickness of 0.006 inch, maximum thickness of 0.015 inch. Color coating of fittings shall match the color coating of the fabric. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with

turnbuckles or other equivalent provisions for adjustment. Tie wire for attaching fabric to rails, braces, and posts shall be 9 gauge steel wire and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A 153/A 153M unless modified. Threaded hardware shall be painted to match polyvinyl chloride coatings.

2.7 CONCRETE

ASTM C 94/C 94M, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 3000 psi at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

PART 3 EXECUTION

3.1 INSTALLATION

Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 500 feet. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a 2 inch clearance between the bottom of the fabric and finish grade.

3.3 POST INSTALLATION

3.3.1 Posts for Chain Link Fence

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Group II line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Driven posts shall be set to a minimum depth of 3 feet and shall be protected with drive caps when being set. For high security fences, fence post rigidity shall be tested by applying a 50 pound force on the post, perpendicular to the fabric, at 5 feet above ground; post movement measured at the point where the force is applied shall be less than or equal to 3/4 inch from the relaxed position; every tenth post shall be tested for rigidity; when a post fails this test, further tests on the next four posts on either side of the failed post shall be made; all failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.4 RAILS

3.4.1 Top Rail

Top rail shall be supported at each post to form a continuous brace between terminal posts. Where required, sections of top rail shall be joined using sleeves or couplings that will allow expansion or contraction of the rail. Top rail, if required for high security fence, shall be installed as indicated on the drawings.

3.5 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed on fences over 6 feet in height. A center brace or 2 diagonal truss rods shall be installed on 12 foot fences. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences 6 feet high or less if a top rail is installed.

3.6 TENSION WIRES

Tension wires shall be installed along the bottom of the fence line and attached to the terminal posts of each stretch of the fence. Top tension wires shall be installed within the top 4 inches of the installed fabric. Bottom tension wire shall be installed within the bottom 6 inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.7 CHAIN LINK FABRIC

Chain link fabric shall be installed on the side of the post indicated. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15 inch intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 24 inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 2 plus or minus 1/2 inch above the ground.

3.8 GATE INSTALLATION

Gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches, stops, and keepers shall be installed as required. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

End of Section

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SECTION 02835

POLYVINYL CHLORIDE (PVC) FENCING

PART 1 - GENERAL

1.1 REFERENCES

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM A 615	(2001b) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 33	(2002a) Concrete Aggregates
ASTM C 150	(2002a) Portland Cement
ASTM C 615	(1999) Granite Dimension Stone
ASTM D 1784	(1999 ae1) Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

1.2 SUBMITTALS

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SD-02 Shop Drawings

Fence Panels; G

SD-03 Product Data

Fence Panels; G

In the form of manufacturer's technical data, specifications and installations for fence, posts, gate uprights, post caps, gates, gate hardware and accessories.

SD-04 Samples

For verification of PVC color in form of 3 inch lengths of actual product to be used in color selection.

1.3 QUALITY ASSURANCE

1.3.1 Installer Qualifications

Engage an experienced installer who has at least three years experience and has completed at least five PVC fence projects with same material and of similar scope to that indicated for this project with a successful construction record of in-service performance.

1.3.2 Single-Source Responsibility

Obtain PVC fences and gates, including accessories, fittings and fastenings from a single source.

1.4 PROJECT CONDITIONS

1.4.1 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 FENCE PANELS

Rails, pickets and accessories shall be of high impact, Ultra Violet (UV) resistant, rigid PVC, and shall comply with ASTM D 1784, Class 14344B.

2.2 POSTS

Shall be 5" x 5" one piece extruded, of lengths indicated and pre-routed to receive rails at the spacing indicated.

2.3 RAILS

Rails shall be one piece extruded of dimensions indicated on the drawings. Rails shall be reinforced with steel stiffener channels.

2.4 PICKETS

Rails shall be one piece extruded of dimensions indicated on the drawings.

2.5 ACCESSORIES

Manufacturers' standard rail end reinforcers and other accessories as required.

2.6 MISCELLANEOUS MATERIALS

2.6.1 Stiffener Channels

Stiffener Channels shall be galvanized steel structural channel. Configure channels for concealed installation within PVC rails with pre-drilled holes for drainage. Thickness: 0.040 Gauge (minimum).

2.6.2 Fasteners and Anchorage

Fasteners and Anchors shall be stainless steel to dimensions indicated in the detail drawings.

2.6.3 PVC Cement

PVC cement shall be as recommended by fence manufacturer.

2.7 POST CAPS

Molded, one piece

2.7.1 Cross Section

Match post or gate upright cross section

2.7.2 Thickness

0.095" minimum

2.7.3 Configuration

Four-sided for installation to top of posts and gate

2.8 ACCESSORIES

Manufacturers' standard gate brace, screw caps, rail end reinforcers and other accessories as required.

2.9 GATE HARDWARE AND ACCESSORIES

2.9.1 General

Provide hardware and accessories for each gate according to the following requirements.

2.9.2 Hinges

Size and material to suit gate size, non lift-off type, galvanized steel with adjuster plate, offset to permit 120-degree gate opening. Provide one pair of hinges for each gate.

2.9.3 Color

To match vinyl fence.

2.9.4 Latch

Manufacturers' standard self-latching, galvanized steel single or dual access gravity latch. Provide one latch per gate.

2.9.5 Hardware

Stainless Steel. Provide sizes as recommended by fence manufacturer.

2.10 CONCRETE

2.10.1 Concrete

Provide concrete consisting of portland cement per ASTM C 150, aggregates per ASTM C 33, and potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2000 psi. Use at least four sacks of cement per cubic yard, 1-inch maximum size aggregate, 3-inch maximum slump. Use 1/2-inch maximum size aggregate in post where required.

2.10.2 Packages Concrete Mix

Mix dry-packaged normal-weight concrete conforming to ASTM C 387 with clean water to obtain a 2 to 3 inch slump.

2.11 REINFORCEMENT FOR FILLED POSTS

2.11.1 Steel Reinforcing Bars

ASTM A 615. Grade 60. Deformed (#4 or ½"). Install 2 bars for each post to a length of 6 feet. Fill post with concrete to 2 inches above rebar.

PART 3 - EXECUTION

3.1 TOP, BOTTOM AND CENTER RAILS

Install rails to post as indicated on the drawings. Install rails level.

3.2 ADJUSTING AND CLEANING

Remove all traces of dirt and soiled areas. Remove any grout or concrete splatters from PVC fence materials with care to avoid scratching.

END OF SECTION

SECTION 02870

SITE FURNISHINGS

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2000) Code of Standard Practice for Steel Buildings and Bridges
AISC 335	(1989) Structural Steel Buildings Allowable Stress Design and Plastic Design
AISC 350	(1999) Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.3	(1995) Operations -- Safety Requirements for Power Actuated Fastening Systems
ANSI B18.2.1	(1996; A 1999) Square and Hex Bolts and Screws Inch Series

ASME INTERNATIONAL (ASME)

ASME B18.2.2	(1987; R 1999) Square and Hex Nuts
ASME B18.6.2	(1998) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series (B18.6.2)
ASME B18.6.3	(1999) Machine Screws and Machine Screw Nuts
ASME B18.21.1	(1999) Lock Washers (Inch Series)
ASME B18.22.1	(1965; R 1998) Plain Washers

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2001a) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 307	(2002) Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 500	(2001a) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(2001) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 653/A 653M	(2002a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C 1048	(1997b) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM D 3451	(2001) Testing Coating Powders and Powder Coatings
ASTM E 488	(1996) Strength of Anchors in Concrete and Masonry Elements

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2002) Structural Welding Code - Steel

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-1925	(Rev. A) Shield, Expansion (Nail Anchors)
FS TT-P-664	(Rev. D) Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

1.2 SUBMITTALS

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SD-02 Shop Drawings

Beaches; G
Tables; G
Shelters; G
Assembly Instruction Drawings

Drawings showing scaled details of proposed site furnishings, elevations for each type of site furnishing; dimensions, details, and methods of mounting or anchoring; shape and thickness of materials; and details of construction.

SD-03 Product Data

Bus Shelters
Benches, Picnic Tables, Trash Receptacles

Manufacturer's descriptive data and catalog cuts.

SD-04 Samples

Finish

Two sets of color data for each furnishing displaying manufacturer's color selections and finishes, and identifying those colors and finishes proposed for use.

SD-07 Certificates

Primer certificate

Manufacturer's certificate of compliance

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M using procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, INSPECTION, STORAGE AND PROTECTION

Materials shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. Site furnishings shall be inspected upon arrival at the job site for conformity to specifications and quality in accordance with paragraph MATERIALS. Protect from corrosion, staining, and other types of damage. Store items in designated area free from contact with soil and weather. Remove and replace damaged items with new items.

1.5 GENERAL REQUIREMENTS

1.5.1 Fabrication Drawings

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

1.5.2 Installation Drawings

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation.

1.5.3 Assembly Instruction Drawings

Submit assembly instruction drawings showing layout(s), connections, bolting and anchoring details as per manufacturer's standards.

1.5.4 Primer Certificate

Submit a certificate from the manufacturer stating that the primer conforms to requirements of FS TT-P-664.

1.5.5 Powder Coatings Certificate

Submit a certificate from the manufacturer stating the powder coat conforms to ASTM D 3451.

PART 2 - PRODUCTS

2.1 MATERIALS

Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

2.1.1 Metals

Metal components shall be furnished with factory drilled holes. Components shall be free of excess weld and spatter. Metal components with holes that will not be filled by hardware or hidden by other components will be rejected. Structural steel products shall conform to ASTM A 36/A 36M, ASTM A 500 and ASTM A 501.

2.1.2 Structural Tubing

Framework to be .125 inch thick structural steel tubing of 1"x2", 2"x3" and 3"x3" dimension. All structural members shall meet or exceed ASTM A 500 Grade B, 46KSI standards.

2.1.3 Anchors and Hardware

Anchors shall be provided, where necessary, for fastening site furnishings securely in place and in accordance with approved manufacturer's instructions. Anchoring devices that may be used, when no anchors are otherwise specified or indicated, include anchor bolts, slotted inserts, expansion shields for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; and lag bolts and screws for wood. Anchor bolts shall conform to ASTM A 307. Hardware shall be galvanized steel in accordance with ASTM A 153/A 153M and compatible with the material to which applied. All exposed hardware shall match in color and finish. Mounting hardware shall be concealed, recessed, and plugged.

2.1.3.1 Threaded Inserts and Expansion Anchors

Provide inserts recessed not less than 2.5 inches into concrete. Pullout 198 pounds in concrete with f'c of 3,000 psi, as tested per ASTM E 488. Expansion shields shall conform to FS A-A-1925, group II, type 4, and class 1. Provide embedment required by manufacturer.

2.1.3.2 Lag Screws and Bolts

ANSI B18.2.1, type and grade best suited for the purpose.

2.1.3.3 Toggle Bolts

ANSI B18.2.1

2.1.3.4 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 or ASTM A 307

2.1.3.5 Power Driven Fasteners

Follow safety provisions of ANSI A10.3.

2.1.3.6 Screws

ANSI B18.2.1, ASME B18.6.2, and ASME B18.6.3

2.1.3.7 Washers

Provide plain washers to conform to ASME B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.1.

2.1.4 Tempered Glass

ASTM C 1048, Kind FT (fully tempered), condition A (uncoated), Type 1 (transparent, Quality q3, 1/4-inch thick, bronze tinted in color.

2.1.5 Plastics

The Contractor shall provide panels and components molded of ultraviolet (UV) and color stabilized polyethylene, with minimum 1/4 inch wall thickness; exposed edges shall be smoothed, rounded, and free of burrs and points; and the material shall be resistant to fading, cracking, fogging, and shattering. The material shall be non-toxic and have no discernible contaminates such as paper, foil, or wood. The material shall contain no more than 3 percent air voids. Material shall be resistant to deformation from solar radiation heat gain. Recycled materials to include plastic lumber will not be used as structural components of site furnishings.

2.2 PRETREATMENT, PRIMING AND PAINTING

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions.

2.2.1 Nonferrous Metal Surfaces

Protect by plating, anodic or organic coatings.

2.2.2 Aluminum Surfaces

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks and other defects which will affect uniform appearance of finished surfaces.

2.3 COATINGS AND FINISHES

2.3.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing shall conform to ASTM A 123/A 123M, ASTM A 153/A 153M or ASTM A 653/A 653M, as applicable. Tailings and sharp protrusions formed as a result of the hot-dip process shall be removed and exposed edges burnished. Galvanize anchor bolts, grating fasteners, washers and parts or devices necessary for proper installation, unless otherwise indicated.

2.3.2 Finish

Finish shall be as specified by the manufacturer or as indicated. Exposed surfaces and edges shall be rounded, polished or sanded. Finish shall be non-toxic, non-glare and resistant to corrosion. Exposed surfaces shall be smooth and splinter-free exposed surfaces.

2.3.2.1 Paint for Bus Shelter

Unit to be primed and sealed with marine base 2-part epoxy primer and paint. High solids, 2-part polyurethane finish coats shall have fade, impact and chemical resistance.

2.3.2.2 Paint for other site furnishings to be as indicated on drawings and schedule.

2.3.2.3 Color

Color of bus shelter shall be dark brown, Federal Standard Color #37056.

2.4 SITE STANDARDS

Site furnishings shall be furnished with the dimensions and requirements indicated. Site furnishings placed in children's outdoor play areas shall meet the safety requirements of ASTM F 1487 for entrapment; sharp points, edges and protrusions; entanglement; pinch, crush and shear points. Site furnishings to be included in children's outdoor play areas shall be free from sharp vertical edges and any protruding elements and designed with a minimum radius of 1/2 inch on all vertical edges; this includes, but is not limited to, seat walls, containment curbs and planters. Where practical, horizontal edges exposed to children's activities shall be rounded.

2.5 BENCHES

2.5.1 Bench for Bus Shelter

Furnish one (1) steel bench 8'-0" in length and with backrest. Bench shall be pre-mounted to the bus shelter and painted to match the color of the bus shelter. Benches and chairs shall be furnished with no sharp edges or protruding hardware.

a. Height: The height above finished grade or specified surface shall be between 18-20 inches and level.

b. Seat: The seat surface shall be pitched or slotted to shed water; the seat depth shall be between 12-18 inches and pitched down at the back at a 0-5 degree angle.

c. Back Rest: The height shall be between 15-18 inches from the top of the seat and the connection shall be at a 90-110 degree angle to the seat.

d. Arm Rest: When arm rests are required, a minimum of 6 inches height from the seat and a minimum arm rest width of 1-1/2 inches shall be provided.

e. Weight Limit: Seats shall support a minimum 300 lbs for each person they are designed to accommodate.

2.5.2 Perforated Steel Benches at Play Areas and Courts

Provide 16 gage perforated steel sheet. Bench to sustain a live load of not less than 200 pounds per square foot.

a. Design bench to sustain a live load of not less than 200 pounds per square foot.

b. Provide 1 1/2 inch O.D. ASTM A 53/A 53M schedule 40 steel pipe pedestals where required.

2.5.3 Fasteners

Provide concealed fasteners except where specifically approved. Types as required for specific usage.

2.5.4 Accessories

Provide manufacturer's standard materials and accessories as required for assembly of units and as indicated on the assembly drawings. Provide unexposed aluminum, stainless steel or steel plates, angles and supports as required for complete assembly. Separate dissimilar materials to prevent electrolytic action.

2.6 BUS SHELTERS

AISC 350, AISC 335. Provide prefabricated shelter to conform to all applicable State and Local Building Codes and to meet manufacturer's standards of construction and materials. The shelter shall be pre-glazed pre-drilled and pre-cut, shipped with all hardware and accessories necessary for complete field assembly. The shelter shall be a pre-assembled, designed and structurally engineered unit to withstand 50-LBF/sq. ft. live load and 90-LBF/sq. ft. wind load. The shelter to be 5'-0" by 12'-0".

2.6.1 Framing Systems

Framing system: columns, rafters, ridge, purlins and other structural-framing members shall be steel as indicated. Manufacturer shall provide shop drawings and calculations prepared by a structural engineer.

Structural steel shall conform to ASTM A 36/A 36M or ASTM A 500, 36,000 psi yield strength and 58,000 psi tensile strength, factory finished with rust inhibited primer and powder coat conforming to ASTM D 3451. Framing sizes and configurations shall be as required for size of structure indicated meeting manufacturer's standard and applicable building codes.

2.6.2 Roof Panels Decking

Fascia to be 6" with 1" overhang, fabricated from 14 gauge galvanized steel. Roof deck to consist of four (4) translucent, polycarbonate, white domes, 24"x48"x6". Roof to be 16 gauge galvanized steel with elastomeric coating system sloped to rear drain holes.

2.6.3 Glazing

Factory installed in separate structural window frames, gasketed and glazed as per manufacturer's standard, interchangeable, glazing system. All steel window frames with concealed exterior fasteners and 1/4" gray tinted tempered safety glass. Unit to have front windscreen with one 4 foot opening.

2.6.4 Base Plates

Six (6) mounting plates shall be fabricated from 2.5" x 3/16" thick square tubing welded to a 6" x 6" x 1/4" hot-rolled steel plate.

2.6.5 Waterproofing

All metal joints are to be pressure sealed against any weather intrusion. Weather stripping and weather gasketing shall be provided for windows.

2.6.6 Furnish one (1) steel bench 8'-0" in length and with backrest. Bench shall be pre-mounted to the bus shelter and painted to match the color of the bus shelter.

2.7 WASTE RECEPTACLES

Waste receptacles to have flat tops and removable semi-rigid plastic liner insert. Waste receptacles shall be furnished with weather protection, odor containment and insect/animal-proofing. Container size shall be as noted on drawings. Provide waste receptacles as indicated, fabricated from perforated steel sheet material powder coat finish, color as indicated. Metal thickness, width and configuration shall be manufacturer's standard. Chemically clean and phosphate coat prior to final powdercoat.

a. Height: Trash and litter deposit openings shall be between 30-40 inches above the ground.

b. Liners: Trash and litter receptacles shall be furnished with removable reusable inner containers. Self-dumping type designs to include hinged bottom, top or sides will be rejected.

c. Anchors: Trash and litter receptacles that can be anchored to resist overturning by typical use, high winds or animals shall be furnished and anchored in accordance with the manufacturer's recommendations.

d. Openings: Openings for trash and litter insertion shall be a minimum of 4 inches in diameter. Edges of the openings shall be crimped, rounded and smoothed.

2.8 TABLES

Picnic tables shall be furnished with attached benches that have no backrests. Table's exposed edges and corners shall be rounded, eased or chamfered. Provide 16 gage perforated steel sheet table tops with solid metal edges as per manufacturer's standard. Weld tops to base as required for frame support.

a. Steel pedestal base: ASTM A 53/A 53M Schedule 40 steel pipe, 2 3/8 inch O.D.

b. Mounting: Type as indicated

c. Hardware: Zinc or cadium plated nuts, bolts, screws and lock washers.

d. Metal finish: Powder coating conforming to ASTM D 3451 testing.

e. Height: The table height shall be between 29-48 inches from the finished grade to the lowest surface of the top, or as noted.

f. Clearance: A minimum vertical clearance of 9 inches between the seat top and the bottom edge of the table top shall be provided. A minimum of 18 inches of leg space under tables, measured from the inside edge of the seat top to the nearest table support, shall be provided. A minimum of 18 inches of leg space under tables, measured from the inside edge of the seat top to the nearest table support, shall be provided. A minimum of 18 inches from the end of the table top to the nearest support leg shall be provided.

g. Top: Table top surfaces shall not contain recesses that might hold water or food particles. The table top width shall be a minimum of 18 inches when utilized from one side only and a minimum of 36 inches when utilized from two sides. The table top length shall be a minimum of 24 inches per person.

h. Wheelchair Access: A minimum clear space of 29 inches from the finished grade to the underside of the table shall be provided for persons with disability to be able to pull a wheelchair beneath the table top at the end of the table; the minimum clear width shall be 34 inches.

2.8.1 Perforated Steel Tables

Provide 16 gage perforated steel sheet table tops with solid metal edges as per manufacturer's standard. Weld tops to base as required for frame support.

a. Steel pedestal base: ASTM A 53/A 53M Schedule 40 steel pipe, 2 3/8 inch O.D.

b. Mounting: Type as indicated

c. Hardware: Zinc or cadium plated nuts, bolts, screws and lock washers.

d. Metal finish: Powder coating conforming to ASTM D 3451 testing.

PART 3 - EXECUTION

3.1 INSTALLATION

The Contractor shall verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of site furnishings. Site furnishings shall be installed plumb and true, at locations indicated, in accordance with the approved manufacturer's instructions.

3.1.1 Assembly and Erection of Components

Items shall be shipped knocked-down (KD) ready for site assembly. Packaged components shall be complete including all accessories and hardware. New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. When the inspection of parts has been completed, the site furnishings shall be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

3.1.2 Anchorage, Fastenings, and Connections

Furnish metal work, mounting bolts or hardware in ample time for securing into concrete or masonry as the work progresses. Provide anchorage where necessary for fastening furniture or furnishings securely in place. Provide, for anchorage not otherwise specified or indicated, slotted inserts, expansion shields, and power-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are applied. Conceal fastenings where practicable.

3.2 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.3 TESTING

Each site furnishing shall be tested to determine a secure and correct installation. A correct installation shall be according to the manufacturer's recommendations and by the following procedure: The Contractor shall measure the physical dimensions and clearance of each installed site furnishing for compliance with manufacturer's recommendations and as indicated. Site furnishings, which do not comply, shall be reinstalled. Fasteners and anchors determined to be non-compliant shall be replaced. A written report describing the results of the testing shall be provided.

3.4 FINISHES

3.4.1 Field Finishes

Where indicated, field finishes shall be applied in accordance with Section 09911 PAINTING. Where dissimilar metals ae in contact, protect surfaces with a coat conforming to FS TT-P-664 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood or absorptive materials subject to wetting, protect with ASTM D 187, asphalt-base emulsion.

3.4.2 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A 780 or by the application of stick or thick paste material specifically designed for repair of galvanizing, as approved by the Contracting Officer. Clean areas to be repaired and remove the slag from the welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallic in stick or paste; spread the molten material uniformly over surfaces to be coated and wipe the excess material off.

3.5 CHILDREN'S PLAY AREAS

The site furnishings shall be installed outside the play structure use zone in accordance with ASTM F 1487. The contractor shall verify and mark the locations of the use zone. These zones are to be free from obstacles and hard surfaces. When child accessibility requirements are to be met, child anthropometric dimensions must be used and not adult anthropometric dimensions.

3.6 SHELTERS

Secure to the adjacent construction with the clip angles attached to the concrete. Secure to concrete with not less than two 1/2-inch diameter expansion bolts.

3.6.1 Glazing

Factory install windows into separate structural frame. Miter corners and connect internally by extruded aluminum corner keys or screw bosses with tamper-proof stainless steel screws. Provide continuous gasketing around windows set to metal frames. Provide 1/2 to ¾-inch deep pocket for polycarbonate glazing. Fully gasket and frame in independent interchangeable factory assembled units. Affix to shelter frame with 3/16-inch, shallow head, aluminum rivets at approximately 13 1/4 inches on centers for full 360 degrees, rivet from inside of shelter.

3.6.2 Roof

Provide manufacturer's standard roof system including fascia assembly, ensuring a weather-tight seal and installation.

3.7 RESTORATION AND CLEAN UP

When the installation has been completed, the Contractor shall clean up and protect the site. Existing areas that have been damaged from the installation operation shall be restored to original condition at Contractor's expense.

3.7.1 Clean Up

The site shall be cleaned of all materials associated with the installation. Site furnishing surfaces shall be cleaned of dirt, stains, filings, and other blemishes occurring from shipment and installation. Cleaning methods and agents shall be according to manufacturer's instructions or as indicated.

3.7.2 Protection

The area shall be protected as required or directed by providing barricades and signage.

3.7.3 Disposal of Materials

Excess and waste material shall be removed and disposed off Government property.

3.8 RE-INSTALLATION

Where re-installation is required, the following shall be accomplished:

a. Re-install the product as specified. Material acquisition of replacement parts is the responsibility of the Contractor. Provide replacement materials that are new and supplied by the original manufacturer to match.

b. Damage caused by the failed installation shall be repaired.

END OF SECTION

SECTION 02882

PLAYGROUND EQUIPMENT

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 135	(2001) Electric-Resistance-Welded Steel Pipe
ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 500	(2003) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 513	(2000) Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
ASTM B 108	(2003a) Aluminum-Alloy Permanent Mold Castings
ASTM B 117	(2002) Operating Salt Spray (Fog) Apparatus
ASTM B 179	(2003) Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes
ASTM B 221	(2002) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221M	(2002) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B 26/B 26M	(2003) Aluminum-Alloy Sand Castings
ASTM D 1248	(2002) Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D 1735	(2002) Testing Water Resistance of Coatings Using Water Fog Apparatus
ASTM D 2454	(1995; R 2002) Determining the Effect of Over Baking on Organic Coatings

ASTM D 2794	(1993; R 1999el) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(2002) Measuring Adhesion by Tape Test
ASTM D 3363	(2000) Film Hardness by Pencil Test
ASTM D 6112	(1997) Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes
ASTM D 648	(2001) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM D 822	(2001) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM F 1487	(2001e1) Playground Equipment for Public Use

CONSUMER PRODUCT SAFETY COMMISSION (CPSC)

CPSC Pub No 325	(1997) Handbook for Public Playground Safety

1.2 DEFINITIONS

Age-Appropriate: A term that describes equipment scale to include platform height, fall height and maximum equipment height, that allows safe and successful use by children of a specific chronological age; mental and physical ability; and anthropometric measurement. Maximum equipment height and complexity will not exceed a child's ability in that age group.

Composite Structure: Also "Composite Play Structure; Linked Structure". Two or more play events attached, directly adjacent or functionally linked, to create one integral unit that provides more than one play activity.

Designated Play Surface: Any elevated surface for standing, walking, sitting, or climbing; or a flat surface a minimum 2 inches wide having up to a maximum 30 degree angle from horizontal. In some play events the platform surface will be the same as the designated play surface. However, the terms should not be interchanged as they do not define the same point of measurement per ASTM F 1487.

Maximum Equipment Height: The highest point on the equipment (i.e., roof ridge, top of support pole).

Play Event: A piece of manufactured playground equipment that supports one or more play activities.

Protective Surfacing: Material to be used within the use zone that meets the fall attenuation requirements of Section 02791 PLAYGROUND PROTECTIVE SURFACING.

Suspended Hazard: Cable, wire, rope or similar devices suspended up to a maximum 7 feet high between play events; or installed up to a maximum 45 degree angle from the ground to the play event.

Tot: A child under 4 years of age in the pre-toddler and toddler age group.

1.3 CHILD SAFETY AND ACCESSIBILITY STANDARDS

1.3.1 Child Safety

Play events shall meet the child safety performance requirements described in CPSC Pub No 325 and ASTM F 1487. The requirements include the following: Head and neck entrapment; sharp points, edges, and protrusions; entanglement; pinch, crush, and shear points; suspended hazards; play event access and egress points; play event use zone perimeter; and design criteria. Since ASTM F 1487 criteria is defined for the minimum user through the maximum user (2 through 12 years of age), the requirements for the infant or pre-toddler age group are not prescribed. This specification and Section 02791 PLAYGROUND PROTECTIVE SURFACING establish the requirements for the infant and pre-toddler age groups.

1.3.2 Child Accessibility

The accessibility requirement in accordance with ASTM F 1487 includes the following: When the play event use zone consists of a protective surfacing rated as inaccessible, at least one accessible route shall be provided from the use zone perimeter to the play event. When there is more than one of the same play activity provided, only one shall meet accessibility requirements (i.e., one swing seat or one spring rocking play event). When the access and egress points are not the same for a play event, an accessible route shall be provided to both. The accessible route shall access all accessible play events and elements. The protective surfacing performance requirements shall be in accordance with Section 02791 PLAYGROUND PROTECTIVE SURFACING.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Configuration; G

Scale drawings defining the revised play event configuration.

Shop Drawings; G

Scale drawings defining the revised use zone perimeters and play event layout.

Fall Height; G

Scale drawings defining the revised depth or type of protective surfacing.

Finished Grade and Underground Utilities

Finished grade, underground utilities, storm-drainage system and irrigation system status; and location of underground utilities and facilities

SD-03 Product Data

Equipment; G

Manufacturer's descriptive data; catalog cuts; references; and the latest edition of ASTM F 1487 and CPSC Pub No 325. Manufacturer's specifications, handling and storage requirements, installation procedures, and safety data sheets to include the following: bare or painted metal platform and slide bed orientation from the direct sun; warnings; and child safety performance standards.

Equipment Identification; G

A list to include part numbers of furnished play event and equipment materials and components.

Delivery, Storage and Handling

Delivery schedule and manufacturer's name

Manufacturer Qualification

Name of the owner or user; service or preventive maintenance provider; date of the installation; point of contact and telephone number; and address for 10 sites.

Wood

Wood components obtained from managed forests.

Spare Parts

Furnish manufacturer supplied spare parts.

Materials

Assembled play event structural integrity tests; vertical load tests; and the maximum number of users that can be on the play event

SD-04 Samples

Color; G

Two color charts displaying the colors and finishes.

SD-06 Test Reports

Recycled Plastic

Individual component and assembled unit structural integrity test; creep tolerance; deflection tolerance; and vertical load test results. The estimated percentage of recovered material content in the material and components. Life-cycle durability

Wood Finishes

Wood finish chemical content and toxicity level.

SD-07 Certificates

Materials

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include composition and tests to which the material has been subjected.

Manufacturer Qualification; G

Certificate of Insurance AA rated for a minimum one million dollars.

Installer Qualification; G

The installer's company name and address, and training and experience certification.

Manufacturer's Representative; G

The individual's name, company name and address, and playground safety training certificate

Wood Treatment; G

Wood treatment chemical content, toxicity level, and life-cycle durability

Substitution

Technical representative's written approval.

Play Event Modification; G

Manufacturer's written approval

Child Safety and Accessibility Evaluation; G

Record of measurements and findings by the certified playground safety inspector. Verification the installed play events and equipment meet manufacturer's recommendations and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

SD-10 Operation and Maintenance Data

Maintenance Instruction; G

Two bound copies of the manufacturer's operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery. Equipment shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. The storage area shall be as designated. The materials shall be stored in a dry, covered area until installed.

1.6 EQUIPMENT IDENTIFICATION

Playground equipment shall be identified with attached and durable label stating the age-group that the equipment is designed to accommodate. There shall be permanent WARNING labels and manufacturer's identification labels, ASTM F 1487.

1.7 INSPECTION

Playground equipment shall be inspected upon arrival at the job site for meeting age-appropriate requirements for the age-group that the equipment is designated to accommodate and specified quality in accordance with paragraphs MATERIALS and CONFIGURATION. Prohibited or unacceptable equipment shall be removed from the job site.

1.8 PROHIBITED EQUIPMENT

Equipment that does not meet the Army's developmental play program requirements and are prohibited on outdoor play areas include the following: chain balance beams; rotating equipment, such as merry-go-rounds, log rolls, whirls and may poles; fulcrum seesaws (teeter totters); spring rocking equipment intended for standing; animal figure swings; rope swings; multiple occupancy swings; swinging exercise and trapeze bars; swinging platforms; tire climbers; swinging dual exercise rings; roller slides; trampolines; swinging gates or doors; and new or used vehicle tires. Play houses or enclosures made of horizontal posts or bars with space between them. Wood components treated with creosote, pentachlorophenol, and tributyl tin oxide. Wood components coated with a finish containing pesticide.

1.9 AGE GROUPS

Play areas are designed to provide challenging play activities by age group. Playground equipment shall be designed to be age appropriate for the age group designated to use it. There is no anthropometric or fall attenuation significance to the discrepancy for the school-age age group between paragraph PLAYGROUND AREAS OTHER THAN CHILD DEVELOPMENT CENTERS as described below. The Army age groups are defined as follows:

1.9.1 Playground Areas Other Than Child Development Centers (CDC)

The age groups accommodated at these areas range from less than 12 months through 12 years of age defined as the following: infant age group (less than 12 months); pre-toddler age group (12 through 24 months); composite toddler/pre-school age group (2 through 5 years of age); school-age age group (5 through 9 years of age); and pre-teen age group (9 through 12 years of age). A multi-age playground consists of the following age groups: infant, pre-toddler, and composite toddler/pre-school age groups.

1.10 MANUFACTURER QUALIFICATION

Play events and equipment similar to those furnished shall have been installed in a minimum 10 sites and been in successful service for a minimum 5 year calendar period. The manufacturer shall provide a

Certificate of Insurance AA rated for a minimum one million dollars covering both product and general liability for the installed life of products.

1.11 INSTALLER QUALIFICATION

The installer shall be certified by the manufacturer for training and experience installing the play events and equipment.

1.12 WARRANTY

Furnished play events and equipment shall have a minimum 1 year calendar period warranty.

1.13 TECHNICAL REPRESENTATIVE

1.13.1 Playground Areas Other Than Child Development Centers (CDC)

The technical representative for outdoor play areas on sites other than CDCs shall be the Director of Public Works or designated representative. The design of these outdoor play areas shall be based on the play program and the age groups to be accommodated as determined by the play area committee.

1.14 MANUFACTURER'S REPRESENTATIVE

The manufacturer's certified playground safety inspector or the manufacturer's designated certified playground safety representative shall supervise the installation and adjustment of the play events and equipment to verify the installation meets the requirements of the manufacturer, this specification, and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of play event products.

2.1.1 Metal

Metal components shall have factory-drilled holes and be corrosion resistant. The components shall be free of excess weld and spatter. Metallic materials shall conform to Section 05500A MISCELLANEOUS METAL. Components with extra holes not filled by hardware or covered by components shall be rejected.

2.1.1.1 Steel

Steel components shall comply with ASTM A 135, ASTM A 500 or ASTM A 513. Minimum tensile strength shall be 45,000 psi. Minimum yield point shall be 33,000 psi.

2.1.1.2 Aluminum

Extruded aluminum components shall be type 6061-T6, 6062-T6 or 6063-T6 and shall conform to ASTM B 221. Minimum tensile strength of extruded aluminum components shall be 39,000 psi and

the minimum yield shall be 36,500 psi. Cast aluminum alloy shall conform to ASTM B 179, ASTM B 26/B 26M and ASTM B 108.

2.1.1.3 Chain

Chain shall be a minimum size 4/0 and shall be corrosion resistant zinc plated. Polyvinyl chloride coating shall be as specified.

2.1.1.4 Rope Cable

Rope cable shall be composed of strands of steel cable with a polypropylene or Dacron synthetic covering that is UV stabilized. Cable ends shall be capped to prevent fraying.

2.1.1.5 Hardware

Hardware shall be corrosion resistant and consist of the following: aluminum, stainless steel, brass, zinc plated steel, zinc-chromate plated steel or galvanized steel, ASTM A 153/A 153M. When secure the hardware shall require a tool to prevent unauthorized loosening and removal.

2.1.1.6 Rails, Loops and Hand Bars

Rails, loops and hand bars shall consist of corrosion resistant aluminum, powder-coated steel or galvanized steel. Polyvinyl chloride coating, if provided, shall be as specified.

2.1.1.7 Anchors

Anchors shall be in accordance with manufacturer's recommendations.

2.1.2 Plastic Components

2.1.2.1 Panels

Plastic panels shall be molded of ultraviolet (UV) and color stabilized polyethylene or nylon with a minimum 3/16 inch thickness, ASTM F 1487. Edges shall be a minimum 3/16 inch radius.

2.1.2.2 Window

Plastic windows shall be flat or molded into a bubble shape and consist of clear polycarbonate plastic a minimum 3/16 inch thick before forming in accordance with ASTM D 1248. Material shall be shatterproof and resistant to crazing, cracking or fogging.

2.1.3 Coatings

2.1.3.1 Galvanized

Metal components shall be hot-dipped in zinc after fabrication according to ASTM A 123/A 123M. Tailings and sharp protrusions formed as a result of the hot-dip process shall be removed and edges shall be burnished.

2.1.3.2 Polyester Powder

Powder-coated surfaces shall receive electrostatic zinc coating prior to painting. Powder coating shall be electrostatically applied and shall be oven cured. Polyester powder shall be in accordance with the following: ASTM D 3359 for adhesion; ASTM D 1735 for flexibility; ASTM D 3363 for hardness; ASTM D 2794 for impact; ASTM D 2454 for over bake resistance; ASTM B 117 for salt spray resistance; and ASTM D 822 for weatherability.

2.1.3.3 Polyvinyl Chloride (PVC)

PVC coating shall be primed with a clear acrylic thermosetting solution. The primed parts shall be preheated prior to dipping. The liquid polyvinyl chloride shall be UV stabilized and mold-resistant. The coated parts shall be cured. The coating shall be a minimum 0.08 inch thick within a plus or minus 0.020 inch tolerance. The coating shall have an 85-durometer hardness, ASTM D 3363. The finish shall be slip-resistant.

2.1.3.4 Concrete

Concrete shall conform to Section 02770 CONCRETE SIDEWALKS AND CURBS AND GUTTERS.

2.1.3.5 Cast-In Place Concrete

Cast-in-place concrete material shall conform to Section 03301 CAST-IN-PLACE CONCRETE (LIMITED APPLICATIONS).

2.1.4 Color

Color shall be provided as indicated.

2.2 EQUIPMENT

2.2.1 Configuration

Play event configuration, platform height, fall height and maximum equipment height shall be as indicated. When the configuration varies from the play event shown, shop drawings defining the configuration shall be provided to include the following: equipment layout with the use zone perimeter; designated play surface spot elevations; maximum equipment height spot elevations; platform spot elevations; protective barriers; guardrails; bare or painted metal platform and slide bed orientation; and play events in relationship to the playground layout.

2.2.2 Substitution

Substitutions will not be allowed and play events will not be selected without written approval from the technical representative. Manufacturer substitutions which increase the play event platform height or maximum equipment height shall be evaluated. The increased height requires additional protective surfacing in accordance with paragraph FALL HEIGHT.

2.2.3 Platform Height

Platform height is used to define the age group for age appropriate play events and composite structures. To be age appropriate, the platform height shall meet the finished elevations of the age

groups in the following paragraphs. For some play events platform height and paragraph FALL HEIGHT are the same.

2.2.3.1 Pre-Toddler Age Group

Platforms designed for children 12 through 24 months of age shall have a finished elevation a maximum 36 inches above the finished elevation of the protective surfacing.

2.2.3.2 Pre-School Age Group

Platforms designed for children 3 through 5 years of age shall have a finished elevation a maximum 48 inches above the finished elevation of the protective surfacing.

2.2.3.3 School-Age Age Group

Platforms designed for children 5 through 8 years of age shall have a finished elevation a maximum 72 inches above the finished elevation of the protective surfacing.

2.2.4 Protective Barrier and Guardrail

Protective barriers and guardrails shall be provided in accordance with paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS. This specification establishes the protective barrier and guardrail requirements for the infant and pre-toddler age group.

2.2.4.1 Protective Barrier

A protective barrier is defined as an enclosing device around an elevated surface that prevents both inadvertent and deliberate attempts to pass through the device. The protective barrier for pre-toddler, toddler and pre-school age groups shall be provided on elevated surfaces a minimum 30 inches above the protective surfacing. The protective barrier for school-age and pre-teen age groups shall be provided on elevated surfaces a minimum 48 inches above the protective surfacing. The protective barrier shall completely surround the elevated surface except for the access or egress route. As infants are not to be placed on an elevated surface, the protective barrier for the infant age group shall be the same as the crawl wall defined in paragraph MEASURING FALL HEIGHT.

2.2.4.2 Guardrail

A guardrail is defined as a device around an elevated surface that prevents inadvertent falls from the elevated surface. The guardrail for pre-toddler, toddler and pre-school age groups shall be provided on elevated surfaces a minimum 20 inches above the protective surfacing. The guardrail for school-age and pre-teen age groups shall be provided on elevated surfaces a minimum 30 inches above the protective surfacing. The guardrail shall completely surround the elevated surface except for the access or egress route. As infants are not to be placed on an elevated surface, the guardrail for the infant age group shall be the same as the crawl wall defined in paragraph MEASURING FALL HEIGHT.

2.2.5 Multiple-Axis (Rotating) Swing

The swivel mechanism shall contain a durable long life bearing to reduce friction and wear. A tire manufactured specifically for a multiple-axis swing shall be provided and shall weigh a maximum 35 lb. The tire shall be composed of rotationally molded, low density elastomer and internally reinforced

with a steel ring. The tire shall have no openings for insects or water. The multiple-axis swing shall not be confused with the multiple occupancy swing as they are not the same.

2.2.6 Single-Axis (To-Fro) Swing

2.2.6.1 General Requirements

The swing seat shall be molded of high quality rubber or polyurethane with an encapsulated steel reinforcement. The swing seat shall be designed to accommodate one user

2.2.6.2 Full Bucket Swing Seat

A full bucket swing seat is designed to accommodate children up to a maximum 4 years of age; the seat is used by a child with adult assistance. The swing seat shall be constructed of rubber with a tempered steel insert molded inside, shall be double-sided shall be enclosed by rubber both front and back, and shall include a 360 degree waist enclosure and leg enclosures. Leg enclosures shall be sized to avoid head or neck entrapment. Finish shall be smooth and edges shall be rounded. These swing seats shall not be mixed with other swing seats within a bay.

2.2.7 Spring Rocking Equipment

Spring mechanisms shall conform to the requirements for pinch, crush and shear points for a maximum 120 lb weight limit in accordance with ASTM F 1487. Seats shall be designed to accommodate only the intended number of users.

2.2.8 Roofs

Roofs shall contain no designated play surface.

2.2.9 Sliding Poles

Sliding poles shall be a maximum 1.9 inch diameter and a continuous surface with no protruding welds or joints along the sliding area.

2.2.10 Plastic Slides

The slides shall be molded of UV stabilized polyethylene or nylon with minimum of 3/16 inch wall thickness. The edge shall be a minimum 3/16 inch radius, ASTM D 1248, Type II, Class A, Grade G4.

2.2.11 Play House or Enclosures

The play house shall be provided with a shelf at the window. The play house and enclosures will be designed to provide other than direct outside visibility from a minimum 5 feet to all inside corners.

PART 3 EXECUTION

3.1 SITE PREPARATION

3.1.1 Finished Grade and Underground Utilities

The Contractor shall verify that finished grades are as indicated; the smooth grading has been completed in accordance with Section 02300 EARTHWORK; installation of the underground utilities through the area has been completed in accordance with Section 02316 EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYTEMS; installation of the storm-drainage system through the area has been completed in accordance with Section 02630 STORM DRAINAGE; and the installation of underground sprinklers through the area has been completed in accordance with Section 02811 UNDERGROUND SPRINKLER SYSTEMS. The location of underground utilities and facilities in the area of the operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.1.2 Layout

The layout of the entire outdoor play area shall be staked before excavation begins to include the following: all play event configuration access and egress points; use zone perimeters; hard surface areas and pathway widths; exterior plant material and planters; walls and fences; and structures. Sufficient space shall be provided between all adjacent play events and individual play events for play activities and circulation. Moving and rotating play events shall be located away from circulation to prevent collisions.

3.1.2.1 Use Zone

The use zone is defined as the area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around equipment; and on whose surface it is predicted that a user would land when falling from or exiting the equipment, (paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS). Also, the use zone is associated with the following terms; "Clear Area," and "Fall Zone". The use zone shall be free of hard surfaces, objects or obstacles that a child could run into or fall on top of and be injured. The use zone shall consist of protective surfacing in accordance with the requirements of Section 02791 PLAYGROUND PROTECTIVE SURFACING. Use zone perimeters shall not overlap hard surfaces. The use zone perimeter shall meet or exceed the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS. Use zone perimeters shall not overlap except for certain play events as defined in ASTM F 1487.

3.1.2.2 Shop Drawings

When the use zone perimeter and play event configuration conflict with the requirements and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS, shop drawings defining corrective measures shall be submitted to include the following: Adjustment to the play event with the use zone perimeter; use zone perimeter overlaps; hard surface area and pathway widths; structures; exterior plant material and planters; walls and fences; and bare or painted metal platform and slide bed orientation to the direct sun.

3.1.3 Orientation

Bare or painted metal platforms and slide beds shall be oriented from the direct sun; or shaded to reduce contact burn risk. Play events that require orientation to adjacent play events or to meet visibility requirements shall be properly oriented.

3.1.4 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments shall be submitted for approval.

3.2 INSTALLATION

Play events shall be installed according to the manufacturer's recommendations and as shown to meet the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

3.2.1 Play Event Modification

Site modifications of play events affect the coverage provided in paragraph WARRANTY; therefore, play events and equipment shall not be modified without the written approval of the manufacturer.

3.2.2 Plastic Play Events

Plastic and recycled plastic components shall be connected by stainless steel hardware. The hardware shall be countersunk. Recycled plastic molded as lumber or wood-polymer lumber shall be installed in accordance with the manufacturer's recommendations.

3.2.3 Footings

The top elevation of play event footings will be installed at the subbase of the protective surfacing.

3.2.4 Multiple-Axis (Rotating) Swing

The multiple-axis (rotating) swing shall be located away from other play events and circulation. It shall not be attached to a composite structure.

3.2.5 Single-Axis (To-Fro) Swing

The single-axis (to-fro) swing shall be located on the perimeter of the outdoor play area. It shall not be attached to a composite structure.

3.2.6 Slides

The required exit region clear area shall be provided in accordance with ASTM F 1487.

3.2.7 Chain or Rope Ladder, Climber or Net Climber

A chain or rope ladder; climber; net climber; and similar components shall be installed in the vertical position. Angled or arch positions are not accepted.

3.2.8 Composite Structure

The composite structure use zone perimeter shall be composed of the use zone perimeters of the play events that, when joined together, comprise the composite structure.

3.2.9 Fall Height

3.2.9.1 General

The fall height is defined as the vertical distance between the finished elevation of the designated play surface and the finished elevation of the protective surfacing beneath it. For some play events the fall height and paragraph PLATFORM HEIGHT are the same. For some play events the fall height and maximum equipment height are the same. When the furnished play event fall height varies from the play event shown, shop drawings defining the revised depth or type of protective surfacing to meet or exceed the requirements of Section 02791 PLAYGROUND PROTECTIVE SURFACING shall be provided.

3.2.9.2 Measuring Fall Height

EQUIPMENT	MEASURING FALL HEIGHT
Composite Structure:	For a platform surrounded by protective barriers, measure from the platform finished elevation. For a platform surrounded by guardrails, measure from the guardrail top elevation.
Infant Crawl Area:	A maximum 24 inch height, measured from the crawl wall or barrier finished elevation.
Playhouse, Non-climbable:	Measure from the designated play surface finished elevation.
Spring Rocking Equipment:	Measure from the seat top elevation.
Stationary Equipment, Climbable:	Measure from the maximum equipment height finished elevation.
Stationary Equipment, Non-climbable:	Measure from the designated play surface finished elevation.
Swing:	Measure from the bottom of the pivot point.

3.2.10 SIGNAGE

For playground areas other than CDC, durable permanent signage shall be provided to identify the age group the equipment is designed to accommodate.

3.3 RESTORATION AND CLEAN UP

When the operation has been completed, the Contractor shall clean up and protect the site. Existing areas that have been damaged from the operation shall be restored to original condition at the Contractor's expense.

3.3.1 Clean Up

The site and play events shall be cleaned of all materials associated with the operation. Play events and surfaces shall be cleaned of dirt, stains, filings, and other blemishes occurring from shipment and installation. Cleaning methods and agents shall be as recommended by the manufacturer. Required labeling shall be undamaged and visible in accordance with paragraph EQUIPMENT IDENTIFICATION.

3.3.2 Protection

The area shall be protected as required or directed by providing barricades and signage.

3.3.3 Disposal of Materials

Excess and waste material shall be removed and disposed off Government property.

3.4 PLAYGROUND ACCEPTANCE

3.4.1 Child Safety and Accessibility Evaluation

When the protective surfacing is installed the play events and protective surfacing shall be thoroughly inspected and measured to verify the playground meets manufacturer's recommendations, paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS, and paragraph FALL HEIGHT. The play events shall be age appropriate for the age group using them in accordance with paragraph PLATFORM HEIGHT. Determine 1) secure anchoring; 2) all hardware and connectors are tight; 3) all hardware and connectors require tools to loosen; 4) all hooks are closed; 5) head and neck entrapment; 6) sharp points, edges, and protrusions; 7) entanglement; 8) pinch, crush, and shear points; 9) suspended hazards; 10) all component holes are filled; and 11) recycled plastic components used as load bearing structural members. Use zone distances shall be measured to determine the area is free of hard surfaces, objects or obstacles. Determine exceptions to use zone overlaps occur in accordance with paragraph USE ZONE. Play event fall height shall be measured and compared to critical height value for thickness of installed protective surfacing. The slide exit region shall have the required clear zone. Play events and surfaces shall be properly oriented. Chain, rope, net climbers or similar components shall be installed in a vertical position. Swing seat clearances shall be measured while occupied by a maximum user for the age group using the equipment. Warning labels and manufacturer identification labels shall be visible in accordance with paragraph EQUIPMENT IDENTIFICATION. Play events that do not comply shall be reinstalled. Fasteners, anchors, hardware and labels that do not comply shall be replaced. Ensure positive drainage for the area and the lowest elevation of protective surfacing subgrade has been provided. A written report describing the results of the evaluation shall be provided.

3.4.2 Spare Parts

Play event and equipment spare parts provided by the manufacturer shall be furnished.

3.4.3 Maintenance Instruction

The manufacturer's operation and maintenance manual describing the recommended preventive maintenance, inspection frequency and techniques, periodic adjustments, lubricants, and cleaning requirements shall be furnished.

3.5 RE-INSTALLATION

When re-installation is required, accomplish the following: Re-install the product as specified. Provide new replacement materials supplied by the manufacturer. Material acquisition of replacement parts is the responsibility of the Contractor. Damage caused by the failed installation shall be repaired at the Contractor's expense.

End of Section

SECTION 02921

SEEDING

PART 1 - GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 4972	(1995a) pH of Soils

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1995) Federal Seed Act Regulations Part 201

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment
Surface Erosion Control Material
Chemical Treatment Material

Manufacturer's literature including physical characteristics, application and installation instructions for equipment, surface erosion control material and chemical treatment material.

A listing of equipment to be used for the seeding operation

Delivery

Delivery schedule.

Finished Grade and Topsoil

Finished grade status.

Quantity Check

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed.

Seed Establishment Period

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants

Application of Pesticide

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-04 Samples

Delivered Topsoil; G

Samples taken from several locations at the source.

Soil Amendments

A 10 pound sample

Mulch

A 10 pound sample

SD-06 Test Reports

Equipment Calibration

Certification of calibration tests conducted on the equipment used in the seeding operation.

Soil Test

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards should be described.

SD-07 Certificates

Seed, G
Topsoil; G
pH Adjuster
Fertilizer
Organic Material
Soil Conditioner
Mulch
Pesticide

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Seed: Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

b. Topsoil: Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. pH Adjuster: Calcium carbonate equivalent and sieve analysis

d. Fertilizer: Chemical analysis and composition percent

e. Organic Material: Composition and source

f. Soil Conditioner: Composition and source

g. Mulch: Composition and source.

h. Asphalt Adhesive: Composition

i. Pesticide. EPA registration number and registered uses.

1.3 SOURCE INSPECTION

The source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Topsoil

All topsoil to be imported. Prior to the delivery of any topsoil a soil test shall be provided for topsoil delivered to the site.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.3 Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturers registered uses.

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.4.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

PART 2 - PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS Seed Act and applicable state seed laws.

2.1.2 Grass Seed Species

Seed species and mixtures shall be proportioned by weight of pure live seed per as follows:

Name of Grass	Proportion by Weight	Percent Purity	Percent Germination
Common Kentucky Bluegrass	100%	98%	90%

Seed at the rate of 5 lbs per 1000 square feet. Temporary seed species for surface erosion control or overseeding shall be the same seed species.

2.1.3 Quality

Weed seed shall be a maximum 2 percent by weight of the total mixture.

2.1.4 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.

2.1.5 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 TOPSOIL

Topsoil shall be as defined in the table below. Topsoil shall be delivered and amended as recommended by the soil test for the seed specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

Characteristic	Optimum	Minimum	Maximum
pH	6.5	5.5	8.0
Nitrate (# / ac)	50	1.0	300
Organic Matter (%)	4-5	3.0	6.0
Phosphorus (Olsen, ug / g)	40	5.0	150
Potassium (ug / g)	500	150	1000
Sodium (meq / 100g)	<0.5	n / a	1.0
Sulfate as S (ug / g)	20-100	10	1000
Conductivity (mmhos / cm)	<0.5	n / a	1.0
Lime (qualitative)	Slight	None	Medium

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, sulfur, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8sieve and a minimum 55 percent shall pass through a No. 60sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8sieve and a minimum 97 percent shall pass through a No. 60sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a No. 8sieve and a minimum 35 percent shall pass through a No. 60sieve.

2.3.2 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: of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.3.3 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.3.1 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. It shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.3.3.2 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings, or other wood waste material that is free of stones, sticks, soil, and toxic substances harmful to plants, and is fully composted or stabilized with nitrogen.

2.3.3.3 Recycled Compost

Compost shall be a well-decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.3.4 Soil Conditioner

Soil conditioner shall be sand or super absorbent polymers for use singly or in combination to meet the requirements of the soil test.

2.3.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10sieve and a minimum 10 percent by weight shall pass a No. 16sieve. Greens and shall be balanced with the inclusion of trace minerals and nutrients.

2.3.4.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized and applied according to the manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide, with an absorption capacity of 250-400 times its weight. Polymers shall also be added to the seed and be a starch-grafted polyacrylonitrite, with graphite added as a tacky sticker. It shall have an absorption capacity of 100 plus times its weight.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.5 WATER

The government shall furnish water. Water shall not contain elements toxic to plant life.

2.6 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

2.7 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall be the following:

2.7.1 Hydrophilic Colloids

Hydrophilic colloids shall be physiologically harmless to plant and animal life without phytotoxic agents. Colloids shall be naturally occurring, silicate powder based, and shall form a water insoluble membrane after curing. Colloids shall resist mold growth.

PART 3 - EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from 1 April to 31 May for spring establishment and from 15 August to 15 Oct for fall establishment.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.1.3 Equipment Calibration

Immediately prior to the commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.

3.1.4 Soil Test

Delivered topsoil shall be tested for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salt analysis, and mechanical analysis. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the seed species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 02300 EARTHWORK, prior to the commencement of the seeding operation. Apply topsoil to a depth of 3”.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying pH Adjuster

The pH adjuster shall be applied as recommended by the soil test. The pH adjuster shall be incorporated into the soil to a maximum 4-inch depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The application rate shall be 0.45 pounds per 1000 square feet. Fertilizer shall be incorporated into the soil to a maximum 4-inch depth or may be incorporated as part of the tillage operation.

3.2.2.3 Applying Soil Conditioner

The soil conditioner shall be as recommended by the soil test. The soil conditioner shall be spread uniformly over the soil a minimum 1-inch depth and thoroughly incorporated by tillage into the soil to a maximum 4-inch depth.

3.2.2.4 Applying Super Absorbent Polymers

Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 4-inch depth.

3.2.3 Tillage

Till subgrade to a minimum depth of 6". After application of soil lift, topsoil shall be tilled to a minimum 8-inch depth. Rototillers shall be used where soil conditions and length of slope permit. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

Seedbed preparation should not commence until the moisture conditions make the ground area and soil friable. The ground should be hand or machine raked so as to remove all debris, clods, rocks and other material larger than 1-inch, to a depth of 2-inches. Such debris, clods, rocks and other material so removed should be disposed of off the immediate property.

3.2.4.2 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be Drill Seeding. Seeding procedure shall ensure even coverage. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Drill Seeding

Seed shall be uniformly drilled to a maximum 1/2-inch depth and at the rate of pounds per 1000 square feet, using equipment having drills a maximum 7 inches distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

3.3.1.2 Rolling

The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Mulching

3.3.2.1 Straw Mulch

Straw mulch shall be spread uniformly at the rate of 2 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.2.2 Non-Asphaltic Tackifier After Drill Seeding

Hydrophilic colloid shall be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture shall be applied over the area after drill seeding.

3.3.3 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1-inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

3.4.2 Temporary Seeding

The application rate shall be 4 pounds per 1000 square feet. When directed during contract delays affecting the seeding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded in accordance with temporary seed species listed under Paragraph SEED.

3.4.2.1 Soil Amendments

When soil amendments have not been applied to the area, the quantity of 1/2 of the required soil amendments shall be applied and the area tilled in accordance with paragraph SITE PREPARATION. The area shall be watered in accordance with paragraph Watering Seed.

3.4.2.2 Remaining Soil Amendments

The remaining soil amendments shall be applied in accordance with the paragraph Tillage when the surface is prepared for installing seed.

3.5 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.6 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.6.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.6.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately. A pesticide plan shall be submitted.

3.7 RESTORATION AND CLEAN UP

3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.7.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with Section 10430 EXTERIOR SIGNAGE.

3.9 SEED ESTABLISHMENT PERIOD

3.9.1 Commencement

The seed establishment period to obtain a healthy stand of grass plants shall begin on the first day of seeding work under this contract and shall continue through the remaining life of the contract and end 6 months after the last day of the seeding operation required by this contract. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be coordinated with Section 02930 EXTERIOR PLANTING. The seed establishment period shall be modified for inclement weather, shut down periods, for separate completion dates of areas or when project is accepted by the government at an earlier date.

3.9.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health when the grass plants are a minimum 1-inch high.

3.9.2.1 Field Area

A satisfactory stand of grass plants from the seeding operation for a field area shall be a minimum 100 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total seeded area.

3.9.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.9.3.1 Mowing

a. Lawn Areas: Lawn areas shall be mowed to a minimum 3 inch height when the turf is a maximum 4 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

b. Field Areas: Field areas shall be mowed once during the season to a minimum 3-inch height. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.9.3.2 Post-Fertilization

The application rate shall be pounds per 1000 square yards. A maximum 1/2 pound per 1000 square feet of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.9.3.3 Temporary Watering System

Provide and maintain temporary piping, hoses and lawn-watering equipment to convey water from sources and to keep meadow uniformly moist.

1. Schedule watering to prevent wilting, puddling, erosion and displacement of seed or mulch. Do not leave hoses over pathways and walks. If necessary to extend across walkway, then provide adequate warning with signage, etc.

2. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

3.9.3.4 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.3.5 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.3.6 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

END OF SECTION

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SECTION 02922

SODDING

PART 1 - GENERAL

1.1 REFERENCES

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 4972	(1995a) pH of Soils

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Quantity Check

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed. The quantity of sod used shall be compared against the total area installed.

Sod Establishment Period

Calendar time period for the sod establishment period. When there is more than one sod establishment period, the boundaries of the sodded area covered for each period shall be described.

Maintenance Record

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants

Application of Pesticide

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-07 Certificates

Sod
Topsoil
pH Adjuster
Fertilizer
Pesticide

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Sod: Classification, botanical name, common name, mixture percentage of species, percent purity, quality grade, field location and state certification.

b. Topsoil: Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. pH Adjuster: Calcium carbonate equivalent and sieve analysis

d. Fertilizer: Chemical analysis and composition percent

e. Pesticide: EPA registration number and registered uses.

1.3 SOURCE INSPECTION

The sources of sod material and delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Sod

Sod shall be protected during delivery to prevent desiccation, internal heat buildup, or contamination.

1.4.1.2 Topsoil

All topsoil to be delivered. Prior to the delivery of any topsoil a soil test shall be provided for topsoil delivered to the site.

1.4.1.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.4 Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturers registered uses.

1.4.2 Inspection

Sod shall be inspected upon arrival at the job site for conformity to species. Sod shall be checked for visible broadleaf weeds, and a visible consistency with no obvious patches of foreign grasses that exceed 2 percent of the canopy. Sod that is heating up, dry, moldy, yellow, irregularly shaped, torn, or of uneven thickness shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 40 mm diameter; and topsoil that contains viable plants and plant parts, shall be rejected. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

1.4.3.1 Sod

Sod shall be stored in designated areas and kept in a moist condition by watering with a fine mist, and covered with moist burlap, straw, or other covering. Covering shall allow air to circulate, preventing internal heat from building up. Sod shall be protected from exposure to wind and direct sunlight until installed.

1.4.3.2 Other Material Storage

Materials shall be stored in designated areas. Lime and fertilizer shall be stored in cool, dry locations, away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with sod operation materials.

1.4.4 Handling

Sod shall not be damaged during handling. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.5 Time Limitation

Time limitation between harvesting and installing sod shall be a maximum 36 hours.

PART 2 - PRODUCTS

2.1 SOD

2.1.1 Sod Classification

Nursery-grown sod shall be provided as classified by applicable state laws. Sod section shall be sized to permit rolling and lifting without breaking.

2.1.2 Grass Species

Grass species shall be proportioned as follows:

Name of Grass	Proportion Percent by Weight	Percent Purity	Germination
Common Kentucky Bluegrass	100%	98%	90%

2.1.3 Quality

Sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 1 inch in diameter, woody plant roots, and other materials detrimental to a healthy stand of grass plants. Broadleaf weeds and patches of foreign grasses shall be a maximum 2 percent of the sod section.

2.1.4 Thickness

Sod shall be machine cut to a minimum 1-1/2 inch thickness. Measurement for thickness shall exclude top growth and thatch.

2.1.5 Anchors

Sod anchors shall be as recommended by the sod supplier.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268 and the following table. Topsoil shall be delivered and amended as recommended by the soil test for the sod species specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash, or other material over a maximum 1.6-inch diameter. Topsoil shall be free from viable plants and plant parts.

Characteristic	Optimum	Minimum	Maximum
pH	6.5	5.5	8.0
Nitrate (# / ac)	50	1.0	300
Organic Matter (%)	4-5	3.0	6.0
Phosphorus (Olsen, ug / g)	40	5.0	150
Potassium (ug / g)	500	150	1000
Sodium (meq / 100g)	<0.5	n / a	1.0
Sulfate as S (ug / g)	20-100	10	1000
Conductivity (mmhos / cm)	<0.5	n / a	1.0
Lime (qualitative)	Slight	None	Medium

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material, and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a 0.09 inch sieve and a minimum 55 percent shall pass through a 0.01 inch sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a 0.09 inch sieve and a minimum 97 percent shall pass through a 0.01 inch sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a 0.09 inch sieve and a minimum 35 percent shall pass through a 0.01 inch sieve.

2.3.2 Fertilizer

The nutrient ratio shall be 18 percent nitrogen, 24 percent phosphorus, and 6 percent potassium. The fertilizer shall be derived from sulfur-coated urea, urea formaldehyde, plastic or polymer-coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micronutrients.

2.3.3 Organic Material

Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.

2.3.3.1 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume straw, sawdust, or other bedding materials. Manure shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.3.3.2 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings, or other wood waste material free of stones, sticks, soil, and toxic substances harmful to plants, fully composted or stabilized with nitrogen.

2.3.3.3 Recycled Compost

Compost shall be a well-decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substance toxic to plants. Gradation: The compost material shall pass through a 0.4 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent or less by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length. Compost shall conform to EPA requirements.

2.4 WATER

Water shall be the responsibility of the Contractor unless otherwise noted. Water shall not contain elements toxic to plant life.

2.5 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 - EXECUTION

3.1 INSTALLING SOD TIME AND CONDITIONS

3.1.1 Sodding Time

Sod shall be installed from April 15 to September 15. Any other installation times will only be granted with written permission from Contracting Officer.

3.1.2 Sodding Conditions

Sodding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the sodding operations, proposed alternate times shall be submitted for approval.

3.1.3 Equipment Calibration

Immediately prior to the commencement of sodding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The

equipment shall be calibrated a minimum of once every day during the operation. Provide calibration test results within one week of testing.

3.1.4 Soil Test

Delivered topsoil shall be tested for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salt analysis, and mechanical analysis. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the sod species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

Prior to the commencement of the sodding operation, the Contractor shall verify that finished grades are as indicated on drawings; the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 02300a EARTHWORK. Apply topsoil to a depth of 3”.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying pH Adjuster

The application rate shall be pounds per square foot. The pH adjuster shall be incorporated into the soil to a maximum of 4 inches in depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The application rate shall be 9 pounds per 1,000 square feet. Fertilizer shall be incorporated into the soil to a maximum of 4 inches in depth or may be incorporated as part of the tillage operation.

3.2.3 Tillage

Till subgrade to a minimum depth of 6". After application of soil lift, topsoil shall be tilled to a minimum 8-inch depth. Rototillers shall be used where soil conditions and length of slope permit. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

See bed preparation should not commence until the moisture conditions make the ground area and soil friable. The prepared surface shall be a maximum of 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be rolled and completed with a light raking to remove from the surface debris, clods, rocks

and stones over a minimum 1 inch in any dimension. Such debris, clods, rocks and other material so removed should be disposed of off the immediate property.

3.2.4.2 Protection

Areas within the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing sod, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Areas shall be sodded as indicated. Adequate soil moisture shall be ensured prior to sodding by spraying water on the area to be sodded and wetting the soil to a maximum 1 inch depth.

3.3.1 Installing Sod

Rows of sod sections shall be placed parallel to and tightly against each other. Joints shall be staggered laterally. The sod sections shall not be stretched or overlapped. All joints shall be butted tight. Voids and air drying of roots shall be prevented. Sod sections shall be laid across the slope on long slopes. Sod sections shall be laid at right angles to the flow of water in ditches. Sod sections shall be anchored on slopes steeper than 3-horizontal-to-1-vertical. Anchoring may be required when surface weight or pressure upon placed sod sections is anticipated to cause lateral movement. Sod anchors shall be placed a minimum 23.6 inches on center with a minimum 2 anchors per sod section.

3.3.2 Finishing

Tamping or rolling the sod in place and knitting the sod to the soil shall prevent displacement of the sod. Air pockets shall be eliminated and a true and even surface shall be provided. Frayed edges shall be trimmed, and holes or missing corners shall be patched with sod.

3.3.3 Rolling

The entire area shall be firmed with a roller not exceeding 87 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled.

3.3.4 Watering Sod

Watering shall be started immediately after completing each day of installing sod. Water shall be applied at least 3 times per week to supplement rainfall, at a rate sufficient to ensure moist soil conditions to a minimum depth of 1 inch. Run-off, puddling, and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or plant material shall be prevented.

3.4 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.4.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.4.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the sodding operation shall be restored to original condition at Contractor's expense.

3.5.2 Clean Up

Excess and waste material shall be removed from the sodded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.6 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the sodding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.7 SOD ESTABLISHMENT PERIOD

3.7.1 Commencement

The sod establishment period to obtain a healthy stand of grass plants shall begin on the first day of work under this contract and shall end 3 months after the last day of sodding operation. Written calendar time period shall be furnished for the sod establishment period. When there is more than 1 sod establishment period, the boundaries of the sodded area covered for each period shall be described. The sod establishment period should be coordinated with Sections 02921a SEEDING. The sod establishment period shall be modified for inclement weather, shut down periods, for separate completion dates of areas, or when project is accepted by the government at an earlier date.

3.7.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health. A satisfactory stand of grass plants from the sodding operation shall be living sod uniform in color and leaf texture. Bare spots shall be a maximum 0.08 square inch. Joints between sod pieces shall be tight and free from weeds and other undesirable growth.

3.7.3 Maintenance During Establishment Period

Maintenance of the sodded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.7.3.1 Mowing

Sodded areas shall be mowed to a minimum of 3 inches in height when the turf is a maximum of 4 inches in height. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.7.3.2 Post-Fertilization

A maximum 3.7 pounds / acre of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.7.3.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.7.3.4 Repair

Unsatisfactory stand of grass plants shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.7.3.5 Maintenance Record

A record of each site visit shall be furnished which describes the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

END OF SECTION

SECTION 02930

EXTERIOR PLANTING

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 NURSERY AND LANDSCAPE ASSOCIATION (ANLA)

ANLA ANSI/ANLA Z60.1	(1996) Nursery Stock

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300	(1995) Tree Care Operations - Trees, Shrubs and other Woody Plant Maintenance

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 4972	(1995a) pH of Soils
ASTM D 5034	(1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D 5035	(1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D 5883	(1996) Standard Guide for Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant Establishment Period

Calendar time period for the plant establishment period. When there is more than one establishment period, the boundaries of the planted areas covered for each period shall be described.

Maintenance Record

Maintenance work performed, quantity of plant losses, and replacements; and diagnosis of unhealthy plant material.

Application of Pesticide

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-04 Samples

Delivered Topsoil

Samples taken from several locations at the source.

SD-06 Test Reports

Soil Test; G

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-07 Certificates

Plant Material
Topsoil
Pesticide

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following.

a. Plant Material: Classification, botanical name, common name, size, quantity by species, and location where grown.

b. Topsoil: Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. Pesticide: EPA registration number and registered uses.

SD-10 Operation and Maintenance Data

Maintenance Instructions; G

Instruction for year-round care of installed plant material.

1.3 SOURCE INSPECTIONS

The nursery or source of plant material and the source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Plant Material Identification

Plant material shall be identified with attached, durable, waterproof labels and weather-resistant ink, stating the correct botanical plant name and size.

1.4.1.2 Protection During Delivery

Plant material shall be protected during delivery to prevent desiccation and damage to the branches, trunk, root system, or earth ball. Branches shall be protected by tying-in. Exposed branches shall be covered during transport.

1.4.1.3 Topsoil

All topsoil to be imported. Prior to the delivery of any topsoil a soil test shall be provided for delivered topsoil.

1.4.1.4 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.5 Pesticide Material

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration number and the manufacturer's registered uses.

1.4.2 Inspection

Plant material shall be well shaped, vigorous and healthy with a healthy, well-branched root system, free from disease, harmful insects and insect eggs, sunscald injury, disfigurement or abrasion. Plant material shall be checked for unauthorized substitution and to establish nursery-grown status. Plant material showing desiccation, abrasion, sunscald injury, disfigurement, or unauthorized substitution shall be rejected. The plant material shall exhibit typical form of branch to height ratio and meet the caliper and height measurements specified. Plant material that measures less than specified, or has been poled, topped off or headed back, shall be rejected. Container-grown plant material shall show new fibrous roots and the root mass shall

contain its shape when removed from the container. Plant material with broken or cracked balls; or broken containers shall be rejected. Bare-root plant material that is not dormant or is showing roots were pulled from the ground shall be rejected. Other materials shall be inspected for compliance with paragraph PRODUCTS. Open soil amendment containers or wet soil amendments shall be rejected. Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material larger than 1-1/2 inch diameter shall be rejected. Topsoil that contains viable plant material and plant parts shall be rejected. Unacceptable material shall be removed from the job site.

1.4.3 Storage

1.4.3.1 Plant Material Storage

Plant material not installed on the day of arrival at the site shall be stored and protected in designated areas. Plant material shall not be stored longer than 30 days. Plant material shall be protected from direct exposure to wind and sun. Bare-root plant material shall be heeled-in. All plant material shall be kept in a moist condition by watering with a fine mist spray until installed.

1.4.3.2 Other Material Storage

Storage of other material shall be in designated areas. Soil amendments shall be stored in dry locations and away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with planting operation material.

1.4.4 Handling

Plant material shall not be injured in handling. Cracking or breaking the earth ball of balled and burlapped plant material shall be avoided. Plant material shall not be handled by the trunk or stems. Materials shall not be dropped from vehicles.

1.4.5 Time Limitation

Except for container-grown plant material, the time limitation from digging to installing plant material shall be a maximum 90 days. The time limitation between installing the plant material and placing the mulch shall be a maximum 24 hours.

1.5 WARRANTY

Furnished plant material shall have a warranty for plant growth to be in a vigorous growing condition for a minimum 12-month period. A minimum 12-month calendar time period for the warranty of plant growth shall be provided regardless of the contract time period. When plant material is determined to be unhealthy in accordance with paragraph PLANT ESTABLISHMENT PERIOD, it shall be replaced once under this warranty.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

2.1.1 Plant Material Classification

The plant material shall be nursery grown stock conforming to ANLA ANSI/ANLA Z60.1 and shall be the species specified.

2.1.2 Substitutions

Substitutions will not be permitted without written request and approval from the Contracting Officer.

2.1.3 Quality

Well-shaped, well-grown, vigorous plant material having healthy and well-branched root systems in accordance with ANLA ANSI/ANLA Z60.1 shall be provided. Plant material shall be provided free from disease, harmful insects and insect eggs, sunscald injury, disfigurement and abrasion. Plant material shall be free of shock or damage to branches, trunk, or root systems, which may occur from the digging and preparation for shipment, method of shipment, or shipment. Plant quality is determined by the growing conditions; method of shipment to maintain health of the root system; and growth of the trunk and crown as follows.

2.1.4 Growing Conditions

Plant material shall be native to or well suited to the growing conditions of the project site. Plant material shall be grown under climatic conditions similar to those at the project site.

2.1.5 Method of Shipment to Maintain Health of Root System

2.1.5.1 Balled and Burlapped (BB) Plant Material

Ball size and ratio shall be in accordance with ANLA ANSI/ANLA Z60.1. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. The plant stem or trunk shall be centered in the ball. All roots shall be clean cut at the ball surface. Roots shall not be pulled from the ground. Before shipment the root ball shall be dipped in gels containing mycorrhizal fungi inoculum. The root ball shall be completely wrapped with burlap or other suitable material and securely laced with biodegradable twine.

2.1.5.2 Bare-Root (BR) Plant Material

Minimum root spread shall be in accordance with ANLA ANSI/ANLA Z60.1. A well-branched root system characteristic of the species specified shall be provided. Roots shall not be pulled from the ground. Bare-root plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. Bare-root plant material shall be dormant. The root system shall be protected from drying out.

2.1.5.3 Container-Grown (C) Plant Material

Container size shall be in accordance with ANLA ANSI/ANLA Z60.1. Plant material shall be grown in a container over a duration of time for new fibrous roots to have developed and for the root mass to retain its shape and hold together when removed from the container. Container-grown plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. The container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

2.1.6 Growth of Trunk and Crown

2.1.6.1 Deciduous Trees

A height to caliper relationship shall be provided in accordance with ANLA ANSI/ANLA Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk, which branches more than 6 inches from ground level.

c. Specimen: The tree provided shall be well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

2.1.6.2 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANLA ANSI/ANLA Z60.1. Acceptable plant material shall be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

2.1.6.3 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material shall have the height-to-spread ratio recommended by ANLA ANSI/ANLA Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.1.6.4 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANLA ANSI/ANLA Z60.1. Acceptable plant material shall be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.1.7 Plant Material Size

Plant material shall be furnished in sizes indicated. Plant material larger in size than specified may be provided at no additional cost to the Government.

2.1.8 Plant Material Measurement

Plant material measurements shall be in accordance with ANLA ANSI/ANLA Z60.1.

2.2 TOPSOIL

Topsoil shall be as defined as per the following table. Topsoil shall be delivered and amended as recommended by the soil test for the plant material specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts. Blow sand will not be approved for use as topsoil.

Characteristic	Optimum	Minimum	Maximum
pH	6.5	5.5	8.0
Nitrate (# / ac)	50	1.0	300
Organic Matter (%)	4-5	3.0	6.0
Phosphorus (Olsen, ug / g)	40	5.0	150
Potassium (ug / g)	500	150	1000
Sodium (meq / 100g)	<0.5	n / a	1.0
Sulfate as S (ug / g)	20-100	10	1000
Conductivity (mmhos / cm)	<0.5	n / a	1.0
Lime (qualitative)	Slight	None	Medium

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite is not recommended.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.3.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 35 percent shall pass through a No. 60 sieve.

2.3.2 Fertilizer

The nutrient ratio shall be 10 percent nitrogen, 20 percent phosphorus, and 20 percent potassium. Fertilizer shall be controlled release commercial grade; free flowing, pellet or tablet form; uniform in composition; and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulfur-coated urea, urea formaldehyde, plastic or polymer-coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micronutrients.

2.3.3 Organic Material

Organic material shall consist of either peat, rotted manure, decomposed wood derivatives or recycled compost.

2.3.3.1 Rotted Manure

Rotted manure shall be unleached horse, chicken, or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. Manure shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and shall be free of stones, sticks, and soil.

2.3.3.2 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, or other wood waste material free of stones, sticks, and toxic substances harmful to plants, and stabilized with nitrogen.

2.3.3.3 Recycled Compost

Compost shall be a well-decomposed, stable, weed free organic matter source. It shall be derived from food, agricultural, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent or less by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.3.4 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for single use or in combination to meet topsoil requirements for the plant material specified.

2.3.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

2.3.4.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized according to manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide with an absorption capacity of 250-400 times its weight.

2.3.4.3 Calcined Clay

Granular particles shall be produced from montmorillonite clay calcined to minimum temperature of 1200 degrees F. Gradation: A minimum 90 percent passing No. 8 sieve; a minimum 99 percent shall be retained on No. 60 sieve; and a maximum 2 percent shall pass a No. 100 sieve. Bulk density: A maximum 40 pounds per cubic foot.

2.3.4.4 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.3.4.5 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall be in conformance with ASTM D 5883.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. Rotted manure is not recommended for use as mulch because it would encourage surface rooting of the plant material and weeds.

2.4.1 Rock Mulch

Washed Riverbank stone ranging in size from 1-1/2 to 2 inches.

2.4.2 Organic Mulch

Organic mulch materials shall be native to the project site and consist of recycled mulch, shredded bark, wood chips, or ground bark.

2.4.2.1 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.4.2.2 Wood Chips and Ground Bark

Locally chipped or ground material shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2-inch wide by 4 inch long.

2.5 WEED BARRIER

Shall be woven or non-woven; polypropylene, polyester, or fiberglass, mat in accordance with ASTM D 5034 or ASTM D 5035. It shall be made specifically for use as a fabric around plant material. Nominal weight shall be a minimum 4 ounces per square yard. Permeability rate shall be a minimum 0.04-inch per second.

2.6 WOOD STAKING MATERIAL

Wood stakes shall be hardwood or fir; rough sawn; free from knots, rot, cross grain, or other defects that would impair their strength.

2.6.1 Wood Ground Stakes

Wood ground stakes shall be a minimum of 2 x 2 inch square and a minimum 3 feet long with a point at one end.

2.7 METAL STAKING AND GUYING MATERIAL

2.7.1 Bracing Stakes

Metal shall be steel heavy-gauge T-fence posts painted dark brown or green. Stake shall be set without damaging rootball.

2.7.2 Metal Ground Stakes

Metal ground stakes shall be a minimum 1/2-inch diameter and a minimum 3 feet long.

2.7.3 Guying Material

Metal guying material shall be a minimum 12-gauge wire. Multi-strand cable shall be woven wire. Guying material tensile strength shall conform to the size of tree to be held firmly in place.

2.7.4 Turnbuckle

Metal turnbuckles shall be galvanized or cadmium-plated steel, and shall be a minimum 3 inches long with closed screw eyes on each end. Screw thread tensile strength shall conform to the size of tree to be held firmly in place.

2.8 RUBBER CHAFING GUARDS

Rubber chafing guards, consisting of recycled material, shall be used to protect tree trunks and branches when metal guying material is applied. The material shall be the same color throughout the project. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

2.9 FLAG

Plastic flag material shall be used on guying wires. It shall be a minimum 6 inches long. Tape color shall be consistent and visually complimentary to the entire project area. The tape color shall meet pedestrian visual safety requirements for day and night.

2.10 WATER

Water to be furnished by the government. Water shall not contain elements toxic to plant life.

2.11 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 - EXECUTION

3.1 INSTALLING PLANT MATERIAL TIME AND CONDITIONS

3.1.1 Deciduous Plant Material Time

Deciduous plant material shall be installed from April 1 to October 1.

3.1.2 Evergreen Plant Material Time

Evergreen plant material shall be installed from April 1 to October 1.

3.1.3 Plant Material Conditions

Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted for approval.

3.1.4 Tests

3.1.4.1 Percolation Test

Test for percolation shall be done to determine positive drainage of plant pits and beds. A positive percolation shall consist of a minimum 1 inch per 3 hours; when a negative percolation test occurs, a shop drawing shall be submitted indicating the corrective measures.

3.1.4.2 Soil Test

Delivered topsoil shall be tested for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the plant material specified.

3.2 SITE PREPARATION

3.2.1 Tillage

Do not till the subgrade. Apply topsoil over satisfactory material.

3.2.2 Finished Grade, Topsoil and Underground Utilities

The Contractor shall verify that finished grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section 02300 EARTHWORK, prior to the commencement of the planting operation. The location of underground utilities and facilities in the area of the planting operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.2.3 Layout

Plant material locations and bed outlines shall be staked on the project site before any excavation is made. Plant material locations may be adjusted to meet field conditions.

3.2.4 Protecting Existing Vegetation

When there are established lawns in the planting area, the turf shall be covered and/or protected during planting operations. Existing trees, shrubs, and plant beds that are to be preserved shall be barricaded along the dripline to protect them during planting operations.

3.3 EXCAVATION

3.3.1 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to plant material location, type of plant and planting method shall be submitted for approval.

3.3.2 Turf Removal

Where the planting operation occurs in an existing lawn area, the turf shall be removed from the excavation area to a depth that will ensure the removal of the entire root system.

3.3.3 Plant Pits

Plant pits for ball and burlapped or container plant material shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits for bare-root plant material shall be dug to a depth equal to the height of the root system. Plant pits shall be dug a minimum 50 percent wider than the ball or root system to allow for root expansion. The pit shall be constructed with sides sloping towards the base as a cone, to encourage well-aerated soil to be available to the root system for favorable root growth. Cylindrical pits with vertical sides shall not be used.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient soil has been firmly placed around root system or ball. In relation to the surrounding grade, the plant material shall be set even with the grade at which it was grown.

3.4.1.1 Bare-Root Plant Material

Bare-root plant material shall be placed in water a minimum 30 minutes prior to setting.

3.4.2 Tree Root Barrier

Tree root barriers shall be installed as recommended by the manufacturer. Tree root barriers shall be used for trees located up to a maximum 6 feet from paved surfaces or structures.

3.4.3 Backfill Soil Mixture

The backfill soil mixture may be a mix of topsoil and soil amendments suitable for the plant material specified. When practical, the excavated soil from the plant pit that is not amended provides the best backfill and shall be used.

3.4.4 Backfill Procedure

Prior to backfilling, all metal, wood, synthetic products, or treated burlap devices shall be removed from the ball or root system avoiding damage to the root system. The backfill procedure shall remove air pockets from around the root system. Additional requirements are as follows.

3.4.4.1 Balled and Burlapped, and Balled and Platformed Plant Material

Biodegradable burlap and tying material shall be carefully opened and folded back from the top a minimum 1/3 depth from the top of the root ball. Backfill mixture shall be added to the plant pit in 6-inch layers with each layer tamped.

3.4.4.2 Bare-Root Plant Material

The root system shall be spread out and arranged in its natural position. Damaged roots shall be removed with a clean cut. The backfill soil mixture shall be carefully worked in amongst the roots and watered to form a soupy mixture. Air pockets shall be removed from around the root system, and root to soil contact shall be provided.

3.4.4.3 Container-Grown and Balled and Potted Plant Material

The plant material shall be carefully removed from containers that are not biodegradeable. Prior to setting the plant in the pit, a maximum 1/4 depth of the root mass, measured from the bottom, shall be spread apart to promote new root growth. For plant material in biodegradable containers the container shall be split prior to setting the plant with container. Backfill mixture shall be added to the plant pit in 6-inch layers with each layer tamped.

3.4.5 Plant Bed

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas. Earth berms shall be provided. Polymers shall be spread uniformly over the plant bed and in the planting pit as recommended by the manufacturer and thoroughly incorporated into the soil to a maximum 4-inch depth.

3.4.6 Watering

Plant pits and plant beds shall be watered immediately after backfilling, until completely saturated.

3.4.7 Staking and Guying

Staking will be required when trees are unstable or will not remain set due to their size, shape, or exposure to high wind velocity. All stakes shall be removed at the end of the plant establishment period.

3.4.7.1 Two Bracing Stakes

Trees shall be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly between the stakes with a double strand of wire. The guying material shall be firmly anchored at a minimum 1/2-tree height and shall prevent girdling. Chafing guards shall be used. All stakes shall be removed at the end of the plant establishment period.

3.4.8 Flags

A flag shall be securely fastened to each guy line equidistant between the tree and the stake, deadmen, or earth anchor. The flag shall be visible to pedestrians.

3.5 FINISHING

3.5.1 Plant Material

Prior to placing mulch, the installed area shall be uniformly edged to provide a clear division line between the planted area and the adjacent turf area, shaped as indicated. The installed area shall be raked and smoothed while maintaining the earth berms.

3.5.2 Landscape Fabric

Prior to placing mulch, fabric shall be placed as indicated in accordance with the manufacturer's recommendations.

3.5.3 Placing Mulch

The mulch shall be placed no more than 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and prevent weed growth, shall be spread to cover the

installed area with a minimum 4-inch uniform thickness. Mulch shall be kept out of the crowns of shrubs and vines and shall be kept off buildings, sidewalks and other facilities.

3.5.4 Pruning

Trained and experienced personnel shall accomplish pruning. The pruning of trees and palms shall be in accordance with ANSI A300. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off".

3.6 MAINTENANCE DURING PLANTING OPERATION

Installed plant material shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed to prevent desiccation and shall continue until the plant establishment period commences. Installed areas shall be kept free of weeds, grass, and other undesired vegetation. The maintenance includes maintaining the mulch, watering, and adjusting settling.

3.7 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.7.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.7.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.8 RESTORATION AND CLEAN UP

3.8.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

3.8.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite. Adjacent paved areas shall be cleared.

3.9 PLANT ESTABLISHMENT PERIOD

3.9.1 Commencement

Upon completion of the last day of the planting operation, the plant establishment period for maintaining installed plant material in a healthy growing condition shall commence and shall be in effect for 12 months unless accepted at an earlier date. Written calendar time period shall be furnished for the plant establishment period. The plant establishment period shall be modified for inclement weather shut down periods, for separate completion dates for areas or when project is accepted at an earlier date.

3.9.2 Maintenance During Establishment Period

Maintenance of plant material shall include straightening plant material, straightening stakes; tightening guying material; correcting girdling; supplementing mulch; pruning dead or broken branch tips; maintaining plant material labels; watering; eradicating weeds, insects and disease; post-fertilization; and removing and replacing unhealthy plants.

3.9.2.1 Watering Plant Material

The plant material shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of 1 inch absorbed water per week, delivered in the form of rain or augmented by watering. Run-off, puddling and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or existing plant material shall be prevented.

3.9.2.2 Weeding

Grass and weeds in the installed areas shall not be allowed to reach a maximum 3 inches height before being completely removed, including the root system.

3.9.2.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.2.4 Post-Fertilization

The plant material shall be top-dressed at least once during the period of establishment with controlled release fertilizer, reference paragraph SOIL AMENDMENTS. Apply at the rate of 2 pounds per 100 square feet of plant pit or bed area. Dry fertilizer adhering to plants shall be flushed off. The application shall be timed prior to the advent of winter dormancy.

3.9.2.5 Plant Pit Settling

When settling occurs to the backfill soil mixture, additional backfill soil shall be added to the plant pit or plant bed until the backfill level is equal to the surrounding grade. Serious settling that affects the setting of the plant in relation to the maximum depth at which it was grown requires replanting in accordance with paragraph INSTALLATION. The earth berm shall be maintained.

3.9.2.6 Maintenance Record

A record shall be furnished describing the maintenance work performed, the quantity of plant losses, diagnosis of the plant loss, and the quantity of replacements made on each site visit.

3.9.3 Unhealthy Plant Material

A tree shall be considered unhealthy or dead when the main leader has died back, or up to a maximum 25 percent of the crown has died. A shrub shall be considered unhealthy or dead when up to a maximum 25 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine if there is a green cambium layer below the bark. The Contractor shall determine the cause for unhealthy plant material and shall provide recommendations for replacement. Unhealthy or dead plant material shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

3.9.4 Replacement Plant Material

Unless otherwise directed, plant material shall be provided for replacement in accordance with paragraph PLANT MATERIAL. Replacement plant material shall be installed in accordance with paragraph INSTALLATION, and recommendations in paragraph PLANT ESTABLISHMENT PERIOD. Plant material shall be replaced in accordance with paragraph WARRANTY. An extended plant establishment period shall not be required for replacement plant material.

END OF SECTION

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SECTION 02935

EXTERIOR PLANT MATERIAL MAINTENANCE

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300	(1995) Tree Care Operations - Trees, Shrubs and other Woody Plant Maintenance

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a) Agricultural Liming Materials
ASTM D 5883	(1996) Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Chemical Treatment Material

Manufacturer's literature including physical characteristics, application and installation instructions for chemical treatment material.

Work Plan and Schedule

Contractor's work plan and schedules

Maintenance Record

Contractor's record of each site visit

Application of Pesticide; G

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method

of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-07 Certificates

Fertilizer; G
Pesticide; G

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Fertilizer. Chemical analysis and composition percent

b. Pesticide. EPA registration number and registered uses.

1.3 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.3.1 Delivery Schedule

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.3.2 Delivery of Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturers registered uses.

1.3.3 Storage

Materials shall be stored in designated areas. Lime and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.3.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

PART 2 PRODUCTS

2.1 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.1.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be burnt lime, hydrated lime, ground limestone, sulfur, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified or in place.

2.1.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.1.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.1.1.3 Burnt Lime

Burnt lime shall contain a minimum calcium carbonate equivalent of 140 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 35 percent shall pass through a No. 60 sieve.

2.1.2 Fertilizer

Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The nutrient ratio shall be 12 percent nitrogen, 16 percent phosphorus, and 4 percent potassium. The fertilizer shall be derived from sulfur-coated urea, urea formaldehyde, plastic or polymer-coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micronutrients.

2.1.3 Organic Material

Organic material shall consist of rotted manure, decomposed wood derivatives or recycled compost.

2.1.3.1 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. It shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds.

2.1.3.2 Decomposed Wood Derivatives

Decomposed wood derivatives shall consist of ground bark, sawdust, yard trimmings, or other wood waste material that is free of stones, sticks, soil, and toxic substances harmful to plants, and is fully composted or stabilized with nitrogen.

2.1.3.3 Recycled Compost

Recycled compost shall be well decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substance toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The

material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.1.4 Soil Conditioner

Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for use singly or in combination.

2.1.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Green sand shall be balanced with the inclusion of trace minerals and nutrients.

2.1.4.2 Calcined Clay

Calcined clay shall be granular particles produced from montmorillonite clay calcined to a minimum temperature of 1200 degrees F. Gradation: A minimum 90 percent shall pass a No. 8 sieve; a minimum 99 percent shall be retained on a No. 60 sieve; and a maximum 2 percent shall pass a No. 100 sieve. Bulk density: A maximum 40 pounds per cubic foot.

2.1.4.3 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

2.1.4.4 Expanded Shale, Clay, or Slate (ESCS)

Rotary kiln produced ESCS material shall conform to ASTM D 5883.

2.2 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. Rotted manure shall not be used.

2.2.1 Inorganic Mulch

Where inorganic mulch is used for decorative purposes, it shall be replaced or augmented in areas designated. Match existing mulch in size, color, and texture.

a. Riverbank stone ranging in size from 1-1/2 to 2 inches.

2.2.2 Organic Mulch

Organic mulch materials shall be native to the project site and consist of recycled mulch, shredded bark, wood chips, or ground bark for use when remulching trees, shrubs, and ground covers.

2.2.2.1 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.2.2.2 Wood Chips and Ground Bark

Locally chipped or ground material shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2-inch wide by 4 inch long.

2.3 WATER

Water shall be the responsibility of the Contractor. Water shall not contain elements toxic to plant life.

2.4 PESTICIDE

Pesticide shall be an insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

2.5 HERBICIDE

Herbicide shall be EPA registered and approved; furnished for pre-emergence and post-emergence application for crabgrass control and broad leaf weed control and complying with Federal Insecticide, Fungicide, and Rodenticide Act (Title 7 U.S.C. Section 136) for requirements on Contractor's licensing, certification, and record keeping. Contractor shall keep records of all pesticide applications and forward data monthly to Contracting Officer. Record keeping format shall be submitted to Contracting Officer for approval.

PART 3 EXECUTION

3.1 SITE PREPARATION

3.1.1 Applying pH Adjuster

pH adjuster shall be applied at a rate of pounds per square yard.

3.2 MULCHING

Mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3 WATERING

Water to supplement rainfall shall be applied at a rate sufficient to ensure plant growth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

3.4.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control.

3.4.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended to prevent the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately. A pesticide plan shall be submitted.

3.5 GENERAL MAINTENANCE REQUIREMENTS

3.5.1 Fertilization of Plants

Fertilizer shall be applied at manufacturer's suggested rate per plant type or turf.

3.5.2 Pesticide Treatment

Pesticide treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.5.3 Irrigation Maintenance

The Contractor shall service and repair controller, pumps, valves, couplers, sprinklers, sprinkler heads, piping; and shall be responsible for winterization and startup during 12 month warranty period. Sprinkler heads shall direct water away from building. The plant material shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone; the amount of water required shall be the equivalent of 1 inch absorbed water per week. Amount of irrigation watering shall take amounts of rain into account.

3.5.4 Maintenance Record

A record of each site visit shall be furnished, describing:

a. Maintenance work performed.

b. Areas repaired or reinstalled.

c. Diagnosis for unsatisfactory stand of grass

d. Diagnosis for unsatisfactory stand of plant material in planting bed.

e. Condition of trees.

f. Condition of shrubs.

g. Quantity and diagnosis of plant loss

h. Irrigation of system

3.6 GRASS PLANT QUALITY

Grass plants shall be evaluated for species and health when the grass plants are a minimum 1-inch high. The living grass area shall be maintained to be uniform in color and leaf texture; and free from weeds and other undesirable growth. The living grass area shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 1 inch in diameter, woody plant roots, and other materials detrimental to a healthy stand of grass plants. Broadleaf weeds and patches of foreign grasses shall be a maximum 2 percent of the total area.

3.6.1 Lawn Area

A satisfactory stand of grass plants for a lawn area shall be a minimum 20 grass plants per square foot. Bare spots shall be a maximum 9 inches square. The total bare spots shall be a maximum 2 percent of the total area.

3.6.2 Field Area

A satisfactory stand of grass plants for a field area shall be a minimum 10 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total seeded area.

3.7 LAWN AND FIELD AREAS MAINTENANCE

3.7.1 Mowing

Lawn and field areas shall be mowed throughout the growing season to meet the requirements of paragraph GRASS PLANT QUALITY. Cutting height shall be adjusted according to type of grass. Frequency of mowing shall be adjusted so that no more than 1/4 of leaf length is removed during a cutting.

3.7.1.1 Lawn Areas

Lawn areas shall be mowed to a minimum 1-1/2 inch height when the turf is a maximum 3 inches high. Remove clippings when the amount cut prevents sunlight from reaching the ground surface.

3.7.1.2 Field Areas

Field areas shall be mowed 2 times during the season to a minimum inch height. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.7.2 Turf Trimming

Turf adjoining paved areas, planting beds and trees shall be kept neatly trimmed at all times, essentially after each mowing. String trimmers at trees and shrubs will be prohibited.

3.7.3 Lime

Lime for pH modification shall be applied as required to meet the requirements of paragraph GRASS PLANT QUALITY.

3.7.4 Herbicide Weed Control

Two or more applications of a pre-emergent herbicide and of a post-emergent herbicide shall be performed to meet the requirements of paragraph GRASS PLANT QUALITY.

3.7.5 Turf Fertilization Program

A regular program of fertilization shall be established to include a spring feeding and early summer feeding to meet the requirements of paragraph GRASS PLANT QUALITY. A total of four pounds of Nitrogen per 1000 square feet shall be applied annually. Additional one pound Nitrogen applications shall be provided as grass color warrants.

3.8 PLANTING BEDS MAINTENANCE

3.8.1 Trimming

Spent flower heads shall be removed. Seasonal succession of bloom requires removal for new plant or trimming back bulb foliage.

3.8.2 Irrigation of Planting Beds

Run-off, puddling and wilting, watering of other adjacent areas or existing plant material shall be prevented.

3.8.3 Weed Control

Grass and weeds in planting beds shall be completely removed before reaching 3 inches in height.

3.9 PLANT MATERIAL QUALITY

3.9.1 General Requirements

Plant material shall be identified as native to the region of the site or as a specimen. Plant material shall be maintained as well shaped, well-grown, vigorous plant material having healthy root systems. The plant material shall be maintained as free from disease, harmful insects and insect eggs, sunscald injury, disfigurement and abrasion. Plant material shall be free of shock or damage to branches, trunk, or root systems. Plant quality is determined by the growing conditions; climate and microclimate of the site for maintaining a healthy root system; and growth of the trunk and crown as follows.

3.9.2 Growth of Trunk and Crown

3.9.2.1 Deciduous Trees

Deciduous tree height to caliper relationship shall be maintained. Height of branching shall bear a relationship to the size and species of the tree and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: To be considered a stem, there shall be no division of the trunk which branches more than 6 inches from ground level.

c. Specimen: The tree shall be well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be indicated.

3.9.2.2 Deciduous Shrubs

Deciduous shrub height to number of primary stems shall be maintained. Shrubs shall be maintained as well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the site.

3.9.2.3 Coniferous Evergreen Plant Material

Coniferous evergreen plant material height-to-spread ratio shall be maintained. The coniferous evergreen trees shall not be "poled" or the leader removed. The plant material shall be maintained to be well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be indicated.

3.9.2.4 Tree Staking

All tree stakes shall be removed at the end of the plant establishment period.

3.10 SHRUB AND HEDGE MAINTENANCE

3.10.1 Trimming and Pruning

Trimming shall be performed to ensure the following:

a. Safety

b. Quality (size, height, and shape)

c. Health (removing broken, diseased branches).

d. Rejuvenation (removing one third to one half of the older stems or branches).

e. Visibility (signs, building entrances, motorist line of sight).

Shrubs shall be pruned to the requirements of paragraph PLANT MATERIAL QUALITY. Trained and experienced personnel in accordance with ANSI A300 shall accomplish pruning. The typical growth habit of individual plant material or the theme shape of the hedge shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed.

3.10.2 Irrigation of Shrubs and Hedges

Run-off, puddling and wilting shall be prevented.

3.10.3 Shrub Fertilization Program

A regular program of fertilization shall be established to include a fall feeding to meet the requirements of paragraph PLANT MATERIAL QUALITY. Use industry standards for foliage and root fertilizing the plant material inventoried.

3.11 TREE MAINTENANCE

3.11.1 Trimming and Pruning of Trees

Trimming shall be performed to ensure the following:

a. Safety

b. Quality (size, height)

c. Health (removing broken, diseased wood branches).

d. Rejuvenation (removing one third to one half of the older stems or branches).

e. Visibility (signs, building entrances, motorist line of sight).

Trees shall be pruned to meet the requirements of paragraph PLANT MATERIAL QUALITY. Trained and experienced personnel in accordance with ANSI A300 shall accomplish pruning. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off".

3.11.2 Irrigation of Trees

Run-off, puddling and wilting shall be prevented.

3.11.3 Tree Fertilization Program

A regular program of fertilization shall be established to include a fall feeding to meet the requirements of paragraph PLANT MATERIAL QUALITY. Use industry standards for foliage and root fertilizing the plant material inventoried.

3.11.4 Unhealthy Plant Material

A tree shall be considered unhealthy or dead when the main leader has died back, or up to a maximum 25 percent of the crown has died. A shrub shall be considered unhealthy or dead when up to a maximum 25 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine if there is a green cambium layer below the bark. The Contractor shall determine the cause for unhealthy plant material and shall provide recommendations to prevent future mortality. Unhealthy or dead plant material shall be removed and replaced immediately.

3.12 RESTORATION AND CLEAN UP

3.12.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the maintenance operations shall be restored to original condition at Contractor's expense.

3.12.2 Clean Up

Excess and waste material shall be removed from the maintenance areas and dispose off site. Adjacent paved areas shall be cleaned as determined by the Contracting Officer.

3.13 CLEANING OF PAVED AREAS

Grass, weeds, leaves, and debris from mowing, clipping, and pruning shall be removed immediately. Excess and waste material shall be removed from paved areas and disposed off site. Debris, leaves shall be removed weekly.

END OF SECTION

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SECTION 03301

CAST-IN-PLACE CONCRETE (LIMITED APPLICATIONS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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 reinforcement, concrete materials, mix design, placement procedures, and finishes.

B. Related Sections include the following:

1. Division 2 Section "Excavation, Filling and Backfilling for Buildings" for drainage fill under slabs-on-grade.
2. Division 7 Section “Building Insulation” for moisture barrier at building perimeter.

1.3 SUBMITTALS

A. General: In addition to the following, comply with submittal requirements in ACI 301.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete mix.

D. Shop Drawings: For steel reinforcing and form work, including void forms.

E. Samples: One sample unit for each type of void form prior to installation.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete 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: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

D. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.

1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
2. Formwork and form accessories.
3. Steel reinforcement and supports.
4. Concrete mixtures.
5. Handling, placing, and constructing concrete.
6. Lightweight concrete.

PART 2 - PRODUCTS

2.1 FORMWORK

Furnish formwork and form accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn.

C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

D. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

E. Smooth Dowels: ASTM A 675,Grade 80 , or ASTM A499

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type V (Sulfate Resisting).

B. Portland Cement: ASTM C 150, Type II (with maximum 5% GA content).

C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding ¾-inch nominal size.

D. Water: Potable and complying with ASTM C 94.

E. Pozzolan (Fly Ash): ASTM C 618, Class F with the optional requirements for multiple factor, drying shrinkage and uniformity from Table 2A of ASTM C 618. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material. The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.4 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. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 RELATED MATERIALS

A. Vapor Retarder under Garage and Exterior Concrete Slabs: Multi-ply reinforced polyethylene sheet, ASTM E 1745, Class C, not less than 7.8 mils thick; or polyethylene sheet, ASTM D 4397, not less than 10 mils thick.

B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a No. 4 sieve and 10 to 30 percent passing a No. 100 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates. (Trimmable compactible fill as noted in ACI 302.1.)

C. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, mono-molecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9-ounces per square yard dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.7 CONCRETE MIXES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Prepare design mixes, proportioned according to ACI 301, for normal-weight concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Compressive Strength (28 Days): 4000 psi piles, grade beams, piers, structural slabs
2. Compressive Strength (28 Days): 3000 psi slabs on grade
3. Slump: 4 inches. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches after adding admixture to plant- or site-verified, 2- to 3-inch slump.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6.0 percent within a tolerance of plus 1.0 or minus 1.5 percent.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with ASTM C 94. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes. When air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: 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 mixer capacity of 1 cubic yard or smaller, 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 mixer capacity larger than 1 cubic yard, increase mixing time by 15 seconds for each additional 1 cubic yard.
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. Record approximate location of final deposit in structure.

2.9 VOID FORMS

Void forms shall be the product of a reputable manufacturer regularly engaged in the commercial production of void forms. The voids shall be constructed of double faced, corrugated fiberboard. The corrugated fiberboard shall be fabricated of standard kraft paper liners, impregnated with paraffin and laminated with moisture resistant adhesive and shall have a board strength of 300 psi. Voids impregnated with paraffin after construction, in lieu of being constructed with paraffin impregnated fiberboard, are acceptable. Voids shall be designed to support not less than 1,000 psf. To prevent separation during concrete placement, fiber voids shall be assembled with steel or plastic banding at 48 inches on center maximum, or by adequate stapling or gluing, as recommended by the manufacturer. Void forms placed under concrete slabs and 4 inches in depth may be heavy duty "waffle box" type, constructed of paraffin impregnated corrugated fiberboard.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, construct, erect, shore, brace and maintain formwork according to ACI 301.

B. Void forms shall be placed under grade beams and slabs as indicated. Voids shall be placed on a smooth firm dry bed of suitable material, to avoid being displaced vertically, and shall be set tight, with no buckled cartons, in order that horizontal displacement cannot take place. Each section of void shall have its ends sealed by dipping in paraffin, with any additional cutting of voids at the jobsite to be field dipped in the same type of sealer, unless liners and flutes are completely impregnated with paraffin. If voids are destroyed or damaged and are not capable of supporting the design load, they shall be replaced prior to placing of concrete.

3.2 VAPOR RETARDER UNDER SLABS

A. Install, protect, and repair vapor-retarder sheets according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.

B. Lap joints 6 inches and seal with manufacturer's recommended tape. Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.3 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Smooth Dowels shall be installed in Slabs on Grade at locations indicated and at right angles to the joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Contracting Officer.

C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

D. Contraction (Control) Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows: Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

B. Consolidate concrete with mechanical vibrating equipment.

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material 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. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Completely remove fins and other projections. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.

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.

3.7 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleed water appears on the surface. Do not further disturb surfaces before starting finishing operations.

C. Float Finish: Apply float finish to surfaces indicated and to surfaces to receive trowel finish.

D. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view.

E. Non-Slip Broom Finish: Apply a non-slip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.8 TOLERANCES

Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.9 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 pound per square foot 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 formed and unformed concrete for at least seven days 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.

3.10 FIELD QUALITY CONTROL

Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cubic yard, but less than 25 cubic yard, plus one set for each additional 50 cubic yard or fraction thereof.

3.11 REPAIRS

Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 03301

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SECTION 04810

UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units (CMUs).

B. Related Sections include the following:

1. Division 3 Section 03301 Cast-In-Place Concrete
2. Division 7 Section "Water Repellents" for water repellents applied to unit masonry assemblies.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

C. Samples for each type and color of exposed masonry units.

D. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. For masonry units include material test reports substantiating compliance with requirements.

E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.3 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection: Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 COLORS, TEXTURES, AND PATTERNS

Exposed Masonry Units: Antique Linen color by Fagenstrom, Inc (or approved equal).

2.3 CONCRETE MASONRY UNITS (CMU's)

A. Shapes: Provide special shapes for corners, jambs, bonding, and other special conditions.

B. Concrete Masonry Units: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
2. Weight Classification: Normal Weight
3. Pattern and Texture for Decorative Units: Standard pattern, split-face finish.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Mortar Pigments: Iron oxides and chromium oxides compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.

F. Aggregate for Mortar: ASTM C 144. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Aggregate for Grout: ASTM C 404.

H. Cold-Weather Admixture: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement: ASTM A 951, mill galvanized, carbon-steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls.

1. Wire Size for Side Rods: 9 ga.
2. Wire Size for Cross Rods: 9 ga.
3. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
4. Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

a. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches in width, plus 1 side rod at each wythe of masonry 4 inches or less in width.

2.6 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.7 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce a uniform color matching that of the Unit Masonry. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1 / ASCE 6 / TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143 / C 143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

3.2 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.3 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
3. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.4 PLACING GROUT

All cells with reinforcing shall be filled solid with grout.

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners by using prefabricated L-shaped units.

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Placing Reinforcement: Comply with requirements in ACI 530.1 / ASCE 6 / TMS 602.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1 / ASCE 6 / TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports.

B. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.8 CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION

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SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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. Framing with dimension lumber
2. Framing with timber
3. Framing with engineered wood products
4. Wood blocking cants and nailers
5. Wood furring
6. Sheathing
7. Sub-flooring and underlayment

B. Related Sections include the following:

1. Division 6 Section "Metal-Plate-Connected Wood Trusses
2. Division 6 Section "Finish Carpentry" for nonstructural carpentry items exposed to view and not specified in another Section

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Exposed Framing: Dimension lumber not concealed by other construction.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NLGA - National Lumber Grades Authority.
2. SPIB - Southern Pine Inspection Bureau.
3. WCLIB - West Coast Lumber Inspection Bureau.

4. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.

2. Engineered wood products.

3. Power-driven fasteners.

4. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

B. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.7 GRADING AND MARKING

1.7.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used.

1.7.2 Structural Glued Laminated Timber

Mark each member with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of structural glued laminated timber products. The marking shall indicate compliance with AITC 190.1 and shall include all identification information required by AITC 190.1.

1.7.3 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with PS1.

1.7.4 Structural-Use and OSB Panels

Mark each panel with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the panel. The mark shall indicate end use, span rating, and exposure durability classification. Oriented Strand Board (OSB), APA F405L.

1.7.5 Preservative-Treated Lumber

The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

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. Laminated-Veneer Lumber:

a. Trus Joist MacMillan.

b. Boise Cascade Corporation.

c. Georgia-Pacific Corporation.

d. Willamette Industries, Inc.

2. Parallel-Strand Lumber: Trus Joist MacMillan.

3. Structural Glued Laminated Members

a. Western Wood Products

b. Boise Cascade Corporation

c. Weyerhauser

4. Prefabricated Wood I-Joists:

a. Trus Joist MacMillan.

b. Boise Cascade Corporation.

c. Georgia-Pacific Corporation

d. Willamette Industries, Inc.

5. Metal Framing Anchors

a. Simpson Strong-Tie Company, Inc.

b. kC Metals Products, Inc.

c. Silver Metal Products, Inc.

d. United Steel Products Company, Inc.

2.2 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. 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.

3. Provide dressed lumber, S4S, unless otherwise indicated.

4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, which meet or exceed those of the manufacturer 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.

C. Wood Structural Panels:

1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

2. Oriented Strand Board: DOC PS 2.

3. Thickness: As needed to comply with requirements specified but not less than thickness indicated.

4. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

5. Factory mark panels according to indicated standard.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to Contracting Officer and one of the following:

a. Chromated copper arsenate (CCA).

b. Ammoniacal copper zinc arsenate (ACZA).

c. Ammoniacal, or amine, copper quat (ACQ).

d. Copper bis (dimethyldithiocarbamate) (CDDC).

e. Ammoniacal copper citrate (CC).

f. Copper azole, Type A (CBA-A).

2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

3. Wood framing members less than 18 inches above grade.

4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

2.4 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

B. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 2 grade and any of the following species:

1. Mixed southern pine; SPIB.

2. Western woods; WCLIB or WWPA.

C. Exterior and Load-Bearing Walls: Construction or No. 2 grade and any of the following species:

1. Douglas fir-larch; WCLIB or WWPA.

2. Hem-fir; WCLIB or WWPA.

3. Mixed southern pine; SPIB.

D. Ceiling Joists (Non-Load-Bearing): Construction, Stud, or No. 2 grade and any of the following species:

1. Douglas fir-larch; WCLIB or WWPA.

2. Douglas fir-south; WWPA.

3. Douglas fir-larch (north); NLGA.

4. Hem-fir; WCLIB or WWPA.

5. Hem-fir (north); NLGA.

6. Mixed southern pine; SPIB.

7. Spruce-pine-fir (south); NELMA, WCLIB, or WWPA.

8. Spruce-pine-fir; NLGA.

E. Joists, Rafters, and Other Framing Not Listed Above: As indicated grade and any of the following species:

1. Douglas fir-larch; WCLIB or WWPA.

2. Hem-fir; WCLIB or WWPA.

3. Southern pine; SPIB.

2.5 TIMBER

For timber of 5-inch nominal size and thicker, provide material as indicated.

2.6 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:

1. Rooftop equipment bases and support curbs.

2. Blocking.

3. Cants.

4. Nailers.

5. Furring.

B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:

1. Mixed southern pine; SPIB.

2. Western woods; WCLIB or WWPA.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.

2. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber (LVL): A composite of wood veneers with grain primarily parallel to member lengths, manufactured with an exterior-type adhesive complying with ASTM D 2559. Product has the following allowable design values as determined according to ASTM D 5456:

1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal- depth members.

2. Modulus of Elasticity, Edgewise: 1,900,000 psi.

B. Structural Glued Laminated Members: A composite of wood elements with grain parallel to length of member, manufactured with an exterior type adhesive, complying with AITC 190.1.

1. Extreme Fiber Stress in Bending: 2,400 psi

2. Maximum Shear Stress: 165 psi

3. Modulus of Elasticity, Edgewise: 1,800,000 psi

Members shall be Industrial Appearance Grade, sealed with a penetrating sealer, and individually wrapped as standard with the manufacturer and approved. Members shall be complete with hardware for joining laminated members and for their connection to other construction.

C. Wood I-Joists: Prefabricated units complying with APA PRI-400; depths and performance ratings not less than those indicated.

1. Web Material: Either oriented strand board or plywood, Exposure 1.

2. Flange Material: Shall be LVL material

3. Structural Capacities: Establish and monitor structural capacities according to ASTM D 5055.

4. Trademark: Factory mark I-joists with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and I-joist compliance with APA standard.

D. Laminated Strand Lumber (LSL)

1. Extreme fiber stress in bending, edgewise 1700 psi for 12" nominal

2. Modulus of elasticity, edgewise 1,300,000 psi

E. Rim Boards: Performance-rated product complying with APA PRR-401.

1. Material: Mat-formed panels all-veneer panels composite panels glulams or structural composite lumber.

2. Thickness and Grade: 1 ¼-inch rim board.

3. Trademark: Factory mark with APA trademark indicating thickness, grade, and compliance with APA standard.

2.8 SHEATHING

A. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.

1. Span Rating: As indicated.

2. Thickness: As indicated.

B. Plywood Roof Sheathing: As indicated.

1. Span Rating: Not less than as indicated.

2. Thickness: Not less than as indicated.

2.9 SUBFLOORING AND UNDERLAYMENT

Plywood Combination Subfloor-Underlayment: DOC PS 1, single-floor panels as indicated.

1. Span Rating: Not less than as indicated.

2. Thickness: Not less than as indicated.

3. Edge Detail: Tongue and groove.

4. Surface Finish: Fully sanded face where required by finish floor material.

2.10 PLYWOOD BACKING PANELS

Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.11 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

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. Anchor bolts ASTM F 1554, Grade 36.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

H. Adhesive Anchor: As indicated.

I. Threaded Rod: ASTM A36.

2.12 METAL FRAMING ANCHORS

A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:

1. Research/Evaluation Reports: Provide products acceptable to Contracting Officer having jurisdiction and for which model code research/evaluation reports exist that show 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, which meet or exceed those of manufacturer 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/A 653M, G60 coating designation.

C. Joist Hangers: As indicated.

D. I-Joist Hangers: U-shaped joist hangers as required by joist engineer but not less than with 2-inch- long seat and 1-1/4-inch- wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.

E. Top Flange Hangers: U-shaped joist hangers as indicated, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

F. Bridging: Rigid, V-section, nailless type, 0.062 inch thick, length to suit joist size and spacing.

G. Post Bases: As indicated.

H. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports as indicated.

I. Rafter Tie-Downs (Hurricane or Seismic Ties): As indicated, bent strap tie for fastening rafters or roof trusses to wall studs below.

J. Floor-to-Floor Ties: As indicated, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

K. Hold-Downs: As indicated brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods.

2.13 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. 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.

C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking and similar supports to comply with requirements for attaching other construction. Provide blocking for all wall-mounted construction, including but not limited to cabinetry and bathroom accessories, and for future grab bar installation in adaptable units, 4SO units, and 4SO-Max units as indicated in the drawings. Do not cover work until inspected by and approved by the Contracting Officer.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.

2. Published requirements of metal framing anchor manufacturer.

3. "Nailing Schedule," as indicated on the drawing and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in the Uniform Building Code.

E. Use common wire nails, unless otherwise indicated. 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; pre-drill as required.

F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved, including future work in adaptable units, 4SO units, and 4SO-Max units as identified in the drawings. All accessories, shelving, casework, finishes, hardware and similar items must be secured to 2-by-4-inch nominal- size blocking or larger as appropriate. The use of gypsum wall board anchors, mollies, expansion anchors, and similar fasteners are expressly forbidden for securing accessories, shelving, casework, finishes and hardware.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Where possible, secure anchor bolts to form work before concrete placement.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work. Fire block furred spaces of walls, at each floor level and at ceiling, with wood blocking or noncombustible materials accurately fitted to close furred spaces.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

D. Furring to Receive Plaster Lath: Install 1-by-2-inch nominal- size furring vertically at 400-mm o.c.

3.4 WOOD FRAMING INSTALLATION, GENERAL

A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Do not splice structural members between supports.

D. Where built-up beams or girders of 2-inch nominal- dimension lumber on edge are required, fasten together as indicated.

3.5 WALL AND PARTITION FRAMING INSTALLATION

A. General: Arrange studs so wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Anchor or nail plates to supporting construction, unless otherwise indicated.

1. For exterior walls, provide 2 x 6 studs at 16 inches o.c. unless otherwise indicated.

2. For interior partitions and walls, provide 2-by-4-inch nominal- size wood studs spaced 16 inches o.c., unless otherwise indicated.

B. Construct exterior corners with 4 or more studs and intersections with three or more studs. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim. Provide continuous horizontal blocking at mid-height of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

C. Fire block concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where fire blocking is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal- thick lumber of same width as framing members.

D. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.

2. For load-bearing walls, provide jamb studs and full height studs as indicated. Provide headers of depth indicated.

E. Provide shear walls, at locations indicated, full-story height, unless otherwise indicated.

3.6 FLOOR JOIST FRAMING INSTALLATION

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal. Attach floor joists as follows:

1. Where supported on wood members, by toe nailing or by using metal framing anchors.

2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.

C. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.

D. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band. For I-joists, follow manufacturer recommendations.

E. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.

F. Provide solid blocking between joists under jamb studs for openings.

G. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

H. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.

1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed and nailed at both ends to joists.

2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3. Bridging may be omitted where joist depth is 12-inch nominal size or less and where indicated live load is 40 lbf/sq. ft. or less.

4. For I-joists follow manufacturer recommendations.

3.7 CEILING JOIST AND RAFTER FRAMING INSTALLATION

A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

2. At bathroom and powder room ceilings, provide joist framing at 12” o.c. maximum to receive water-resistant gypsum board.

B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors as indicated or required. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.

C. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.8 TIMBER FRAMING INSTALLATION

A. Install wood posts using metal anchors indicated.

B. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.9 STRUCTURAL GLUED LAMINATED MEMBERS

Brace members before erection. Align members and complete all connections before removal of bracing. Unwrap individually wrapped members only after adequate protection by a roof or other cover has been provided. Treat scratches and abrasions of factory applied sealer with two brush coats of the same sealer used at the factory.

3.10 STAIR FRAMING INSTALLATION

A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:

1. Stringer Size: As indicated.

2. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.

3. Stringer Spacing: At least 3 stringers for each 36-inch clear width of stair.

B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.11 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated. Comply with "Code Plus" provisions in above-referenced guide.

B. Fastening Methods: Fasten panels as indicated below:

1. Combination Subfloor-Underlayment:

a. Glue and screw to wood framing.

b. Space panels 1/8 inch apart at edges and ends.

2. Sheathing:

a. Nail to wood framing as indicated.

b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

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SECTION 06176

METAL-PLATE-CONNECTED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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 wood roof, floor and girder trusses and truss accessories.

B. Related Sections include the following: -Division 6 Section "Rough Carpentry" for roof sheathing and sub-flooring and dimension lumber for supplementary framing and permanent bracing.

1.3 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NLGA - National Lumber Grades Authority
2. SPIB - Southern Pine Inspection Bureau
3. WCLIB - West Coast Lumber Inspection Bureau
4. WWPA - Western Wood Products Association

1.4 PERFORMANCE REQUIREMENTS

Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated
2. Maximum Deflection Under Design Loads

    a. Roof Trusses: Vertical deflection of 1/240 of span
    b. Roof Trusses: Horizontal deflection at reactions of 1-1/4 inches
    c. Floor Trusses: Vertical live load deflection of 1/360 of span

3. Minimum Depth

    a. Roof Trusses: Span/24
    b. Floor Trusses: Span/20

1.5 SUBMITTALS

A. Product Data: For metal-plate connectors, metal framing anchors, bolts and fasteners.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Shop Drawings: Show location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes and stress grades of lumber; splice details; type, size, material, finish, design values, orientation and location of metal connector plates; and bearing details. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.

D. Qualification Data: For metal-plate manufacturer, fabricator and Installer.

E. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design value approved by the American Lumber Standards Committee Board of Review.

F. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood
2. Metal-plate connectors
3. Metal framing anchors

1.6 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in TPI 1.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that involves inspection by SPIB, Timber Products Inspection, TPI, or other independent testing and inspecting agency acceptable to Contracting Officer.

C. Source Limitations for Connector Plates: Obtain metal connector plates through one source from a single manufacturer.

D. Comply with applicable requirements and recommendations of the following publications:

1. TP1 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses"
3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses"

E. Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with TPI recommendations to avoid damage and lateral bending. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 COORDINATION

Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

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. Metal Connector Plates

a. Mitek Industries, Inc.
b. Alpine Engineered Products, Inc.
c. Robbins Engineering, Inc.

2. Metal Framing Anchors

a. Simpson Strong-Tie Company, Inc.
b. KC Metals Products, Inc.
c. Silver Metal Products, Inc.
d. United Steel Products Company, Inc.

2.2 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory-mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified.
3. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specifications for Wood Construction" and its "Supplement" and within the deflection limits in paragraph 1.4A.

2.3 METAL CONNECTOR PLATES

A. General: Fabricate connector plates to comply with TPI 1 from metal complying with requirements indicated below:

B. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M, G60 coating designation, Designation SS, Grade 33, and not less than 0.036 inch thick.

C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, 80Z coating designation, ASTM A 570/A 570M, Structural Steel (SS), Grade 33, and not less than 0.047 inch thick.

D. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coating designation; Structural Steel (SS), Grade 33, and not less than 0.036 inch thick.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

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

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.5 METAL FRAMING ANCHORS

A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:

1. Research/Evaluation Reports: Provide products acceptable to Contracting Officer and for which model code research/evaluation reports exist that show 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, which meet or exceed those of the Simpson Strong-Tie Product 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/A 653M, G60 coating designation.

C. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, as indicated but not less than 1-1/2-inches wide by 0.050-inch thick.

D. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4-inches wide by 0.050-inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

E. Floor Truss Hangers: U-shaped hangers, full depth of floor truss, with 1-3/4-inch- long seat; formed from metal strap 0.062 inch thick with tabs bent to extend over and be fastened to supporting member.

2.6 MISCELLANEOUS MATERIALS

Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

2.7 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. Before installing, splice trusses delivered to Project site in more than one piece.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square and true to line and securely fasten to supporting construction.

F. Space trusses as indicated, adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams. Install and fasten strong back bracing vertically against vertical web of parallel-chord floor trusses at centers indicated by truss manufacturer.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not cut or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements. Do not alter trusses in field.

3.2 REPAIRS AND PROTECTION

Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturers' written instructions.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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 standing and running trim to be covered by metal
2. Interior standing and running trim for field-painted finish
3. Stair railings
4. Shelving and clothes rods
5. Drop box
6. Flag pole holder
7. Wall water valve access door
8. Composite wood lumber

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for structural wood decking and framing exposed to view.
2. Division 7 Section "Siding" for steel siding and trim.
3. Division 7 Section “Sheet Metal Flashing and Trim” for trim work.
4. Division 9 Section "Painting" for priming and back priming of finish carpentry.

1.3 DEFINITIONS

Inspection agencies, and the abbreviations used to reference them, include the following:

A. NLGA - National Lumber Grades Authority.

B. SCMA - Southern Cypress Manufacturers Association.

C. WCLIB - West Coast Lumber Inspection Bureau.

D. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Include construction details, material descriptions, and dimensions of individual components and profiles, textures and colors.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type

of preservative used, net amount of preservative retained and chemical treatment manufacturer's written instructions for handling, storing, installing and finishing treated material.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Provide data and shop drawings for composite lumber steps.

B. Samples for Verification:

1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50-sq. in. for lumber and 8 by 10 inches for panels.
2. For each finish system and color of lumber and panel products with factory-applied finish, 50-sq. in. for lumber, 8 by 10 inches for panels and 12 by 12 inches for shelving.

1.5 QUALITY ASSURANCE

Installer Qualifications: A qualified installer

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect materials against 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.

B. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by the American Lumber Standards' Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
2. For exposed lumber, mark grade stamp on end or back of each piece.

B. Medium-Density Fiberboard: ANSI A208.2, Grade MD

C. Particleboard: ANSI A208.1, Grade M-2

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

Preservative Treatment by Pressure Process: AWPA C2 (lumber), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

A. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:

1. Chromated copper arsenate (CCA)
2. Ammoniacal copper quat (ACQ)
3. Copper bis (dimethyldithiocarbamate) (CDDC)
4. Ammoniacal copper citrate (CC)
5. Copper azole, Type A (CBA-A)
6. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent

B. Do not use chemical formulations that require incising.

C. Kiln-dry material after treatment to levels required for untreated material. Do not use material that is warped or does not comply with requirements for untreated material.

D. Mark each treated item with the Quality Mark Requirements of an inspection agency approved by the American Lumber Standards' Committee Board of Review.

E. Application: As indicated on drawings.

2.3 EXTERIOR STANDING AND RUNNING TRIM

Lumber Trim for Exterior Metal Wrap Applications: Kiln-dried lumber with surfaced (smooth) face and of the following species and grade: Grade 2 Common, pressure-preservative-treated hem-fir, NLGA, WCLIB or WWPA.

2.4 INTERIOR STANDING AND RUNNING TRIM

Moldings: Wood moldings made from kiln-dried stock and graded under WMMPA WM 4 or medium density fiberboard.

1. Moldings for Opaque Finish (Painted): P-grade
2. Base Pattern: As indicated on drawings
3. Shoe-Mold Pattern: As indicated on drawings
4. Casing Pattern: As indicated on drawings

2.5 STAIRS AND RAILINGS

A. Interior Railings: Clear, kiln-dried hard maple, yellow poplar or approved equivalent, of pattern indicated, either solid or laminated.

B. Stairs at Rear Patio, Garage and Exterior Bulk Storage

Provide treads and risers made from 1-1/4” composite wood lumber manufactured by Trex Company Inc. or approved equal.

2.6 SHELVING AND CLOTHES RODS

A. Shelving: 3/4-inch particleboard shelving for fixed or adjustable use in widths indicated on the Drawings. Both sides of shelving and exposed edges to be surfaced with white, thermally fused melamine. Semi-exposed cut edges to be filled and painted to match.

1. Shelf Cleats: 3/4-by-3-1/2-inch boards of same material and finish as shelving.
2. Fixed Intermediate Shelf Brackets: Prime-painted formed steel, with provision to support clothes rod where rod is indicated.
3. Adjustable Shelf Brackets and Standards: Factory-finished formed metal slotted standards and brackets, of length and size required to support pantry and bulk storage shelving as indicated on the Drawings. Standards and brackets to be heavy-duty with lock-in tab design.
4. Hardware and Fasteners: Manufacturer’s standard hardware and fasteners which conform to the provision that the use of gypsum wall board anchors, mollies, expansion anchors, and similar fasteners are expressly forbidden for securing accessories, shelving, casework, finishes and hardware.

B. Clothes Rods: 1-3/8-inch-diameter, clear, kiln-dried hardwood rods. Rod Flanges: Clear, kiln-dried wood turnings.

2.7 DROP BOX

Individual drop box: Manufactured vertical, wall-mounted type of galvanized steel with durable powder coated finish. Nominally 11-inches wide by 14-1/2 inches high by 3-1/2 inches deep. Provide with magazine rack at bottom. Mount with manufacturer’s standard hardware. Location, mounting height and color as indicated on the drawings.

2.8 FLAG POLE HOLDER

Pole holder: White porcelain wall-mounted bracket of size to accommodate a 1-inch pole. Mount with manufacturer’s standard hardware and secure through full depth of wall sheathing. Location and mounting height as indicated on the drawings.

2.9 WALL WATER VALVE ACCESS DOOR

Access Door: Surface-mounted metal access door for installation at gypsum wall board. Door and frame to be of 14 ga. minimum steel; frame to have perforated mounting flanges; door to be 14 by 14 inch with piano hinge and flush, screwdriver-operated latch. Finish to be factory-applied baked enamel coat over rust-inhibiting phosphate treated steel.

2.10 COMPOSITE WOOD LUMBER

A. Material Description: Solid composite material consists of approximately 50% wood fibers by weight with the remainder of the material being a thermoplastic polymer plastic material.

B. Size: As indicated

C. Color: Selected from manufacturer's standard color selection by Contracting Officer's Representative.

D. Flash Point (ASTM D1929): > 698 degrees F (370 degrees C)

E. Flammability (ASTM E84): Flamespread index 80, smoke developed index 285

F. Auto Flammability: > 743 degrees F (395 degrees C)

G. Solubility in Water: Negligible

H. Toxicity (EPA Test TCLP1113): Passes

I. Abrasion Resistance (ASTM D2394): 0.01 inch (0.25 mm) wear/1000 revs

J. Hardness (ASTM D143): 1124 lb (510 kg)

K. Self-Ignition Temperature (ASTM D1929): 743 degrees F (395 degrees C)

L. Flash Ignition Temperature (ASTM D1929): 698 degrees F (370 degrees C)

M. Flame Spread (ASTM E84): 80

N. Water Absorption (sanded surface) (ASTM D1037, 24-hour immersion): 4.3%

O. Water Absorption (unsanded surface)(ASTM D1037, 24-hour immersion): 1.7%

P. Expansion/Contraction Properties: Thermal Typical Trex Wood Polymer lumber values for Coefficient of Thermal Expansion/Contraction (36-inches (914 mm) long samples) Width: 35.2 × 10-6 to 42.7 × 10-6, Length: 16.1 × 10-6 to 19.2 × 10-6

Q. Expansion/Contraction Properties: Moisture typical Trex Wood Polymer lumber values for Long Term Water Immersion (36-inches (914 mm) long samples): Width -3%. Constant High Humidity (6-inches (152 mm) long samples): Width -1%

R. Nail Withdrawal, 8d common wire nail (ASTM D1761): 163 lb/in (198 N/m)

S. Screw Withdrawal, No. 10 wood screw (ASTM D1761): 558 lb/in (679 N/m)

T. Static Coefficient of Friction - Dry (ASTM D2047): 0.53/0.55

U. Static Coefficient of Friction - Dry (ASTM D1679): 0.59/0.70

V. Static Coefficient of Friction - Wet (ASTM D1679): 0.70/0.75

W. Fungus Resistance (White/Brown Rot) (ASTM D1413): Rating = No decay

X. Termite Resistance (AWPAE1-72): Rating = 9.6

Y. Specific Gravity (typical) (ASTM D2395): 0.91 - 0.95

Z. Thermal Conductivity (ASTM C177): 1.57 Btu-in/hr-ft @ 85 degrees F

2.11 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws of the following materials, in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer:

1. Stainless steel
2. Hot-dip galvanized steel
3. Aluminum
4. Prefinished aluminum in color to match stain, where face fastening of material to receive stain is unavoidable.

B. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible. Where finish carpentry materials are exposed in areas of high humidity, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.

C. Glue: Aliphatic or phenolic resin wood glue recommended by manufacturer for general carpentry use.

D. Flashing: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim" for flashing materials installed in finish carpentry.

E. Neoprene Rubber Sheets: Neoprene rubber sheets of commercial grade, hardness, Shore A Durometer is 50, tensile strength is 1000 psi, 1/8-inch minimum thickness, color is black, install at flexible joint in garage between coat closet wall and garage slab.

F. Seam Bindings: Seam binding clear aluminum trim, ¾-inch wide screw-down style, Pemko – 276, install at flexible joint in garage between coat closet wall and garage slab.

2.12 FABRICATION

A. Wood Moisture Content: Comply with requirements of specified inspection agencies and with manufacturer's written recommendations for moisture content of finish carpentry at relative humidity conditions existing during time of fabrication and in installation areas.

B. Back out or kerf backs of the following members, except members with ends exposed in finished work:

1. Exterior standing and running trim wider than 5 inches
2. Interior standing and running trim, except shoe and crown molds

C. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours, unless longer conditioning is recommended by manufacturer.

C. Prime lumber for exterior applications to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 9 Section "Painting".

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

A. Match color and grain pattern across joints.

B. Install trim after gypsum board joint finishing operations are completed.

C. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

D. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.5 STAIR AND RAILING INSTALLATION

A. Treads and Risers at Interior Stairs: Secure treads and risers by gluing and nailing to rough carriages

B. Interior Railings: Secure wall rails with metal brackets. Assemble railings at goosenecks, easements, and splices with rail bolts and glue.

3.6 SHELVING AND CLOTHES RODS

Install supports so as to set shelving and rods level and true. Locate all fixed brackets and adjustable bracket standards over studs. Coordinate location of blocking for clothes rod flanges. Mount all brackets, standards and rod flanges per manufacturer's recommendations. Install all shelving complete and ready for use.

3.7 DROP BOX

Provide metal covered wood mounting pads and/or blocking, as required to securely mount each item, prior to installation of steel siding. Coordinate with siding installer.

3.8 WATER VALVE ACCESS DOOR

Install door per manufacturer's written instructions. Paint to match adjacent gypsum board.

3.9 COMPOSITE WOOD LUMBER

A. Install per composite wood lumber manufacturer's written instructions.

B. Treads and Risers: Secure treads and risers by fastening to rough carriages. Extend treads over carriages and finish with bullnose edge.

3.10 ADJUSTING

Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.11 CLEANING

Clean finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07115

BITUMINOUS DAMPPROOFING

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 cold-applied, emulsified-asphalt dampproofing applied to the following surfaces:

1. Exterior, below-grade surfaces of concrete grade beams..
2. Back side of concrete retaining walls, below grade.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 BITUMINOUS DAMPPROOFING

A. Odor Elimination: For interior and concealed-in-wall uses, provide dampproofing material warranted by manufacturer to be substantially odor free after drying for 24 hours under normal conditions.

B. Cold-Applied, Emulsified-Asphalt Dampproofing:

1. Trowel Coats: ASTM D 1227, Type II, Class 1.

2. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
3. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.2 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

C. Protection Course, Asphalt-Board Type: Premolded, 1/8-inch- thick, multi-ply, semi-rigid board consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on 1 side with polyethylene film.

D. Protection Course, Polystyrene Type: Fan-folded, rigid, extruded-polystyrene board insulation; nominal thickness not less than 3/16 inch .

E. Protection Course, Roll-Roofing Type: Smooth-surfaced roll roofing complying with ASTM D 224, Type II.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.

B. Apply dampproofing to grade beams from finished-grade line to bottom of grade beam.

1. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.

2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat required for embedding fabric is in addition to other coats required.

C. Apply dampproofing to provide continuous plane of protection on interior face of above grade, exterior concrete walls unless walls are indicated to receive direct application of paint.

D. Contractor's Options: Provide cold-applied, emulsified- asphalt dampproofing, as specified in subsequent articles for substrates indicated, within the following limitations:

1. Use cold-applied, emulsified-asphalt dampproofing on any surface indicated to receive dampproofing.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete Grade Beams: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft. , or one trowel coat at not less than 4 gal./100 sq. ft.

B. On Backs of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft.

C. On Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft.

3.5 INSTALLATION OF PROTECTION COURSE

A. Install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course. Support protection course with spot application of trowel-grade mastic where not otherwise indicated.

3.6 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION

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SECTION 07190

WATER REPELLENTS

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 penetrating water-repellent coatings for the following vertical and horizontal surfaces:

1. Concrete unit masonry (unpainted and unglazed).

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for curing compounds, curing and sealing compounds, and penetrating liquid floor treatments.
2. Division 4 Section "Unit Masonry Assemblies" for integral water-repellent admixture for unit masonry assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Absorption: Minimum 80 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens.

1. Concrete Unit Masonry: ASTM C 140.
2. Hardened Concrete: ASTM C 642.

B. Water-Vapor Transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, per ASTM E 96.

C. Permeability: Minimum 80 percent water-vapor transmission in comparison of treated and untreated specimens, per ASTM D 1653.

D. Water Penetration and Leakage through Masonry: Maximum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, per ASTM E 514.

E. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, per ASTM G 154.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include manufacturer's printed statement of VOC content.
2. Include manufacturer's standard colors.

B. Samples: For each type of water repellent and substrate indicated, 12 by 12 inches in size, with specified water-repellent treatment applied to half of each Sample.

C. Manufacturer Certificates: Signed by manufacturers certifying that water repellents comply with requirements.

D. Qualification Data: For Installer.

E. Preconstruction Testing Reports: For water-repellent-treated substrates.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for assemblies.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.6 PROJECT CONDITIONS

A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:

1. Ambient temperature is above 40 deg F.
2. Concrete surfaces and mortar have cured for more than 28 days.
3. Concrete or brick masonry walls are not treated prior to 30 days after building close-in.
4. Rain or snow is not predicted within 24 hours.
5. Application proceeds more than seven days after surfaces have been wet.
6. Substrate is not frozen, or surface temperature is above 40 deg F.
7. Windy conditions do not exist that may cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified in Part 1 "Performance Requirements" Article within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

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 other Part 2 articles.

2.2 PENETRATING WATER REPELLENTS

A. Siloxane, Penetrating Water Repellent: Clear, oligomerous alkylalkoxysiloxanes containing 10 percent or more solids; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 3.3 lb/gal. or less of VOCs.

1. Available Products:

a. Chemical Products Industries, Inc.; CP-500W.
b. ChemMasters; Spall Guard WB, or Spall Guard WB 10%.
c. Chemprobe Coating Systems, L. P.; Prime A Pell H_2O.
d. Diedrich Technologies, Inc.; 303-S.
e. Euclid Chemical Company (The); Weatherguard.
f. Hydrozo, a division of ChemRex; Enviroseal 40.
g. ProSoCo, Inc.; Siloxane PD, or Siloxane WB Concentrate.
h. SaverSystems, Div. of Meredith, Inc.; Masonry Saver WB.
i. Specco Industries, Inc.; W-5, or W-5-14.
j. Wacker Chemical Corp.; 29A, 290, 1001A, 2001, SMK 1311.
k. Approved equivalent

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 water-repellent manufacturer's written instructions, to ensure that surface is dry enough.

1. Cast-in-Place Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.

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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. 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.

1. Precast Concrete: At Contractor's option, first application of water repellent on precast concrete units may be completed before installing units. Mask sealant-bond surfaces to prevent water repellent from migrating onto joint surfaces.

C. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.3 CLEANING

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION

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. Infiltration testing
2. Concealed building insulation.
3. Exposed building insulation.
4. Loose-fill building insulation.
5. Weather-resistive barrier.
6. Vapor retarders.

1.3 SUBMITTALS

A. Product Data:
1. For each type of product indicated.
2. HERS (Home Energy Rating System) inspector qualifications

B. Product Test Reports:
1. Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.
2. Air infiltration testing (blower door test) results

1.4 QUALITY ASSURANCE

A. Source Limitations: 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, 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.

C. The Contractor shall provide certification that all homes constructed meet the requirements for tight construction (reduced air infiltration), as defined by the US EPA Energy Star Home Program. The Contracting Officer’s Representative shall initially select six homes for testing.

The contractor shall perform post-construction infiltration inspection on each of the six selected homes until they pass. Additional tests may be performed on remaining homes, at the discretion of the Government. Contractor provided independent HERS (Home Energy Rating System) inspector should select the first home for blower door testing. A successful test meets the criteria of "Tight", as defined by paragraph 1.4.C.2 of this specification. If the first test home fails, the Contractor shall make necessary repairs and will perform subsequent test(s) at no additional cost to the Government until the first home passes. The remaining five homes in the group shall also be tested, with the same criteria as the first home. The contractor is responsible for all repairs and tests necessary to allow each of these six homes to pass inspection. If the Government chooses to perform tests on any home outside of the chosen six, which have proven to fail, the contractor will make necessary repairs and provide passing test results for verification.

1. Air infiltration testing (blower door test) shall be performed in accordance with ASTM E779-03, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.

2. The chart below provides a reasonable estimate of relative leakiness for a representative housing unit.

Air flow at 50 pascals is the preferred value for blower door testing. The amount of airflow measured in cubic feet per minute (cfm) for a pressure difference across the enclosure of 50 Pa is expressed as CFM/50. This value is derived by increasing the fan speed until the pressure difference between the inside and the outside of the house is at the desired level, namely 50 Pa.

The term Estimated Natural Infiltration Rate (ENIR) is used in an attempt to reduce a blower-door derived value such as ACH/50 or CFM/50 to an estimate of the natural infiltration rate, i.e., the rate under typical operating conditions and thus normal air pressure differences, e.g., ACH/Natural = ACH50 / ENIR adjustment factor

Unit	**Tight**	**Moderate**	**Leaky**
CFM at 50 Pa	Less than 1,500 CFM/50	Between 1,500 and 4,000 CFM/50	Above 4,000CFM/50
ACH at 50 Pa	Less than 5 ACH/50	Between 5 and 10 ACH/50	Above 10 ACH/50
ENIR	Less than 0.35 ACH	Between 0.35 and 1 ACH	Above 1 ACH

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.

PART 2 - PRODUCTS

2.1 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.

B. Unfaced Mineral-Fiber Blanket Insulation for thermal or acoustical requirements: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

C. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass.

1. Type as recommended by insulation manufacturer for application to walls of a conditioned crawl space.

D. Acoustical Insulation:

1. Mineral Fiber Boards: ASTM C553, Type II, flexible, or Type III, semi-rigid (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.

G. Self-Supported, Spray-Applied, Cellulosic Insulation: ASTM C 1149 for type indicated below, chemically treated for flame-resistance, processing, and handling characteristics.

1. Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications).

2.2 WEATHER-RESISTIVE BARRIER

A. Polymer-Based Building Wrap: ASTM E 1677, Type I air retarder; with flame spread and smoke developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; and UV stabilized.

1. Thickness: Not less than 3 mils.
2. Permeance: Not less than 10 perms.

3. Flame-Spread Index: 25 or less per ASTM E 84.
4. Allowable Exposure Time: Not more than three months.

B. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints and penetrations in building wrap.

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarder:

1. ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm, for use at walls ceilings, and slabs on grade, and as indicated on the drawings.
2. 20 mils thick, with maximum permeance rating of 0.076 perm, for use at crawlspace.

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.

B. Insulation Baffle: Preformed, polystyrene ventilation baffle designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.
1. Raft-R-Mate Attic Rafter Vents, manufactured by Owens Corning, or approved equal

2.5 INSULATION FASTENERS

A. General: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following methods to ensure insulation does not shift from installed location.

B. 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 inch in diameter, length to suit depth of insulation indicated.

C. 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. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

a. Crawlspaces.
b. Attic spaces.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

E. Sheathing or other barrier layer (for example: wire fastened to studs in a zig-zag configuration, vapor retarder with holes) which allows roof ventilation air to freely circulate per IRC requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after 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 of interfering with insulation attachment.

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, and unsoiled and that has not been left 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. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls or in crawl spaces or in floor or attic spaces, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. 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 (non-breathing) 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. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill the cavities formed by framing members. If 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.

D. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:

1. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce airtight installation after concealing finish material is in place.

E. Install faced mineral-fiber blanket Insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. After adhesive has dried, install insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
3. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

F. 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.

1. For cellulosic loose-fill insulation, comply with the Cellulose Insulation Manufacturers Association's Special Report #3, "Standard Practice for Installing Cellulose Insulation."

3.5 INSTALLATION OF WEATHER-RESISTIVE BARRIER

A. Cover wall sheathing with weather-resistive barrier as indicated.

1. Comply with manufacturer's written instructions.
2. Cover upstanding flashing with 4-inch overlap.
3. Seal seams, edges, and penetrations with tape.

B. Extend into jambs of openings and seal corners with tape.

3.6 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 two 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. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly and securely attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.

E. 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.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work, including vapor retarder installed in the crawlspace. Cover with vapor-retarder tape or another layer of vapor retarder.

3.7 PROTECTION

A. Protect installed insulation, weather-resistive barrier, vapor retarders and moisture barrier 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

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SECTION 07310

ASPHALT SHINGLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Asphalt shingles
2. Felt underlayment
3. Self-adhering ice and water shield sheet underlayment

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry” for roof deck wood structural panels.
2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings and counter flashings not part of this Section.

1.03 DESCRIPTION

Work included: Provide shingle roofing including accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.04 SUBMITTALS

A. Product data: For each type of product indicated. Submit technical product data, installation instructions and recommendations from shingle, roofing felt and metals manufacturers, including certification data and statement that materials comply with requirements.

B. Samples for Verification: For the following products, of sizes indicated, to verify color selected

1. Asphalt Shingle: Full-size asphalt shingle strip
2. Ridge and Hip Cap Shingles: Full-size ridge and hip cap asphalt shingle
3. Self-Adhering Ice and Water Shield Sheet Underlayment: 12 inches square

C. Warranty: The contractor shall furnish a separate shingle manufacturer and contractor's warranty for the type of shingles specified. The manufacturer's warranty shall be full 5-year labor and material warranty for manufacturing defects and 25 year limited warranty. In addition to the manufacturer's warranty, the contractor shall cover a period of two years from date of shingle acceptance by the Contracting Officer. Repair and

replacement of defective work shall be done without cost to the Government. The contractor's warranty shall provide that:

1. If within that period the asphalt T-Lock shingles tear or blow off the roof in whole or in part because of winds of any velocity less than 75 miles per hour, replacement of shingles, including both labor and materials, shall be the responsibility of the Contractor.
2. All Tabbed shingles on general roof area, and around roof and vent flashings and eave and rake edges found to be free of adhesion during the 2-year warranty period shall be hand sealed at the responsibility of the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Shingles: Shall be “Custom Lok 25" mineral surfaced lock tab asphalt (organic felt) shingle roofing, as manufactured by CertainTeed Corporation or equal approved by the Contracting Officer. Shingles shall weigh no less than 250 pounds per square and shall bear a Class "C" fire-rating label. Ridge shingles shall be job-fabricated from same shingles.

B. Felts (organic)

1. Shingle underlayment to be Type II, No. 30 asphalt saturated organic felt for roofing meeting ASTM D226
2. Membrane waterproofing to be Type II, No. 30 asphalt saturated roofing felt meeting ASTM D224
3. Self-Adhering Ice and Water Shield Sheet Underlayment: Similar and equal to “Weather Watch” as manufactured by GAF Corp. or “WinterGuard” as manufactured by CertainTeed Corporation or approved equal

C. Cements and Sealant

1. Asphalt plastic cement shall be fibrated asphalt complying with ASTM D2822 or 4586 for trowel application.
2. Sealant shall be single component base sealing compound, Aluminum color meeting Fed Spec TT-S-230C (Feb 70, Type: Urethane).

D. Sheet Metal

1. Pre-finished galvanized steel sheet for Style "D" roof edge metal, hot-dipped zinc-coated minimum 29 gauge sheet metal, commercial quality with baked-on enamel factory finish
2. Galvanized sheet steel for valley metal: hot-dipped zinc-coated minimum 28 gauge sheet metal, commercial quality with baked-on enamel factory finish, color as approved by Contracting Officer
3. Solder, Flux, sealants and accessories: As necessary and compatible to the material being installed

E. Fasteners: Nails for shingles shall be hot-dipped galvanized steel with sharp points and flat heads 3/8" to 7/16" in diameter. Steel nails shall have annular threads; nail shanks shall be at least 0.120 inch and not more than 0.135 inch in outside diameter. Nails for fastening asphalt saturated felt shall conform to Fed Spec FF-N-105 (Aug 77, Type II, Style 20). Length as recommended by shingle manufacturer. Staples will not be permitted for fastening of roofing materials. Fasteners for sheet metal work shall be galvanized or cadmium-plated steel.

2.02 OTHER MATERIALS

Provide all other materials necessary for a complete and proper installation as approved by the Contracting Officer.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify that the wood decks are dry, properly sloped for drainage, and completely secured.

3.02 UNDERLAYMENT AND SHINGLE INSTALLATION

A. Install systems per the manufacturer's written instructions as approved by the Contracting Officer.

B. Secure roofing shingles in accordance with manufacturer’s recommendations for high wind areas. In addition, seal each shingle on entire roof, including rakes, eaves and ridge caps, using two 1-inch diameter spots of roofing cement near edge of each shingle. Cement shall be placed so it will squeeze to edge of shingle when pressed down.

C. Metal Roof Flashings: Provide approved flashings around sewer vents and other miscellaneous roof penetrations. Set flashing flanges into full bed of plastic cement. Install pre-finished Style "D" roof edge metal flashings on all rake and eave edges. Set flashing in full bed of plastic cement. Apply a full bed of plastic cement between all shingle layers and to deck around all roof flashings and at roof to wall terminations. Provide a continuous bead of approved sealant around the top of all vent and appliance flashings. Seal the junction of metal sleeves and the flanges to shingles with an application of approved sealant.

D. Roof Edge Seal: Provide an approved manufactured self-adhering ice and water shield sheet underlayment roof edge seal similar and equal to "Weather Watch" ice and water barrier as manufactured by GAF Corp or “WinterGuard” as manufactured by CertainTeed Corporation or approved equal. Fasten strip in place with one row of nails 1-1/2 inches above lower edge and spaced 6 to 8 inches on centers. Apply the starter shingles laid with cutouts reversed and flush with metal drip edge. Lay first course of shingles directly on top of starter strip, flush and even with metal drip edge. Align strip properly, centering cutouts on starter strip tabs. Nail each shingle from the end adjoining previously applied shingle.

Provide 2-inch head lap. Secure roofing shingles in accordance with manufacturer's recommendations for high wind area application and as specified herein. In addition, provide plastic cement tabbing of each cut shingle on entire roof including ridge caps using two 1-inch diameter spots of cement near edge of shingle. Cement shall be placed so it will squeeze to edge of shingle when pressed down.

E. Rake, Valley, Sidewall Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below and on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

1. Rakes: Extend from edges of rake 24 inches beyond interior face of exterior wall.
2. Metal-Flashed Open Valleys: Install 36-inch wide self-adhering sheet underlayment directly to deck and centered in valley. Stagger end-laps between layers at least 72 inches. Extend from lowest to highest point 18 inches on each side. Lap ends of strips at least 12 inches in direction to shed water, and seal with asphalt roofing cement. Fasten to roof deck with roofing nails.
3. Sidewalls: Extend beyond side wall 18 inches and return vertically against side wall not less than 6 inches.

F. Hips and Ridges: Form ridges with shingles cut from strip shingles by same manufacturer and matching material and color of field shingles. Bend shingles lengthwise down the center with equal exposure on each side of ridge. Lap shingles to provide not more than 5-inch exposure from butt, and nail in unexposed area 5-1/2 inches from butt and 1 inch vertically from edge. In cold weather, warm the shingle before bending. Provide cement tabbing under each side of all ridge shingles per D. above.

G. Shingles Abutting Vertical Walls: Shingles shall be fitted to vertical walls. All shingle layers adjacent to vertical walls shall be embedded into a full bed of asphalt plastic cement 4 inches wide by full length of wall. Apply a minimum ½-inch thick continuous bead of polyurethane sealant between the ends of the shingles and the vertical wall.

H. Rake Edge of Building: Apply full 2-inch wide bed of plastic cement between all layers of shingles to deck.

I. Eave Edge of Buildings: Apply full 2-inch wide bed of plastic cement between all layers of shingles and to deck at all eave edges.

3.03 METAL INSTALLATION

A. Fabricate and install metal to details indicated or otherwise required by job site conditions, as approved. Conform to standards of the components and material manufacturers and Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual" Fifth Edition, 1993. Joints shall be filled with approved polyurethane sealant, as required, to form a weatherproof joint.

B. Workmanship and installation methods employed for forming, anchoring, cleating and provisions for thermal expansion and contraction on all sheet metal work shall conform to commercial practice specified in the SMACNA manual.

C. Proper Surfaces and Dissimilar Materials: Surfaces to which sheet metal is to be applied shall be even, smooth, sound, thoroughly clean and dry, and free from any defects that might affect the application. Where metal abuts or members tie into dissimilar materials, protect contact surfaces with a heavy coat of bituminous paint.

D. Open Sheet Metal Valley Flashing: Cut regular shingle courses on each roof on a true line two inches from valley centerline at top of valley, and increase width between lines by one inch for each eight feet. Apply full bed of bituminous cement over the sheet metal flashing, between shingles and metal along and under the side of all layers of shingles adjoining both sides of valley. Press shingles tightly into the plastic bituminous cement. Seal edges of shingles on both sides of valleys with a heavy bead of polyurethane sealant. Valley flashings, where sloping roofs intersect, shall be constructed using not less than 20 inch wide, 28 gauge galvanized metal sheets in full one-piece lengths. Form the sheets to fit valley with metal extending 10 inches up the slope on each side. Nail at approved laps and on both sides just sufficiently to hold metal in place. Remove all wrinkles in metal. Do not cut off shingles without protecting valley metal surfaces. The contractor, at no additional cost to the Government, shall replace scratched or scored metal.

E. Roof Edge Flashing: Provide prefinished (colored) galvanized style "D" metal drip edge on all roof edges (rakes and eaves). Provide longest lengths available, but in no case shall lengths less than 36 inches long be installed. Anchors metal to roof edge using specified roofing nails spaced 6 to 8 inches separate and one inch in from inner edge of metal flange. Fit metal drip edge tight to fascia. Notch drip edge of metal as required to fit over gutter hangers, as approved.

F. Metal Roof Penetration Flashing: Provide approved flashings around sewer vents, electrical masts and miscellaneous roof penetrations. Set flashing flanges in a full bed of plastic cement.

1. Set all layers of shingles around roof penetrations in a full four-inch wide bed of plastic cement.
2. Provide a continuous bead of polyurethane sealant around the top of all vent and appliance flashings as approved. Seal the junction of the metal sleeve and the flange to shingles with an application of sealant.

3.04 SEALANT APPLICATION

A. Application of polyurethane sealant shall be accomplished in strict accordance with the sealant manufacturer's published instructions.

The following Certificate of Guarantee must be signed at the completion of the project.

"Certificate of Guarantee"

We, (Name of Applicator Company), agree to maintain the roofing and flashing on the below mentioned building for the period indicated. This Agreement is to render the roof and flashing waterproof, subject to the conditions outlined below.

Owner of Building _____
Location _____
Location of Building _____(Street Address)_____
City _____ State_____
Number of square feet in roof _____

This Guarantee is effective this _____ day of _____, _____.
The manufacturer's warranty is five years labor and material for manufacturing defects and a 25-year limited warranty. It is understood and agreed that we will not be responsible for leaks in the roofing or flashing due to excessive winds, distortion of the foundation on which the roofing or flashing rests, excessive hail storms, or any other conditions over which we have no control.

Signed

_____(Name of Applicator Company)_____

By

_____(Signature and Title)_____

END OF SECTION

SECTION 07460

SIDING

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. Steel siding.
2. Aluminum soffit.
3. Siding accessories.
4. Steel gable vents.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for sheathing and air-infiltration barrier.
2. Division 7 Section “Building Insulation” for insulation over wall sheathing.
3. Division 7 Section "Sheet Metal Flashing and Trim" for flashing, gutters, metal trim and other sheet metal work.
4. Division 7 Section "Joint Sealants" for field-applied sealants.

1.3 SUBMITTALS

A. Product Data: For each type of product specified. Include identification of materials; dimensions of individual components; installation instructions; and available profiles, textures, and colors.

B. Samples for Verification: Full-size units of each type of siding and trim indicated; in sets for each color, texture, and pattern specified.

1. 12-inch- long-by-actual-width samples of siding.
2. 12-inch- long-by-actual-width samples of trim.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed siding installations similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Siding and Accessories: Obtain each color, texture, pattern, and type of siding and related accessories from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's unopened packages or bundles with labels intact.

B. Store materials in a dry, well-ventilated, weather tight place. Comply with manufacturer's written instructions for storage, handling, and protection.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with siding installation only if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions and if substrate is completely dry.

1.7 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 Project Warranty: Submit a written warranty, executed by siding manufacturer, agreeing to repair or replace siding that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 color-difference units as measured according to ASTM D 2244.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SIDING

A. Formed Steel Siding: Steel siding and accessories fabricated from 0.017-inch- thick, galvanized steel sheet complying with ASTM A 653, G90 , and as follows:

1. Horizontal Pattern: 8-inch exposure.
2. Horizontal Pattern: 10-inch exposure in double 5-inch style.
3. Finish: Manufacturer's standard primer and PVC finish over zinc-phosphate pretreatment; medium-grain wood texture finish.

2.2 SOFFIT

A. Aluminum Soffit: Aluminum soffit complying with AAMA 1402, fabricated from aluminum sheet in alloy recommended by siding manufacturer, and as follows:

1. Pattern: Double V-groove profile, 12-inch exposure, 12-foot lengths.
2. Ventilation: Perforated panels, center vented, 3.9 sq. in. net free open area per lineal foot.
3. Thickness: 0.016-inch nominal.
4. Finish: Manufacturer's standard smooth finish, low-luster polyester coating.

2.3 ACCESSORIES

A. Siding Accessories: Provide accessories fabricated from 0.017-inch- thick, galvanized steel sheet complying with ASTM A 653, G90. Provide starter strips, edge trim, window and door head flashing, window and door casings, metal fascia, corner cap, metal moldings and trim, and other items as recommended by manufacturer for building configuration; match type of siding.

B. Fasteners: Non-corrosive nails in sufficient length to penetrate a minimum of 1 inch into substrate. Provide prefinished fasteners in color to match siding or soffit where face nailing is unavoidable. Provide siding fasteners that are approved by siding manufacturer. Provide soffit fasteners that are approved by soffit manufacturer.

2.4 COLORS AND TEXTURES

A. Where manufacturer's standard products are indicated, provide siding and accessories complying with the following requirements:

1. Color as indicated on the Drawings. Texture to be manufacturer’s standard medium-grain wood texture.

2.5 GABLE VENTS

A. Gable Vents: Open louver type of die-formed, spot welded galvanized steel. Vents to have integral nailing flange and ¼-inch mesh metal insect screening.

B. Fasteners: Manufacturer’s standard.

C. Color, style and size: As indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of siding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

3.3 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply. Center nails in elongated nailing slots without binding siding to allow for thermal movement. Overlap joints to shed water away from direction of prevailing wind.

B. Corner Trim Protection: Provide wood blocking at the base of outside corner trim as recommended by the siding manufacturer to protect against vermin infiltration and to reinforce metal corner trim against accidental damage.

C. Install steel siding, aluminum soffit, and accessories according to AAMA 1402. Install steel fascia in strict accordance with manufacturer's installation instructions for high wind area applications.

D. Isolate dissimilar metals by separating from siding with rubber gaskets, elastomeric sealant, or rubber washers where fasteners penetrate siding. Dissimilar metals behind siding may be isolated by covering with polyethylene film.

E. Install exterior shutters and gable vents per siding manufacturer's recommendations.

3.4 ADJUSTING AND CLEANING

A. Remove and replace damaged, improperly installed, or otherwise defective siding materials with new materials complying with specified requirements.

B. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION

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 the following sheet metal flashing and trim:

1. Formed roof drainage system.
2. Formed wall flashing and trim.

B. Related Sections include the following:
1. Division 6 Section "Finish Carpentry” for exterior standing and running trim
2. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 7 Section "Asphalt Shingles" for installing sheet metal flashing and trim integral with roofing.
4. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants

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, rattling, leaking, and fastener disengagement.

B. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft.: 208-lbf/sq. ft. perimeter uplift force, 312-lbf/sq. ft. corner uplift force, and 104-lbf/sq. ft. outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats and attachments to adjoining work.
4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: Full-size Sample.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leak proof, secure, and non-corrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Aluminum Sheet: ASTM B 209 , Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:

1. Mill Finish: Standard one-side bright.
2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion

coating; Organic Coating: as specified below). Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermo-cured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 or 2605.

1) Color: As selected by Architect from manufacturer's full range.

B. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZM150 coating designation, Grade 275; structural quality.
3. Exposed Finishes: Apply the following coil coating:

a. Factory Prime Coating: Factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil.
b. Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

1) Color: White.

c. High-Performance Organic Finish: Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1) Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermo-cured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified below:

a) Humidity Resistance: 1000 hours.
b) Salt-Spray Resistance: 1000 hours.

2) Color: White.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.

C. Slip-Sheet: Rosin-sized paper, minimum 3-lb/100 sq. ft.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, non-corrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop-fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric or butyl sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required, in continuous, seamless, site-fabricated sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.

1. Gutter Style: Ogee.
2. Expansion Joints: Lap type.
3. Gutters with Girth up to 15 Inches : Fabricate from the following material:

a. Prepainted Metallic Coated Steel: 0.0217 inch thick.

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Manufactured Hanger Style: Manufacturer’s standard.
2. Fabricate downspouts from the following material:
   a. Prepainted Metallic Coated Steel: 0.0217 inch thick.

C. Downspout Extensions: Fabricate rectangular extensions from same material as downspouts.

1. Manufactured Extension Style: Manufacturer’s standard.
2. Fabricate extensions from the following material:
   a. Prepainted Metallic Coated Steel: 0.0217 inch thick.

D. Drip Edges at Roof Eaves and Rakes

2.6 STANDING AND RUNNING TRIM WRAP

A. Sheet Metal Fabrications: For locations such as fascia at eaves and rakes and band board trim, and as otherwise indicated. Fabricate in minimum 96-inch long, but not exceeding 10-foot long, sections. Furnish with 6-inch wide joint cover plates.

1. Joint Style: Lap, 4 inches wide.

a. Aluminum: 0.050 inch thick.
b. Prepainted, Metallic-Coated Steel: 0.0276 inch thick.

2.7 WALL BASE FLASHING

A. Base Flashing at Roof / Wall Intersections: Fabricate from the following material:

1. Aluminum: 0.040 inch thick.
2. Prepainted, Metallic-Coated Steel: 0.0276 inch thick.

2.8 ROOF-PENETRATION FLASHING

A. Roof-Penetration Flashing: Fabricate from the following material:

1. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
2. Neoprene: Manufacturer’s standard.

2.9 WALL SHEET METAL FABRICATIONS

A. Openings Flashing in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high end dams. Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.

2.10 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

1. Coat side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric or butyl sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
2. Aluminum: Use aluminum or stainless-steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 degrees F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 degrees F.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work.

1. Do not solder aluminum sheet.
2. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Attach gutters at eave or fascia to firmly anchored gutter brackets straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Fasten gutter spacers to front and back of gutter.
2. Loosely lock straps to front gutter bead and anchor to roof deck.
3. Anchor and loosely lock back edge of gutter to continuous cleat, eave or apron flashing.
4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
5. Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.
6. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Pipe or Post Counter-Flashing: Install counter-flashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant, or by means of interlocking folded seam or blind rivets and sealant.

C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Seal with elastomeric or butyl sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Openings Flashing in Frame Construction: Install continuous head, sill and similar flashings to extend 4 inches beyond wall openings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 07650

ADHESIVE FLEXIBLE FLASHING

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 APPLICABLE STANDARDS

ASTM D142	Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Themoplastic Elastomers-Tension
ASTM D903	Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
ASTM D1970	Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D3767	Standard Practice for Rubber-Measurement of Dimensions
ASTM E96	Test Methods for Water Vapor Transmission of Materials
ASTM E1005	Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference
ASTM E2112	Standard Practice for Installation of Exterior Windows, Doors and Skylights

1.3 SUMMARY

A. This Section includes the following flexible flashing:

1. Self-adhered flashing.

B. Related Sections include the following:
1. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 7 Section "Building Insulation" for field-applied weather resistive barrier
3. Division 7 Section "Joint Sealants" for field-applied flashing and trim sealants
4. Division 8 Section "Wood Windows" for installation of windows.
5. Division 8 Section "Vinyl Garden Windows" for installation of windows.

1.4 PERFORMANCE REQUIREMENTS

A. General: Self-Adhered Flashing is a self-sealing, self-healing, fully adhered, composite flexible flashing. It is designed to protect critical non-roof flashing details from air, water and moisture infiltration. It provides an excellent positive seal around the outside and inside of doors and

windows. It can also be used to seal joints, seams, holes and other undesirable openings in wall sheathing systems.

1.5 SUBMITTALS

A. Product Data: For product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: Submit one 12” x 12” sample of each product supplied.

1.6 QUALITY ASSURANCE

A. Applicator: Installer shall be familiar with adhered flexible flashing products and shall have experience in flashing installation. Skilled workers trained in this work shall install adhered flexible flashings.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Read product packaging, labels and Material Safety Data Sheets for proper handling and disposal instructions.

B. Deliver material in manufacturer’s unopened packages.

C. Store material under cover, protected from rain and physical damage. Provide cover on top and all sides, allowing for adequate ventilation. Store away from flames or sparks and where temperatures will not exceed 90 degrees Fahrenheit 32°C) for extended periods. Keep only as much material at point of use as required for each day’s work.

D. Single-stack (do not double-stack) palletized material.

1.8 COORDINATION

A. Coordinate installation of flexible flashing with interfacing and adjoining construction to provide a leak proof, secure, and non-corrosive installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Made of two impermeable weatherproofing materials, consists of a thick layer of high-quality rubberized asphalt adhesive (styrene-butadiene-styrene polymer) and a durable cross-laminated, high-density polyethylene carrier sheet. A disposable, silicone-coated, Kraft-paper release liner is removed for application.

B. Specific Products:

1. Vycor Plus Flexible Wall Flashing, manufactured by Grace Construction Products
2. StraightFlash, manufactured by Dupont™
3. Approved equivalent

C. Physical and Chemical Properties (Property, Test: Typical Value):

1. Color, visual: Grey-Black
2. Thickness, ASTM D 3767, Method A: 40 mil (0.64 mm)
3. Tensile strength, membrane, ASTM D 412, Die C modified: 250 psi (1720 kN/m^2)
4. Elongation, ultimate failure membrane, ASTM D 412, Die C modified: 250%
5. Flexibility, ASTM D 1970: Unaffected at -45°F (-43°C)
6. Cracked cycling, 100 cycles per ASTM C 836: Unaffected at -25°F (-32°C)
7. Lap adhesion at minimum application temperature, ASTM D 1876 modified: 5.0 lbs/in width (875 N/m)
8. Adhesion to plywood at minimum application temperature, ASTM D 903: 3.0 lbs/in width (525 N/m)
9. Peel strength, ASTM D 903 modified: 9.0 lbs/in width (1576 N/m)
10. Permeance, maximum, ASTM E 96, Section 12, Water Method: 0.05 perms (2.9 ng/m^2sPa)
11. Water absorption, maximum, ASTM D 570: 0.1%
12. Material weight installed, maximum, ASTM D 461: 0.3 lb/ft^2 (1.3 kg/m^2)

2.2 ACCESSORIES

A. Primer: As recommended by manufacturer.

B. Joint Sealants: As specified in Section 07920.

PART 3 - EXECUTION

3.1 PREPARATION

A. Handle AFF safely and properly. Best information on safe handling, storage, personal protection, health and environmental considerations is presented in Material Safety Data Sheets, available from the manufacturer. Precautions also are clearly stated on product containers and labels.

B. Inspect and field-measure jobsite conditions and substrates before installation.

C. Substrates shall be clean, dry, frost free, smooth and continuous, devoid of gaps, voids, unsupported areas, spalled areas, loose substrate, debris, and sharp protrusions, and free from coatings or finishes that might impede adhesion and other matter potentially hindering sound adhesion and installation regularity. Clean loose dust or dirt from surface by wiping with clean dry cloth or brush wherever AFF is to be applied.

D. Prime AFF contact surfaces as recommended by manufacturer or as required by field conditions.

E. AFF cannot be applied to moist or damp surfaces. After precipitation, allow a minimum of 24 hours for drying before application. Apply at air and surface temperatures of 25 degrees Fahrenheit (-4°C) and above.

3.2 INSTALLATION

A. General.

1. Manufactured Products. Comply with manufacturer's written instructions.
2. Install AFF in coordinated work schedule sequence with adjoining fenestration products, weather-resistive barrier membrane, sealant, and flashing materials.
3. Never dilute primers, coatings or sealants.
4. Keep containers closed except when removing materials.

B. Application to Wall-Sheathing Joints**.**

1. Working with the longest strips practical, cut AFF to required length. Expose starting end of elastomeric adhesive by peeling its release liner. Center AFF over the joint. Align and affix in place by hand pressure. Confirm alignment and continue application, removing remaining release liner while working along.
2. Apply AFF as evenly and straight as possible, with accurate alignment, flat surfaces, and flush planes. Avoid fish-mouths along edges. Take care at laps, seams, and splices to remove trapped air and prevent voids. For better adhesion, supplement hand pressure by firmly rolling with a hand roller.
3. Should significant wrinkling occur, carefully cut and lay flat the affected area, and overlay an oversized piece, tire-patch fashion. Press patch into place with heavy hand pressure and roller.
4. During construction, before work is completed, gravity or heavy wind may act to peel AFF from vertical surfaces. If adhesion fails, provide product replacement, or additional mechanical fasteners, per manufacturer's recommendation.
5. AFF must be supported continuously by the substrate and not span or bridge joints, gaps, or voids in excess of one-quarter inch (6 mm). Leakage will occur where fasteners have penetrated unsupported areas and repairs have not been made.
6. Provide minimum two-inch (51-mm) overlap at AFF joinery. Shingle the laps in direction of moisture drainage unless specifically detailed otherwise in these construction documents and approved.

C. Application at Window and Door Openings.

1. General: Apply AFF to window, door, and similar openings according to these construction documents, manufacturer's recommendations, and ASTM E 2112 guidelines.
2. Apply AFF first starting at the sill, then continuing up the jambs, and finally finishing at the head. Shingle typical laps in direction of moisture drainage.
3. Cut AFF to required length. Expose elastomeric adhesive from starting end by peeling release liner. Align and affix tightly in place by hand pressure. Confirm alignment and continue applying the strip, removing remaining release liner while working along.
4. Carefully place AFF as evenly as possible, making accurate lines and flat surfaces, straight and in plane. Avoid fish-mouths along edges. Take care at laps, seams, and splices to eliminate voids and remove trapped air. For maximum adhesion, supplement hand pressure using a hand roller.
5. At the sill, wrap AFF into the rough opening and adhere to the sill but do not remove release liner at overlap onto vertical sheathing. Adhesion to vertical wall surface below the sill will come later, after application of weather-barrier membrane. (Alternately, apply an apron of weather-barrier membrane to the wall below the sill and now adhere the vertical flap of flexi-

ble flashing thereupon.)

6. Fabricate corners, sill pans, transitions, and terminations with a minimum number of pieces. Use a patch of material, approximately three-inch (76-mm) diameter, to close all outside-corner virtual holes or pinholes.

3.3 POST-INSTALLATION PROTECTION AND REPAIR

A. After application and before covering with exterior finishing, protect AFF from mechanical damage, prolonged solar exposure, and severe weather. Cover in proper construction sequence, as soon as practical, preferably within 30 days.

B. Before covering, thoroughly inspect AFF for punctures and other damage and make repairs. Quality AFF is self-sealing around penetrating nails and screws but not self-healing. Exposed punctures shall be patched according to manufacturer's written instructions.

C. Hand roll and secure all loose edges, laps, seams, fishmouths, and air bubbles before covering.

D. Upon completion, properly installed AFF requires no maintenance.

END OF SECTION

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SECTION 07920

JOINT SEALANTS

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 joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:

   a. Joints between different materials.
   b. Perimeter joints between materials and frames of doors, windows and louvers.
   c. Control and expansion joints in ceilings and other overhead surfaces.
   d. Other joints as indicated.

2. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:

   a. Perimeter joints of exterior openings where indicated.
   b. Tile control and expansion joints.
   c. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
   d. Joints between plumbing fixtures and adjoining walls, floors, and counters
   e. Other joints as indicated.

3. Interior joints in the following horizontal traffic surfaces:

   a. Control and expansion joints in tile flooring.
   b. Other joints as indicated.

B. Related Sections include the following:

1. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
2. Division 9 Section "Ceramic Tile" for sealing tile joints.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 degrees F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected from manufacturer's full range.

C. Exterior Joint Locations: Silicone sealants, if used, are to be approved by Contracting Officer prior to application to exterior joint locations.

2.2 SEALANTS

A. Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

2.2.1 Interior Sealant

A. ASTM C 920, Type S or M, Grade NS, Class 12.5, Use NT. Locations(s) of sealant shall be as follows:

LOCATION

1. Small voids between walls or partitions and casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.

2. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete surfaces.

3. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.

4. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.

5. Behind escutcheon plates at valve pipe penetrations and shower heads in showers.

2.2.2 Exterior Sealant

A. For joints in vertical surfaces, provide ASTM C 920, Type M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C 920, Type M, Grade P, Class 25, Use T. Locations(s) of sealant shall be as follows:

LOCATION

1. Joints and recesses formed where frames and sub sills of windows, doors, louvers, and vents adjoin concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.

2. Expansion and control joints.

3. Joints in precast concrete copings courses.

4. Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.

5. Voids where items pass through exterior walls.

6. Metal-to-metal joints where sealant is indicated or specified.

7. Joints between ends of flashings, fascias, copings and adjacent walls.

2.2.3 Floor Joint Sealant

A. ASTM C 920, Type M, Grade P, Class 25, Use T. Locations(s) of sealant shall be as follows:

LOCATION

1. Seats of metal thresholds for exterior doors or where metal thresholds are indicated.

2. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

D. Single-Component Non-Sag Urethane Sealant:

1. Type and Grade: S (single component) and NS (non-sag).
2. Class: 25.
3. Uses Related to Exposure: T (traffic) and NT (non-traffic).
4. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: aluminum coated with a high-performance coating, galvanized steel, ceramic tile and wood

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type OP, Grade NF.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; 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. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), or as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction 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 joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, 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.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions 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 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 after

cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.
b. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean 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. Nonporous joint substrates include the following:

a. Metal.
b. Porcelain enamel.
c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on pre-construction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturers' written instructions. 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 written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Non-Sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants 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 installations with repaired areas are indistinguishable from original work.

3.6 SEALANT PREPARATION

A. Do not add liquids, solvents or powders to the sealant. Mix multi-component elastomeric sealants in accordance with manufacturer's instructions.

3.7 APPLICATION

A. Joint Width-To-Depth Ratios

1. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
¼ inch (minimum)	¼ inch	¼ inch
over ¼ inch	½ of width	Equal to width
For wood, concrete:		
¼ inch (minimum)	¼ inch	¼ inch
Over ¼ inch to ½ inch	¼ inch	Equal to width
Over ½ inch to 2 inches	½ inch	5/8 inch
Over 2 inches	(As recommended by sealant manufacturer)	

2. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.

END OF SECTION

SECTION 08110

METAL DOORS

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. Steel insulated flush doors.
2. Steel insulated panelized doors.
3. Aluminum storm doors.
4. Aluminum-clad wood doors.
5. Aluminum screen doors.
6. Coordinating factory fitting steel and aluminum-clad wood doors in wood frames.

B. Related Sections include the following:

1. Division 7 Section “Adhered Flexible Flashings” for field-applied sheet flashing
2. Division 8 Section “Siding” for door frame casings.
3. Division 8 Section "Door Hardware (Scheduled by Describing Products)" for door hardware and weather stripping.
4. Division 9 Section "Painting" for field painting factory-primed doors and frames.

1.3 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-clad wood doors capable of complying with performance requirements indicated, based on testing manufacturer's doors that are representative of those specified and that are of test size indicated below:

1. Minimum size required by AAMA/NWWDA 101/I.S.2.

B. AAMA/NWWDA Performance Requirements: Provide glazed aluminum-clad wood doors for the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2:

1. Performance Class: R or LC or C.
2. Performance Grade: 40 minimum for performance class indicated.

C. National Fenestration Rating Council (NFRC): Provide glazed aluminum-clad wood doors certified by the NFRC.

D. Provide glazed aluminum-clad wood doors that comply with the following requirements:

1. Window U-Factor: 0.36 maximum.
2. Window Solar Heat Gain Coefficient: 0.52 maximum.
3. Window Visible Light Transmittance: 0.53 minimum.
4. Window Air Leakage: 0.20 maximum.

1.5 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Show the following:

1. Elevations of each door design.
2. Details of doors including vertical and horizontal edge details.
3. Details and locations of reinforcement and preparations for hardware.
4. Details of anchorages, accessories, joints, and connections.

1.6 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

1.7 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, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to the Contracting Officer. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.2 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

C. Aluminum Storm Doors: Manufacturer's standard complying with requirements for one piece solid wood core with seamless aluminum laminate on sides and edges, with self-storing aluminum screen, lockable latch, perimeter weatherstripping, door bottom sweep, and heavy duty closer. Aluminum alloy to be 0.05-inches thick minimum. Screens to be non-ferrous material and located at top of door. Hardware to not interfere with entry door hardware.

D. Aluminum-Clad Wood Doors: Provide doors complying with ANSI/NWWDA, AAMA, SIGMA/IGCC, CFR and ASTM standards for wood preservative treatment, organic coatings, glazing and insulating glass units.

1. Door sets to be comprised of:

a. Aluminum-clad wood in-swinging doors. Internal locking mechanism to secure inactive leaf of pairs of doors at head and sill.
b. Metal framed screen doors at operable leafs.
c. Insulating glass units with grids (simulated divided lite).
d. Hardware by manufacturer, as described in Division 8 Section "Door Hardware", and factory installed.
e. Aluminum-clad wood door frames.
f. Doors factory mounted in doorframes.

2. Materials:

a. Frames: Pine clad with extruded aluminum, with extruded aluminum extension pieces as needed for installation.
b. Door panels: Pine clad with extruded aluminum.

c. Finish: Aluminum clad exterior: Kynar modified acrylic topcoat over primer, color: white. Interior wood: acrylic latex prime coat, color: white.
d. Insulating glass: As specified in Section “Glazing”.
e. Hardware: levers, hinges, locks and finish to meet requirements of Section “Door Hardware”.
f. Weatherstripping: Factory applied weatherstripping at frame perimeter and sides of operating panel; factory sealant around fixed panels; sweep with drip cap on operating panels. Limit air infiltration to 0.25 cfm/sf in accordance with ASTM E 283.

3. Aluminum-clad wood in-swinging doors:

a. Terrace door: Pair with one active leaf and one fixed as its sidelight. Operable leaf hinged at center mullion. Manufacturer’s standard sliding screen door provided for active leaf.
b. French door: Single door with manufacturer’s standard swinging screen door.

4. Aluminum screen doors:

a. Doors to be fully compatible with the aluminum-clad wood doors and frames, and mounted to those doorframes. Hardware to not interfere with underlying doors.
b. Frames: Extruded aluminum frame with full screen. Color: white.
c. Screening: Aluminum wire. Color: charcoal.
d. Sliding screen door hardware to include manufacturer’s standard recessed handle, strike, stop and weatherstripping. Top-hung adjustable roller assembly and sill track.
e. Swinging screen door hardware to include manufacturer’s standard latching handles, hinges, heavy-duty closer, weatherstripping and associated mounting bars for underlying door frame.

E. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and 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.

F. Exterior Steel Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

G. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.

H. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.

I. Single-Acting, Door-Edge Profile: Square edge.

J. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

K. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

L. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

M. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F or better.
2. Provide insulating glass units with grids (simulated divided lites) where scheduled in the Drawings and as specified in Section “Glazing”.
3. Doors to be panel style or flush, as indicated in the Door Schedule.

N. 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 in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

O. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

P. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

2.3 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

2.4 ACCESSORIES

A. Manufacturer’s standard installation brackets, nailing fins, casings and covers as required for a proper and complete installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Factory-Fitted Doors: Align in frames for uniform clearance at each edge. Coordinate with wood frames.

C. Door Installation: Comply with ANSI A250.8. Fit metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 08211

FLUSH WOOD DOORS

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. Fire-rated solid-core doors and frames.
2. Hollow-core doors with wood-veneer and hardboard faces.
3. Shop priming flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 6 Section "Finish Carpentry" for wood door frame casing.
2. Division 9 Section “Painting” for painting.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.

B. 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 and frames.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
2. Fire-Rated Wood Doors and Frames: Doors and frames complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to the authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 and UBC Standard 7-2.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

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 between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer’s standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall be in effect during the following period of time from date of Substantial Completion:

a. Solid-Core Doors: Five years.
b. Hollow-Core Interior Doors: One year.

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION, GENERAL

A. Doors for Opaque Finish:

1. Grade for Opaque Finish: Custom.
2. Faces for Fire-Rated Interior Doors: Veneer.
3. Faces for Interior Doors: Hardboard.
4. Apply medium density overlay to standard thickness closed grain, hardwood face veneers.

2.2 FIRE-RATED SOLID-CORE DOORS

A. Interior Fire-Rated Solid Core Doors:

1. Core: Either glued block or structural composite lumber.
2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

2.3 HOLLOW-CORE DOORS

A. Interior Hardboard-Faced Doors:

1. Core: Standard hollow core.
2. Construction: Hardboard faces glued directly to core.
3. Blocking: Provide wood blocking with minimum dimensions as follows:

a. 5-by-18-inch lock blocks at both stiles.
b. 5-inch top-rail blocking.
c. 10-inch bottom-rail blocking.
d. 2-1/2-inch mid-rail blocking.

2.4 INTERIOR FIRE-RATED DOOR FRAMES

A. Frames, complete with casings, fabricated from solid fire-retardant-treated wood or from veneered fire-retardant particleboard, fire-retardant medium-density fiberboard, or mineral board.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

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.

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces and edges of doors, including cutouts, with one coat of wood primer specified in Division 9 Section "Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and 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 level heads and plumb jambs.
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 doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

C. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

   1. Countersink fasteners, fill surface flush, and sand smooth.

D. Install wood doors to comply with manufacturer's written instructions and with referenced quality standard, and as indicated.
   1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Field-Finished Doors: Refer to the following for finishing requirements:

   1. Division 9 Section "Painting."

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08212

STILE AND RAIL WOOD DOORS

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. Interior stile and rail wood doors.
2. Interior wood door frames.
3. Shop priming stile and rail wood doors.
4. Factory fitting stile and rail wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 8 Section “Door Hardware” for hardware and prefabricated pocket door frames.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of construction.

1. Include adhesive manufacturer's product data indicating urea-formaldehyde content.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate fire ratings for fire doors.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of stile and rail wood door through one source from a single manufacturer.

B. Quality Standard for Doors of Stock Design and Construction: Comply with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," unless more stringent requirements are specified.

1. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6, and include panel design number if applicable.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 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 maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced quality standards unless more stringent requirements are specified.

1. Assemble interior doors, frames, and sidelites, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and ASTM D 5751 for joints other than finger joints.

B. Low-Emitting Materials:

1. Provide doors made with adhesives and composite wood products that do not contain added urea-formaldehyde resins.

2.2 STILE AND RAIL DOORS OF STOCK DESIGN AND CONSTRUCTION

A. Interior Doors:

1. Grade for Opaque Finish: Standard.
2. Wood Species for Opaque Finish: Manufacturer's standard softwood species and cut for stiles and rails; with panels of same species or wood-base construction materials, as standard with manufacturer.

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch from bottom of door to top of threshold.

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.

2.4 SHOP PRIMING

A. Doors for Opaque Finish: Shop apply one coat of wood primer specified in Division 9 Section "Painting" to faces and edges of doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors and fire-rated wood door frames will be installed.

1. Verify that installed 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. Install wood doors to comply with manufacturer's written instructions and with referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Field-Finished Doors: Refer to the following for finishing requirements:

1. Division 9 Section "Painting."

3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

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SECTION 08361

SECTIONAL OVERHEAD DOORS

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 electrically operated, insulated, sectional overhead doors.

B. Related Sections include the following:

1. Division 7 Section “Adhered Flexible Flashings” for field-applied sheet flashing
2. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
3. Division 16 Sections for electrical service and connections for powered operators and accessories.

1.3 DEFINITIONS

A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

a. Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.

B. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.

1.5 SUBMITTALS

A. Product Data: For each type and size of sectional overhead door and accessory. Include the following:

1. Summary of forces and loads on walls and jambs.
2. Motors: Show nameplate data and ratings, characteristics, and mounting arrangements.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data.

C. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.

1. Obtain operators and controls from sectional overhead door manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered. Refer to Division 1 Section "Product Requirements."

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.1 STEEL DOOR SECTIONS

A. Construct door sections including face sheets and frames from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M coating designation.

1. Minimum Base-Metal (Uncoated) Thickness for Section Faces: 24 gauge 0.022 inch
2. Exterior-Section Face: Flat.
3. Exterior-Section Face: Manufacturer's standard grooved, ribbed or fluted.

B. Fabricate door panels from a single sheet to provide sections not more than 24 inches high and nominally 2 inches deep. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weather tight seal, with a reinforcing flange return.

1. Provide door sections with continuous thermal-break construction, separating faces of door.

C. Enclose open sections with channel end stiles formed from not less than 0.064-inch-thick galvanized steel sheet and weld end stiles to door section in place. Provide intermediate stiles formed from not less than 0.064-inch-thick galvanized steel sheet, cut to door section profile, and welded in place.

1. Stile Spacing: Not more than 48 inches apart.

D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized steel bars, struts, trusses or strip steel, formed to depth and bolted or welded in place.

E. Provide reinforcement for hardware attachment.

F. Thermal Insulation: Insulate inner core of steel sections with door manufacturer's standard polyurethane or polystyrene insulation, foamed in place to completely fill inner core of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum

flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following inside facing material, with no exposed insulation material evident:

1. Inside Facing Material: Zinc-coated (galvanized) steel sheet with a minimum base (uncoated) metal thickness of 27 gauge 0.016 inch.

G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

H. Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean galvanized surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants.

a. Pre-treat zinc-coated steel, after cleaning, with a conversion coating of type suited to organic coating applied over it.

2. Apply manufacturer's standard primer and finish coats to interior- and exterior-door faces after forming, according to coating manufacturer's written instructions for application, thermosetting, and minimum dry film thickness.

a. Color and Gloss: As indicated on the Drawings.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653/A 653M for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced at 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

1. Provide tracks configured for the following lift types:

a. Standard.

B. Track Reinforcement and Supports: Galvanized steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

1. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.

a. Repair galvanized coating on tracks according to ASTM A 780.

C. Weather Seals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom, top, and jambs of overhead door.

1. Provide motor-operated doors with bottom weather seal.

D. Windows: Type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors, as required. Provide removable stops of same material as door-section frames.

1. Size: Manufacturer's standard for type of glazing indicated.
2. Thickness: Manufacturer's standard for type of glazing indicated.
3. Clear Float Glass: Insulated, fully tempered, and complying with ASTM C 1036, Type I, Class 1, Quality Q3.
4. Grids: Manufacturer’s standard of same material as stops.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty galvanized steel hinges of not less than 0.0747-inch-thick, uncoated steel at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors exceeding 16 feet in width, unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch-diameter roller tires for 3-inch-wide track and 2-inch-diameter roller tires for 2-inch-wide track.

1. Tire Material: Case-hardened steel.

2.4 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from oil-tempered-steel wire complying with ASTM A 229/A 229M, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 10,000 cycles.

2.5 ELECTRIC DOOR OPERATORS

A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycle requirements specified, with electric motor and factory-pre-wired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
1. Provide chain-driven, ½ hp, garage door opener with 2 remote controls.
2. Provide photoelectric safety sensor at door bottom.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

B. Fasten vertical track assembly to framing, spaced not less than 24 inches apart. Hang horizontal track from structural overhead framing with angle or channel hangers fastened to framing by welding or bolting or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.2 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and with weather tight fit around entire perimeter.

END OF SECTION

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SECTION 08550

WOOD WINDOWS

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 aluminum-clad wood-framed window product types:

1. Casement windows.
2. Fixed windows.
3. Awning windows.

B. Related Sections include the following:

1. Division 7 Section “Adhered Flexible Flashings” for field-applied sheet flashing.
2. Division 8 Section "Glazing" for glazing requirements for wood windows.

1.3 DEFINITIONS

A. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.

B. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:

1. Minimum size required by AAMA/NWWDA 101/I.S.2.

B. AAMA/NWWDA Performance Requirements: Provide wood windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

1. Performance Class: R or LC or C.
2. Performance Grade: 40 minimum for performance class indicated.

C. National Fenestration Rating Council (NFRC): Provide window units certified by the NFRC.

D. Window units to meet the following:

1. Window U-Factor: 0.36 maximum.

2. Window Solar Heat Gain Coefficient: 0.52 maximum.
3. Window Visible Light Transmittance: 0.52 minimum.
4. Window Air Leakage: 0.20 maximum.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of wood window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:

1. Grid details, including reinforcement and stiffeners (manufacturer’s standard for sealing inside insulating glass units).
2. Joinery details.
3. Flashing and drainage details.
4. Weather-stripping details.
5. Glazing details.

C. Samples for Verification: For wood window components required, prepared on Samples of size indicated below.

1. Main Framing Member: 12-inch- long, full-size sections of extrusions with factory-applied color finish.
2. Hardware: Full-size units with factory-applied finish.
3. Weather Stripping: 12-inch- long sections.

D. Qualification Data: For Installer.

E. Maintenance Data: For operable window sash, operating hardware, weather stripping and finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer acceptable to wood window manufacturer for installation of units required for this Project.

B. Source Limitations: Obtain wood windows through one source from a single manufacturer.

C. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Provide WDMA-certified wood windows with an attached label.

D. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify wood window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Failure to meet performance requirements.
2. Structural failures including excessive deflection.
3. Water leakage, air infiltration, or condensation.
4. Faulty operation of movable sash and hardware.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Insulting glass failure.

B. Warranty Period: 10 years from date of Substantial Completion.

C. Warranty Period for Metal Finishes: 10 years from date of Substantial Completion.

D. Warranty Period for Glass: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Wood: Clear ponderosa pine or another suitable fine-grained lumber; kiln-dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; water-repellent preservative treated.

B. Aluminum Extrusions and Rolled Aluminum for Cladding: Manufacturer's standard formed sheet or extruded-aluminum cladding, mechanically bonded to exterior exposed wood members. Provide aluminum alloy and temper recommended by wood window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, and not less than 16,000-psi minimum yield strength.

1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
3. Baked-Enamel Finish: Manufacturer's standard baked enamel complying with AAMA 2603 and paint manufacturer's specifications for cleaning, conversion coating, and painting. Color: White.

C. Clad Trim and Glazing Stops: Clad-wood material; material and finish to match clad frame members.

D. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be non-corrosive and compatible with wood window members, cladding, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

E. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

G. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when wood window is closed.

1. Weather Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.

H. Replaceable Weather Seals: Comply with AAMA 701/702.

2.2 GLAZING

A. Glass and Glazing Materials: Refer to Division 8 Section "Glazing" for glass units and glazing requirements applicable to glazed wood window units.

2.3 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with wood and aluminum cladding; designed to smoothly operate, tightly close, and securely lock wood windows and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide extruded, cast, or wrought aluminum, die-cast zinc with special coating finish or nonmagnetic stainless steel.

B. Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A.

1. Operation Function: All ventilators move simultaneously and securely close at both jambs without using additional manually controlled locking devices.

C. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.

1. Locking mechanism and handles for manual operation.
2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, non-staining, non-corrosive, durable material.

2.4 INSECT SCREENS

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window and provide for each operable exterior sash or ventilator.

1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 class.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners and removable PVC spline/anchor concealing edge of frame.

1. Aluminum Tubular Framing Sections and Cross Braces: Roll-formed from aluminum sheet with minimum wall thickness as required for class indicated.
2. Finish: Manufacturer's standard.

C. Glass-Fiber Mesh Fabric: 20-by-20 or 20-by-30 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration in color. Comply with ASTM D 3656. Mesh Color: Charcoal gray.

2.5 FABRICATION

A. General: Fabricate wood windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate wood windows that are reglazable without dismantling sash or ventilator framing.

C. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.

D. Factory machine windows for openings and hardware that is not surface applied.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Factory-Glazed Fabrication: Except for light sizes in excess of 100 united inches , glaze wood windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/NWWDA 101/I.S.2.

G. Glazing Stops: Provide nailed or snap on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.6 WOOD FINISHES

A. Factory-Finished Windows: Provide fabricator's standard factory finish consisting of prime coat and two finish coats; 3-mil dry film thickness. Apply finish to exposed exterior and interior wood surfaces. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; and other conditions affecting performance of work.

1. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches of opening.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Metal Protection: 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 in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 ADJUSTING

A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

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SECTION 08631

VINYL GARDEN WINDOWS

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. Factory fabricated tubular extruded polyvinyl chloride (PVC) and glazed windows with fixed and operating sash.
2. Operating hardware and insect screens.

B. Related Sections include the following:

1. Division 7 Section “Adhered Flexible Flashings” for field-applied sheet flashing
2. Division 7 Section “Joint Sealants”.
3. Division 8 Section “Glazing” for insulating-glass units.

1.3 SUBMITTALS

A. Product Data: For each type of factory-fabricated product. Include construction details, material descriptions, dimensions of individual components and profiles, textures, colors, manufacturer's installation and maintenance instructions, shelving connections, bracing and hardware attachments to other work, technical support data, standard assembly and details.

B. Drawings: For support bracing attached to other work that is required for window installation per the window manufacturers’ recommendations and is provided for by the Contractor rather than the window manufacturer.

1.4 QUALITY ASSURANCE

A. Quality Standards: Unless other wise indicated comply with the following standards:

1. Windows shall comply with the requirements of AAMA 101/I.S.2 (American Architectural Manufacturer's Association)
2. Air infiltration: Maximum 0.14 CFM per foot of overall sash crack at inward test pressure of 1.57, ASTM E 283.
3. Structural performance: No glass breakage, damage to hardware, permanent deformation at positive and negative test pressure of 37.5 psf, ASTM E 330.
4. Water penetration: No water penetration at inward test pressure of 3.75 psf, ASTM E 547.

B. Manufacturer: Company specializing in manufacturing extruded tubular vinyl windows with welded corners and minimum five years documented experience.

1.2 PERFORMANCE REQUIREMENTS

A. Window units to meet the following thermal requirements:

1. Window U-Factor: 0.36 maximum.
2. Window Solar Heat Gain Coefficient (SHGC): 0.52 maximum.
3. Window Visible Transmittance (VT): 0.53 minimum.
4. Window Air Leakage (AT): 0.20 maximum.

B. National Fenestration Rating Council: Window units shall be certified by the NFRC.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Comply with manufacturer's instructions for protection of units from damage.

B. Deliver in manufacturer's protective packaging.

1.6 WARRANTY

A. Provide manufacturer's standard warranty which agrees to repair or replace units that fail in workmanship for a period of ten years from the original date of purchase.

C. Provide ten-year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.

C. Warranty: Includes coverage for degradation of color finish.

D. Warranty: Includes coverage of materials and labor in full by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Vinyl: ASTM D 4216 hollow tubular sections of extruded polyvinyl chloride (PVC), PVC compound containing impact-resistance, solid plasticizer titanium dioxide, surface and color stabilizers.

B. Fasteners: Stainless or Galvanized steel.

2.2 COMPONENTS

A. Frames: Manufacturer’s standard frames.

B. Bottom Shelf: Insulated bottom shelf, manufacturer's standard.

D. Intermediate Shelf: Wire shelf with baked-enamel finish, supported with manufacturer's standard hardware.

D. Insect Screen Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.

E. Insect Screens 14/18 mesh, glass fiber strands.

F. Operable Sash Weather Stripping: Manufacturer's standard for permanently resilient, profiled to effect weather seal.

2.3 GLASS AND GLAZING MATERIALS

A. Provide insulating-glass units as specified in Division 8 Section "Glazing".

B. Glazing Method: Provide factory inside glazed units except where field glazing is required due to large window unit dimensions. Units shall be reglazeable without dismantling sash frame.

2.4 HARDWARE

A. Single Hung Sash: Metal and nylon spiral friction slide cylinder, each sash, each jamb.

B. Casement Sash: Gear type rotary operators and friction hinges, each sash, each jamb.

C. Sash lock: Manufacturer's standard.

2.5 FABRICATION

A. Fabricate framing, mullions and sash members with fusion welded corners and joints, in a rigid jig. Supplement frame sections with internal reinforcement where required for structural rigidity.

B. Form snap-in glass stops, closure molds, weather stops, and flashings of extruded PVC for tight fit into window frame section.

C. Form weather stop flange to perimeter of unit.

D. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

E. Arrange fasteners to be concealed from view.

F. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

G. Assemble insect screen frame, miter and reinforced frame corners. Fit mesh taut into frame and secure.

H. Weatherstrip operable units

I. Factory glaze window units.

2.6 FINISHES

A. Exterior and Interior Surfaces: White.

B. Screens: Charcoal grey.

C. Operators and Exposed Hardware: White baked enamel, or manufacturer's standard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

A. Install window frames with supports in accordance with manufacturer's instructions.

B. Coordinate support bracing with the manufacturers' recommendations and the existing conditions and as shown on the drawings.

C. Attach window frames and shims to perimeter opening to accommodate construction tolerances and other irregularities.

D. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Coordinate attachment and seal of perimeter air and vapor barrier materials

G. Install perimeter sealant and backing materials.

3.3 CLEANING

A. Remove protective material from pre-finished surfaces.

B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

C. Remove excess sealant by moderate use solution acceptable to sealant manufacturer and window manufacturer.

END OF SECTION

SECTION 08712

DOOR HARDWARE

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. Door hardware for the following:

a. Swinging doors
b. Pocket doors
c. Folding doors
d. Other doors to the extent indicated

2. Cylinders for doors specified in other Sections

B. Related Sections include the following:

1. Division 8 Section "Metal Doors"
2. Division 8 Section "Flush Wood Doors"
3. Division 8 Section "Stile and Rail Wood Doors"

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1.3 SUBMITTALS

A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. 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. Door Hardware: As follows:

a. Hinges
b. Locks and latches
c. Bolts
d. Cylinders and keys
e. Operating trim
f. Closers
g. Stops and holders
h. Door gasketing
i. Thresholds

2. 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.

C. 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. 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

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

D. Keying Schedule: Prepared by or under the supervision of supplier, detailing Contracting Officer’s final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Warranties: Special warranties specified in this Section.

1.4 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, Architect, and Owner about door hardware and keying. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

E. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," as follows:

a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
b. Door Closers: Comply with the following maximum opening-force requirements indicated:

1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

2. NFPA 101: Comply with the following for means of egress doors:

a. Latches and Locks: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
b. Thresholds: Not more than 1/2 inch high.

F. 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.

G. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." 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. Address for delivery of keys.
4. Keying instructions furnished to the Contractor by the Contracting Officer.

1.5 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 Owner by registered mail or overnight package service.

1.6 COORDINATION

A. 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.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner 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.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section, and the Door Hardware Schedule at the end of Part 3.

1. Door Hardware Sets: Requirements for quantity and each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

2.2 HINGES AND PIVOTS, GENERAL

A. Standards: Comply with the following:

1. Butts and Hinges: BHMA A156.1.
2. Self-Closing Hinges: BHMA A156.17.

B. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For 1-3/8-inch-thick wood doors.
2. Three Hinges: For 1-3/4-inch-thick doors 90 inches or less in height.

C. Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

1. Exterior Doors and Interior Fire-Rated Doors: 4-1/2-by-4-1/2- inch, heavy-weight.
2. Interior Doors: 3-1/2-by-3-1/2- inch, standard weight.

D. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

E. Hinge Applications: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with closers: Anti-friction bearing hinges.
3. Interior Doors: Standard-weight hinges.

F. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
2. Interior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

G. Hinge Options: Corners: Square, or 5/8-inch radius.

H. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors and wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.3 HINGES

A. Antifriction-Bearing, Full-Mortise (Butt) Hinges: Heavy weight; BHMA Grade 1, with 4 ball bearings; button tips; non-rising removable pins; and base metal as follows:

1. Base Metal: Wrought brass or bronze, or Wrought, forged, or cast steel, or malleable iron.

B. Plain-Bearing, Standard-Weight, Full-Mortise (Butt) Hinges: BHMA Grade 3, button tips, non-rising removable pins, and base metal as follows:

1. Base Metal: Wrought brass or bronze.

2.4 LOCKS AND LATCHES, GENERAL

A. Standards: Comply with the following:

1. Bored Locks and Latches: BHMA A156.2.

B. Bored Locks: BHMA Grade 2; Series 4000.

C. Interconnected Locks: BHMA Grade 2; Series 5000.

D. Certified Products: Provide door hardware listed in the following BHMA directories:

1. Mechanical Locks and Latches: BHMA's "Directory of Certified Locks & Latches."

E. Lock Trim: Comply with the following:

1. Lever: Wrought.
2. Escutcheon (Rose): Wrought
3. Dummy Trim: Match lever lock trim and escutcheons.
4. Lockset Designs: Provide lockset design designated below or, if sets are provided by another manufacturer, provide designs that match those designated:

a. Bored Locks: Schlage

F. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

1. Bored Locks: BHMA A156.2.
2. Interconnected Locks: BHMA A156.12.

G. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Bored Locks: Minimum 1/2-inch latch bolt throw.
2. Deadbolts: Minimum 1-inch bolt throw.

H. Backset: 2-3/4 inches, unless otherwise indicated.

2.5 MECHANICAL LOCKS AND LATCHES

A. Bored Auxiliary Locks: Comply with the following:

1. Material: Brass
2. Deadlocks: Deadbolt operated by key outside and turn inside (E0151)
3. Cores: Removable Cores

2.6 CYLINDERS AND KEYING

A. Standards: Comply with cylinders: BHMA A156.5.

B. Cylinder Grade: BHMA Grade 1.

C. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six
2. Bored-Lock Type: Cylinders with tailpieces to suit locks.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key, and usable with other manufacturers' cylinders. All exterior door cores shall be “Best” compatible or approved equivalent, and keyed to the Base Master Key controlled system with keying instructions furnished to the Contractor by the Contracting Officer.

2. Locks for individual family units shall be keyed differently from any other housing unit. All exterior locks on each housing unit, including storage areas and door from garage to interior utility room but excepting the overhead garage door, shall be keyed alike.

E. Construction Keying: Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

F. 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 Owner's existing system.

G. Keys: Provide nickel-silver keys complying with the following:

1. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Two sets per lock.
b. Master Keys: 6 sets for entire project.

2.7 STRIKES

A. Standards: Comply with the following:

1. Strikes for Bored Locks and Latches: BHMA A156.2.

B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

2.8 CLOSERS, GENERAL

A. Standards: BHMA A156.4.

B. Surface Closers: BHMA Grade 2.

C. Certified Products: Provide door closers listed in BHMA’s “Directory of Certified Door Closers”.

D. 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.

2.9 CLOSERS

A. Modern-Type-with-Cover Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in cover indicated; complying with the following:
1. Mounting: Hinge side, top jamb.
2. Type: Delayed action closing.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Cover Material: Aluminum or molded plastic.
5. Closing Power Adjustment: At least 50 percent more than minimum tested.

2.10 VIEWER

A. Provide metal framed glass viewer, 180 degree view; suitable for fire-rated doors where applicable; mounted with centerline at 5’-2” above interior floor level.

2.11 STOPS AND HOLDERS, GENERAL

A. Standards:

1. Stops and Bumpers: BHMA A156.16.
2. Combination Overhead Holders and Stops: BHMA A156.8.

B. Stops and Bumpers: BHMA Grade 1.

C. Combination Overhead Stops and Holders: BHMA Grade 1

2.12 STOPS AND HOLDERS

A. Wall Bumpers: Polished cast brass or aluminum with rubber bumper; 2-1/2- inch diameter, minimum ¾- inch projection from wall, with backplate for concealed fastener installation; with concave bumper configuration for lever handles.

2.13 OVERHEAD STOPS AND HOLDERS

A. Overhead Concealed Slide Holders: Hold open and release by push and pull of door, unless control is set in inactive position; with stop and shock absorber; adjustable holding pressure; for single-acting doors opening 110 degrees.

2.14 DOOR GASKETING, GENERAL

A. Standard: Comply with BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated. Provide factory applied weather-strip gasketing at all exterior doors.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Air Leakage: Not to exceed 0.25 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

D. Fire-Labeled Gasketing: 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 UL 10B or NFPA 252.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.

2.15 DOOR GASKETING

A. Silicone Seal Pressure Sensitive Perimeter Gasketing: Silicone gasket material that begins compressing at ¼" and can be compressed sufficiently to seal opening with 1/16" gaps. Provide gasket that will not lose its form and stays flexible below -100 degrees F and resilient above +400 degrees F. Provide silicone perimeter gasketing where indicated or scheduled except at steel exterior doors.

B. Magnetic Weatherstrip Perimeter Gasketing. Metal gasket material fastened to frame with screws. Provide magnetic perimeter gasketing at steel exterior doors.

C. Door Shoes: Gasket material held in place by metal housing; mounted to bottom edge of door with screws.

1. Gasket Material: Neoprene.
2. Housing Material: Aluminum.
3. Mounting: Surface mounted on bottom edge of door.

2.16 THRESHOLDS, GENERAL

Standard: Comply with BHMA A156.21.

2.17 THRESHOLDS

A. Saddle Thresholds: Type and base metal as follows:

1. Type: Thermal break and fluted top.
2. Base Metal: Aluminum.

B. Ramped Thresholds: Modular, interlocking, sloped, fluted-top metal assemblies with closed return ends; 1:12 slope; and base metal as follows:

1. Top Surface: Fluted.
2. Base Metal: Aluminum.

2.18 SLIDING DOOR HARDWARE, GENERAL

A. Standard: Comply with BHMA A156.14.

B. Sliding Door Hardware: Provide complete sets consisting of rails, hangers, supports, bumpers, and accessories indicated.

C. Pocket Sliding Door Hardware: Provide as part of pre-fabricated pocket door frame and rated for doors weighing up to 75 lb.

2.19 SLIDING DOOR HARDWARE

A. Pocket Sliding Door Hardware: Overhead box rails and door hardware that allows vertical adjustment; heavy-duty residential/commercial grade hardware complying with the following:

1. Rail Material: Aluminum box track with 14-16 gauge zinc dichromate plated steel components
2. Door Type: Single

3. Rail Configuration: Convex double leg, low friction, single overhead style.
4. Wheel Assembly: Jump proof three wheel hangers.
5. Wheel Material: Nylon, machine turned ¾-inch diameter.
6. Pulls: Sliding door lock with emergency release; mortised edge pull.

B. Pocket Door Pre-Fabricated Frame: Manufactured for a finish wall thickness of 4-9/16-inches to accommodate single 1-3/8-inch wood doors and delivered with all required hardware. Wood framing studs reinforced with rust resistant steel stiffeners.

2.20 FOLDING DOOR HARDWARE, GENERAL

A. Standard: Comply with BHMA A156.14.

B. Bi-Folding Door Hardware: Rated for door panels weighing up to 50 lb.

2.21 FOLDING DOOR HARDWARE

A. Bi-Folding Door Hardware: Rails and door hardware that allows horizontal and vertical adjustment; complying with the following:

1. Rail Material: Galvanized wrought steel
2. Rail Configuration: Double leg box track
3. Mounting: Top and bottom hung, with pivots and brackets
4. Hinges: Panel hinges and door aligners, manufacturer’s standard for door size and weight

2.22 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 Architect. 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. Steel Machine or Wood Screws: For the following fire-rated applications:

a. Mortise hinges to doors
b. Strike plates to frames

c. Closers to doors and frames

3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided. Closers to doors and frames.

4. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.23 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. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 626: Satin chromium plated, over brass base metal.

2. BHMA 630: Satin stainless steel, over stainless steel base metal.

3. Other: Finishes to match the above, of classification appropriate over particular base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.

B. Wood Doors: Comply with DHI A115-W series.

3.3 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. 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.

C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.6 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.

3.7 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.8 DOOR HARDWARE SCHEDULE

HW-1 FRONT ENTRY

1.5 Pr	Butts
1 ea	F109 (Entry lock)
1 ea	Dead bolt
1 ea	Strike
1 set	Gasketting
1 ea	Threshold
1 ea	Door shoe
1 ea	Closer
1 ea	Viewer
1 ea	Wall bumper
Note:	Storm door hardware by door manufacturer

HW-2 DOOR FROM UTILITY TO GARAGE (20 MIN.)

1.5 Pr	Butts
1 ea	F109 (Entry lock)
1 ea	Dead bolt
1 ea	Strike
1 set	Gasketting
1 ea	Threshold
1 ea	Door shoe
1 ea	Closer (overhead stop)
1 ea	Viewer

HW-3 UNIT 4 J TERRACE DOOR W/FIXED PANEL AND SLIDING SCREEN

Hardware to be provided by door manufacturer; list provided for coordination of requirements.

1.5 Pr	Butts
1 ea	F109 (Entry lock)
1 ea	Dead bolt
1 ea	Strike
1 set	Gasketting
1 ea	Threshold
1 ea	Door shoe
1 set	Sliding screen door hardware

HW-4 DOOR FROM UTILITY TO KITCHEN OR ENTRY; DOOR TO WALK-IN-CLOSET

1.0 Pr	Butts	
1 ea	F75 (Passage or closet latch)	
1 ea	Strike	
1 ea	Wall bumper	

HW-5 NOT USED

HW-6 BEDROOM & BATHS

1.0 Pr	Butts	
1 ea	F76 (Privacy lock)	
1 ea	Strike	
1 ea	Wall bumper	

HW-7A PAIR BI-FOLD DOORS

1 Set	Bi-fold door hardware	
2 ea	Dummy pulls	Coordinate style with cabinet hardware

HW-7B SINGLE BI-FOLD DOORS

1 Set	Bi-fold door hardware	
1 ea	Dummy pulls	Coordinate style with cabinet hardware

HW-8 MECHANICAL ROOM

1.0 Pr	Butts	
1 ea	F75 (Passage or closet latch)	
1 ea	Strike	

HW-9 UNIT 4J DOOR TO E.B.S. FROM GARAGE (20 MIN.)

1.5 Pr	Butts	
1 ea	F84 (Classroom lock)	
1 ea	Strike	
1 set	Gasketting	
1 ea	Threshold	
1 ea	Door shoe	
1 ea	Closer	
1 ea	Wall bumper	

HW-10 UNIT 4J DOOR TO YARD FROM GARAGE

1.5 Pr	Butts	
1 ea	F109 (Entry lock)	
1 ea	Strike	
1 ea	Gasketting	
1 ea	Threshold	
1 ea	Door shoe	
1 ea	Overhead Stop	

HW-11 UNIT 4J BATH 1 POCKET DOOR TO TOILET/TUB

1.0 set	Pocket door sliding hardware
1 ea	Sliding door lock
1 ea	Mortised edge pull
1 ea	Strike

HW-12 UNIT 2J IN-SWINGING DOOR WITH SWINGING SCREEN DOOR TO REAR PATIO

Hardware to be provided by door manufacturer; list provided for coordination of requirements.

1.5 Pr	Butts
1 ea	F109 (Entry lock)
1 ea	Dead bolt
1 ea	Strike
1 ea	Dust Proof Strikes
1 set	Gasketting
1 ea	Threshold
1 ea	Door Shoes
1 ea	Wall Bumper
1 Set	Swinging screen door hardware w/heavy duty closer

END OF SECTION

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SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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 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

B. Related Sections include Division 8 Section "Mirrored Glass."

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. 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.

D. Deterioration of Insulating Glass: Failure of 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.

1.4 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 thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than

thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

   a. Specified Design Wind Loads: service load 25 psf pressure/suction, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."

   b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

      1) Load Duration: 60 seconds or less.

   c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch , whichever is less.

      1) For insulating glass.

   d. Minimum Glass Thickness for Exterior Lites: Not less than ¼-inch.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

   1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   2. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:

      a. U-Factors: NFRC 100, expressed as Btu/sq.ft. x h x deg F.
      b. Solar Heat Gain Coefficient: NFRC 200.
      c. Solar Optical Properties: NFRC 300.

E. National Fenestration Rating Council Certification: Window and glazed door units to be certified by the NFRC.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- square Samples for glass.

   1. Coated vision glass.
   2. Insulating glass for each designation indicated.

C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

D. Qualification Data: For installers.

E. Product Test Reports: For each of the following types of glazing products:

1. Coated float glass.
2. Insulating glass.
3. Glazing gaskets.

F. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance.

B. Source Limitations for Coated Glass: Obtain coated glass from one manufacturer for each type of coating and each type and class of float glass indicated.

C. Source Limitations for Insulating Glass: Obtain insulating glass from one manufacturer for each type of coating and each type and class of float glass indicated.

D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

E. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

F. Safety Glazing Products: Category II materials complying with testing requirements in 16 CFR 1201.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.

1.7 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.

1.8 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.

1.9 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-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.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace 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 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. For uncoated glass, comply with requirements for Condition A.
2. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
3. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

C. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.

D. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

E. Insulating-Glass Units, General: Factory-assembled 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 Part 2 "Insulating-Glass Units" Article.

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 Part 1 "Performance Requirements" Article.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Dual seal, with primary and secondary sealants as follows:

   a. Manufacturer's standard sealants.

5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

   a. Spacer Material: Low conductance spacer.
   b. Desiccant: Molecular sieve or silica gel, or blend of both.
   c. Corner Construction: Manufacturer's standard corner construction.

2.2 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. EPDM, ASTM C 864.
2. Silicone, ASTM C 1115.
3. Thermoplastic polyolefin rubber, ASTM C 1115.
4. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. EPDM.
2. Silicone.
3. Thermoplastic polyolefin rubber.
4. Any material indicated above.

2.3 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, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type 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).

F. Grids: Manufacturer's standard for sealing inside insulating glass units, as indicated on the Drawings. Color to be white.

2.4 FABRICATION OF GLAZING UNITS

Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.5 INSULATING-GLASS UNITS

A. Passive Solar Low-E Insulating-Glass Units:

1. Overall Unit Thickness and Thickness of Each Lite: 3/4 -inch and 1/8 -inch respectively.
2. Interspace Content: Argon.
3. Outdoor and Indoor Lites: Type I (transparent glass, flat) float glass.

    a. Class 1 (clear) float glass
    b. Annealed Kind FT (fully tempered), Condition C (other coated glass); or Kind FT (fully tempered), Condition A (uncoated surfaces); as required.

4. Low-E Coating: Pyrolytic or sputtered on second or third surface, manufacturer's standard.
5. Window U-Factor: 0.36 maximum.
6. Window Solar Heat Gain Coefficient: 0.52 maximum.
7. Window Visible Light Transmittance: 0.53 minimum.
8. Window Air Leakage: 0.20 maximum.

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

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. 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.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where 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.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

K. Provide manufacturer’s standard grids for the windows and doors in the pattern indicated. Grids shall be sealed within insulating glass units.

3.4 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch 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. Center glass lites in openings on setting blocks and press firmly against soft compression gasket 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. Compress gaskets to produce a weather tight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

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 substances 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 buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from 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 in writing by glass manufacturer.

END OF SECTION

SECTION 08814

MIRRORED GLASS

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. Silvered mirrored glass.

B. Related Sections include the following:

1. Division 10 Section "Toilet and Bath Accessories" for metal-framed mirrors.

1.3 DEFINITIONS

A. Deterioration of Silvered Mirrored Glass: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning silvered mirrored glass contrary to mirrored glass manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.4 PERFORMANCE REQUIREMENTS

A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Silvered mirrored glass. Include description of materials and process used to produce mirrored glass that indicates source of glass, glass coating components, edge sealer, and quality-control provisions.
2. Mirror hardware.

B. Shop Drawings: Include elevations, sections, details, and attachments to other Work.

C. Product Certificates: Signed by manufacturers of mirrored glass certifying that products furnished comply with requirements.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed mirrored glass installations 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. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each type of accessory indicated.

D. Glazing Publications: Comply with published recommendations in GANA's "Glazing Manual," unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.

E. NAAMM's Publication: For silvered mirrored glass, comply with recommendations in NAAMM's "Mirrors, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to mirrored glass 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 silvered mirrored glass, comply with mirrored glass manufacturer's written instructions for shipping, storing, and handling mirrored glass as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrored glass until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

PART 2 - PRODUCTS

2.1 FLOAT GLASS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent glass, flat), class, quality, and other properties as indicated below:

1. Clear Annealed Float Glass: Class 1 (clear), Quality q2 (mirror).

a. Thickness: 6.3 mm.

2.2 MIRRORED GLASS

A. Silvered Mirrored Glass: Annealed, clear float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic

protective coating applied to second glass surface to produce a coating system complying with FS DD-M-411.

2.3 FABRICATION

A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes to suit project conditions.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirrored Glass Edge Treatment: Treat edges as indicated below.
   1. Beveled polished edge of width standard with manufacturer.
   2. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
   3. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.4 MISCELLANEOUS MATERIALS

A. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.

B. Mirror Bottom Clips: As recommended by manufacturer.

C. Mirror Top Clips: As recommended by manufacturer.

D. Plated Steel Hardware: Formed-steel shapes with plated finish.

   1. Profile: As recommended by manufacturer.
   2. Finish: Stainless steel or chrome finish.

E. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

F. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrored glass units are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.

   1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
   2. Proceed with mirrored glass installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 GLAZING

A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

C. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.

1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
2. For metal or plastic clips, place a felt or plastic pad between mirrored glass and each clip to prevent spalling of mirrored glass edges.
3. Install bottom and top clips symmetrically placed and evenly spaced.

3.3 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.

1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash mirrored glass not more than four days before date scheduled for inspections intended to establish date for Substantial Completion. Wash mirrored glass by methods recommended in NAAMM publication and in writing by mirrored glass manufacturer. Use water and glass cleaners free from substances capable of damaging mirrored glass edges or coatings.

END OF SECTION

SECTION 09260

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. Interior gypsum wallboard.
2. Water resistant gypsum wallboard.

B. Related Sections include the following:

1. Division 7 Section "Building Insulation" for insulation and vapor retarders installed in gypsum board assemblies.
2. Division 9 Section “Painting” for surface preparation of gypsum board, prior to application of orange peal spray texture.

1.3 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. Gypsum Board Finish Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.

1. Install mockups for the following applications:

   a. Surfaces indicated to receive nontextured paint finishes.

2. Simulate finished lighting conditions for review of mockups.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C 36.

1. Regular Type:

a. Thickness: As indicated.
b. Long Edges: Tapered.
c. Location: As indicated.

2. Type X:

a. Thickness: As indicated.
b. Long Edges: Tapered.
c. Location: As indicated at 1-Hour common walls and separation walls between house and garage and mechanical room.

2.2 WATER RESISTANT GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Water Resistant Gypsum Wallboard: ASTM C 630/C 630M.

1. Core: Regular type, thickness as indicated, at walls and ceilings of powder rooms, bathrooms, and utility rooms.
2. Core: Type X, thickness as indicated, at 1-Hour common walls in bathrooms and utility rooms.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc or paper-faced galvanized steel sheet.
2. Shapes:

   a. Cornerbead: Use at outside corners, unless otherwise indicated.
   b. U-Bead: J-shaped; exposed short flange does not receive joint compound; use at exposed panel edges.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Water Resistant Gypsum Wallboard: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound or drying-type, all-purpose compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound or drying-type, all-purpose compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound or drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound.

D. Joint Compound for Water Resistant Gypsum Wallboard:

1. Water Resistant Gypsum Wallboard: Use setting-type taping and setting-type, sandable topping compounds.

2.5 TEXTURE PATTERN

A. Texture pattern for interior walls and ceilings exposed to view (Option to smooth finish):

1. Light orange peal texture: Manufacturer’s standard.
2. Do not apply texture pattern to ceilings in kitchens, laundry rooms or bathrooms.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

D. Acoustical Insulation: As specified in Division 7 Section "Building Insulation."

E. Polyethylene Vapor Retarder: As specified in Division 7 Section "Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

B. 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.

C. Install gypsum panels with face side out. 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.

D. Locate edge and 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. Do not make joints other than control joints at corners of framed openings.

E. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

F. Attach gypsum panels to framing provided at openings and cutouts.

G. Form control and expansion joints with space between edges of adjoining gypsum panels.

H. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

I. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

J. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.3 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before 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 horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and 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, unless otherwise indicated or required by fire-resistance-rated assembly.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Water Resistant Gypsum Wallboard:

1. Water Resistant Gypsum Wallboard: Install at all bathroom and powder room walls and ceilings. Install with 1/4-inch gap where panels abut other construction or penetrations. Do not install in locations where a vapor barrier is used in the wall construction.

2. Ceiling Locations: Install only at framing spaced at 12 inches o.c. Install wood furring as needed to provide a level finished ceiling.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Contracting Officer for visual effect.

3.5 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies.
2. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

a. Texture Option: Provide light orange peal spray texture as a base under painted surfaces. (Reference Section 09911, Painting. One prime coat of paint is required prior to application of orange peal spray texture.)

E. Water Resistant Gypsum Wallboard: Finish according to manufacturer's written instructions.

F. Finish walls with 1-Hour rating as required to meet the fire resistance specified and in accordance with UL listings.

3.6 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Contracting Officer will conduct an above-ceiling observation and report 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 seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
2. Before 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.

END OF SECTION

SECTION 09310

CERAMIC TILE

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. Paver tile (glazed floor tile).
2. Metal transition accessories.
3. Plywood underlayment.

B. Related Sections include the following:

1. Division 6 Section “Finish Carpentry” for wood wall base at ceramic tile.
2. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory.

C. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:

1. Joint sealants.

D. Underlayment: Comply with provisions of the American Plywood Association Form No. E30K, “APA Design/Construction Guide: Residential & Commercial”.

E. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockup of floor tile installation.
2. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 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 in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and 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.

D. Store in unopened containers and protected from freezing.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As indicated.

D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2 TILE PRODUCTS

A. Glazed Floor Tile CT-1 and CT-2: Flat tile as follows:

1. Composition: Porcelain.
2. Module Size: 12 by 12 inches.
3. Thickness: 5/16 inch.
4. Face: Plain with cushion edges.
5. Finish: Mat, opaque glaze.

2.3 ACCESSORIES

A. Metal transition strips: Aluminum moldings to provide transition between ceramic tile and resilient flooring and between ceramic tile and carpet.

1. Moldings shall be an integral leg type for setting in adhesive, with sloped flange to transition between tile and resilient flooring or between tile and carpet, and have a concealed fastening system. Face flange shall be a minimum 9/31-inch and overall height to be equal to combined height of setting material and tile thickness. Sloped flange to be length and depth required to adjust to finish surface of adjoining resilient flooring or carpet. Finish edges of materials to be completed protected by molding flanges.
2. Finish: Satin aluminum, clear anodized.
3. Fasteners: Manufacturer’s standard type for installation.

2.4 SETTING AND GROUTING MATERIALS

A. Organic Adhesive: ANSI A136.1, Type I, floor type.

B. Polymer Modified Tile Grout: ANSI A118.7.

1. Polymer type: As recommended by tile manufacturer for use and installation type.
2. Grout: Sanded grout mixture for joints 1/8 inch or wider.

2.5 UNDERLAYMENT

A. Underlayment, General: Provide underlayment in thickness recommended by the tile manufacturer.

B. Plywood Underlayment for Ceramic Tile Flooring: Exterior C-C Plugged or Exposure 1 Underlayment with fully sanded face, minimum 19/32-inch.

2.6 MISCELLANEOUS MATERIALS

A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

B. Grout Sealer: Manufacturer’s standard product for sealing grout joints that does not change color or appearance of grout.

2.7 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions 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; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
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.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Contracting Officer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings; including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of 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.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. Tile Council of America Installation Guidelines: TCA’s "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. 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 plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. 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 indicated.

F. Grout tile to comply with requirements of the following tile installation standards:

1. For polymer modified tile grout, comply with ANSI A108.10.

3.4 FLOOR TILE INSTALLATION

A. Ceramic tile installer is responsible for installation of wood underlayment, as recommended by the ceramic floor tile manufacturer, TCA and the APA, to ensure the tile is adhered to a clean, dry substrate, as required by the manufacturer.

1. Underlayment installation:

a. Nail to subflooring.
b. Layout underlayment per recommendations for offsetting underlayment panel joints above sub-floor joints and staggering of underlayment panel end joints.
c. Space underlayment panels 1/8-inch apart at edge and end joints.

d. Fill and sand joints of underlayment receiving ceramic tile as recommended by the tile manufacturer just before installing tile.
e. Maximum variation of underlayment finished surface to be 1/4-inch in 10-feet.

B. General: Install tile to comply with requirements in Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

C. Joint Widths: Install tile on floors with the following joint widths:

1. Paver Tile: 1/4-inch.

D. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer’s written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with a soft cloth.

3.5 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush affected surfaces, other than tile surfaces, with clean water before and after cleaning.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.6 FLOOR TILE INSTALLATION SCHEDULE

A. Tile Installation at Entry: Interior floor installation on wood; organic adhesive; TCA F142, ANSI A108.4 and ANSI A108.10.

1. Tile Type: Textured porcelain tile.
2. Grout: Polymer modified sanded tile grout.

END OF SECTION

SECTION 09652

SHEET VINYL & LAMINATE 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:

1. Sheet vinyl floor coverings, with backings.
2. Plywood underlayment.
3. Laminate flooring and cushion.

B. Related Sections include the following:

1. Division 6 Section "Finish Carpentry" for wood wall base at laminate flooring.
2. Division 9 Section “Ceramic Tile” for metal transition strips between tile and sheet vinyl floor coverings.
3. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base and transition strips installed with sheet vinyl floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch sections of each different color and pattern of floor covering required.

C. Maintenance Data: For floor coverings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

B. Underlayment: Comply with provisions of APA Form No. E30K, “APA Design/Construction Guide: Residential & Commercial”.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.6 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOOR COVERING

A. Sheet Vinyl Floor Covering With Backing: ASTM F 1303.

1. Type (Binder Content): II, minimum binder content of 34 percent.
2. Wear-Layer Thickness: Grade 1, minimum thickness of 0.050 inches.
3. Overall Thickness: 0.08 inches.
4. Interlayer Material: None.
5. Backing Class: Class A (fibrous, non-asbestos formulated).

B. Color and Pattern: Sheet goods: as indicated. Weld rod color per manufacturer’s published match recommendation.

C. Wearing Surface: Overall randomly embossed texture.

D. Sheet Width: 6 feet.

E. Seaming Method: Heat weld in accordance with sheet vinyl and adhesive manufacturer's instructions.

F. Fire-Test-Response Characteristics:

1. Critical Radiant Flux Classification: Class I, not less than 0.45 watts/sq.cm per ASTM E 648.

2.2 LAMINATE FLOORING

A. Products: Subject to compliance with requirements, provide the following:

1. Laminate Flooring consisting of a wear layer, core board and balance backing.
2. Installation Method: Glueless, locking tongue and groove planks in a floating floor system.
3. Visual Appearance: wood strip.
4. Surface Texture: moderate wood grain.
5. Core Board: melamine impregnated and moisture resistant HDF (high density fiberboard).
6. Warrantee: 15 years residential.

B. Performance Characteristics:

1. Critical Radiant Flux: Class II., in accordance with ASTM E 648
2. Level of Use: AC22 (General Residential) in accordance with EN 13329:2000
3. Abrasion Resistance: =1800 Taber cycles in accordance with EN 13329:2000 or NEMA LD3-3.13

2.3 UNDERLAYMENT

A. Underlayment, General: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than ¼-inch over smooth sub-floors and not less than 11/32-inch over board or uneven surfaces.

B. Plywood Underlayment for Sheet Vinyl Floor Covering: DOC PS 1, Exterior C-C Plugged, or Exposure 1 Underlayment with fully sanded face.

C. Cushion for Laminate Flooring: Polyethylene closed-cell foam product as recommended by laminate flooring manufacturer.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic 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. Armalock Installation System: As recommended by laminate flooring manufacturer.

D. Transition Strips for Sheet Vinyl Floor Covering: As specified in Division 9 Section “Resilient Wall Base and Accessories”.

E. Coordinated Transitions and Moldings for Laminate Flooring: As indicated in drawings and recommended by laminate flooring manufacturer to finish gaps and reduce surface levels at laminate flooring edges adjoining other floor finish materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion/application of floor coverings.

B. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install floor coverings until they are same temperature as space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF SHEET VINYL FLOOR COVERINGS

A. Sheet vinyl installer is responsible for installation of wood underlayment, as recommended by the vinyl floor covering manufacturer and the APA, to ensure the product is glued to a clean, dry substrate, as required by the manufacturer.
1. Underlayment installation:
   a. Nail to subflooring.
   b. Layout underlayment per recommendations for offsetting underlayment panel joints above sub-floor joints and staggering of underlayment panel end joints.
   c. Space underlayment panels 1/32-inch apart at edge and end joints.
   d. Fill and sand edge joints of underlayment receiving resilient flooring just before installing floor.

B. Unroll sheet vinyl floor coverings and allow them to stabilize before cutting and fitting.

C. Lay out sheet vinyl floor coverings as follows:

1. Maintain uniformity of floor covering direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
3. Match edges of floor coverings for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other non-permanent marking device.

G. Install floor coverings on covers for crawl space access and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of floor coverings installed on covers. Tightly adhere floor-covering edges to substrates that abut covers and to cover perimeters.

H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 INSTALLATION OF LAMINATE FLOORING

A. Install laminate flooring per manufacturer’s written instructions.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing floor covering installation:

1. Remove adhesive and other blemishes from floor covering surfaces.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.

    a. Do not wash floor coverings until after time period recommended by manufacturer.

B. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Apply protective floor polish to surfaces that are free from soil, visible adhesive, and blemishes if recommended in writing by manufacturer.
2. Cover floor coverings with undyed, untreated building paper until Substantial Completion.

3. Do not move heavy and sharp objects directly over 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.

END OF SECTION

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. Wall base at sheet vinyl flooring.
2. Molding accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 COLORS AND PATTERNS

A. Colors and Patterns: As indicated.

2.2 RESILIENT WALL BASE

A. Wall Base: ASTM F 1861.

B. Type (Material Requirement): TS (rubber, vulcanized thermoset).

C. Group (Manufacturing Method): I (solid, homogeneous) or II (layered).

D. Style: Cove (with top-set toe).

E. Minimum Thickness: 0.125 inch.

F. Height: 4 inches.

G. Lengths: Coils in manufacturer's standard length.

H. Outside Corners: Pre-molded.

I. Inside Corners: Job-formed.

J. Surface: Smooth.

2.3 RESILIENT MOLDING ACCESSORY

A. Transition strips for resilient floor covering to carpet:

1. Material: Rubber; metal transition strips are not allowed.
2. Profile and Dimensions: Manufacturer's standard as selected by Contracting Officer.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturers 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, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Remove substrate coatings 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.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Do not stretch wall base during installation.

E. Pre-Molded Corners: Install pre-molded corners before installing straight pieces.

F. Job-Formed Corners:
1. Inside Corners: Use straight pieces of maximum lengths possible. Form 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.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.

3. Damp-mop surfaces to remove marks and soil.

    a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION

SECTION 09680

CARPET

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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.

B. Related Sections include the following:

1. Division 6 Section “Finish Carpentry” for wood wall base.
2. Division 9 Section “Ceramic Tile” for metal transition strips at carpet.
3. Division 9 Section “Sheet Vinyl Floor Coverings” for reducer strips for carpet at sheet vinyl flooring and laminate flooring.

1.3 SUBMITTALS

A. 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.

B. 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.
2. Carpet Cushion: 6-inch- square Sample.
3. Carpet Seam: 6-inch Sample.

C. 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 listed on Drawings and described 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. Refer to Division 1 Section "Substitutions."

D. Mockups: Before installing carpet, install mockups for each type of carpet installation required demonstrating aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Contracting Officer.
2. Notify Contracting Officer seven days in advance of dates and times when mockups will be installed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Contracting Officer's approval of mockups before starting work.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Remove mockups when directed.
7. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

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.

1.7 WARRANTY

A. General Warranty: Special 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 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. Warranty includes stain and soil protection. 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. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET - CUT PILE - NYLON FIBERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following: Tufted Carpet - Cut Pile.

1. Color: As indicated on Drawings and selected by Contracting Officer from manufacturer's full range.
2. Wear classification: Heavy, as defined by (Engineering Technical Letter) ETL-03-3, April 2003.

B. Fiber Content: Nylon, 25 to 100% recycled fiber.

1. Carpet shall carry Carpet and Rug Institute (CRI) indoor air quality (IAQ) label.
2. VOC out gassing: 100 mg/square meter, maximum.

C. Tuft Bind: 5 pounds per loop pile, minimum, in accordance with ASTM D 1335.

D. Pile Height: 0.18 inches.

E. Surface Pile Weight: 30 oz./sq. yd. Minimum.

F. Gauge: 1/10 inch minimum

G. Density: 5775 minimum; density = 36 x Pile Weight (ounces per square yard) / Pile Height (inches)

H. Primary Backing: Manufacturer's standard synthetic material.

I. Secondary Backing: Manufacturer's standard synthetic material.

J. Width: 12 feet.

K. Performance Characteristics:

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

A. Polyurethane-Foam Cushion: High-density; bonded.

1. Complies with HUD Use of Material Bulletin 72A HUD Building Product Standard and Certification Program for Carpet Cushion.
2. Compression Force Deflection at 50 Percent: 15.0 lb/sq in. per ASTM D 3574.
3. Thickness: 3/8" to 1/2"
4. Density: 5.0-lb/cu ft.

B. Bonded polyurethane carpet cushion shall contain the highest practicable percentage of material which has been recovered or diverted from solid waste (e.g., post consumer waste), but not including material reused in a manufacturing process. Where two materials have comparable price and performance, the one having the higher recovered material content shall be selected.

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:

1. Carpet manufacturer.

B. Tackless Carpet Stripping: Water-resistant plywood in strips as required to match cushion thickness and that complies with CRI 104, Section 11.3.

C. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams. Seaming cement to be low-VOC.

D. Adhesives: Water-resistant, mildew-resistant, non-staining type to suit products and sub-floor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

E. Transition Strips: As indicated on Drawings for each type of adjoining floor finish material.

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. 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. 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. Stretch-in Installation: Comply with CRI 104, Section 11, "Stretch-in Installation."

B. 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. Level adjoining border edges.

C. Do not bridge building expansion joints with carpet.

D. 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.

E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, 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 nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. 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

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SECTION 09911

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 exposed exterior and interior items and surfaces.

1. 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 these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

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. Finished mechanical and electrical equipment.
b. 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. Utility tunnels.
e. Pipe spaces.
f. Duct shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper and copper alloys.
e. Bronze and brass.
f. Galvanized metal.

4. Operating parts include moving parts of operating equipment and the following:

   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 5 Section "Sheet Metal Flashing and Trim" for shop priming ferrous metal.
2. Division 8 Section "Metal Doors " for factory priming metal doors.
3. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.
4. Division 15 Section “Basic Mechanical Materials and Methods” for identification of piping.
5.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Satin (eggshell) refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semi-gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: 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: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Contracting Officer will furnish color chips for surfaces to be coated.

C. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain primers for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1. Contracting Officer will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.

a. Wall Surfaces: Provide samples on at least 100 sq. ft..
b. Small Areas and Items: Contracting Officer will designate items or areas required.

2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.

a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.

3. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to 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 storage containers 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.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F .

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when 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 other Part 2 articles.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Benjamin Moore & Co. (Benjamin Moore).
2. Kelly-Moore Paint Co. (Kelly-Moore).
3. PPG Industries, Inc. (Pittsburgh Paints).
4. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with 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 that are factory formulated and recommended by manufacturer for application indicated. 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. V.O.C. Levels: Provide paint materials with a V.O.C. concentration of not more than 100 grams per liter (g/l).

D. Lead Content: Provide paint materials that have no lead content.

E. Colors: As indicated on Drawings.

2.3 EXTERIOR PRIMERS

A. Exterior Wood Primer for Acrylic Enamels: Factory-formulated alkyd or latex wood primer for exterior application.

1. Benjamin Moore; Moorwhite Primer No. 100: Applied at a dry film thickness of not less than 2.1 mils.
2. Kelly-Moore; 255 Stain--Lock II Stain Resistant Acrylic Primer: Applied at a dry film thickness of not less than 2.0 mils.
3. Pittsburgh Paints; 72-1 Sun-Proof Exterior House & Trim Wood Primer Flat--Latex: Applied at a dry film thickness of not less than 1.6 mils.

4. Sherwin-Williams; A-100 Exterior Latex Wood Primer B42W41: Applied at a dry film thickness of not less than 1.4 mils.

B. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.

1. Benjamin Moore; IronClad Alkyd Low Lustre Metal & Wood Enamel No. 163: Applied at a dry film thickness of not less than 1.3 mils .
2. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils .
3. Pittsburgh Paints; 7-858 Pittsburgh Paints Industrial Rust Inhibitive Steel Primer: Applied at a dry film thickness of not less than 1.5 mils .
4. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils .

C. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.

1. Benjamin Moore; IronClad Latex Low-Lustre Metal & Wood Enamel No. 363: Applied at a dry film thickness of not less than 1.6 mils .
2. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils .
3. Pittsburgh Paints; 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils .
4. Sherwin-Williams; primer not required over this substrate.

D. Exterior Aluminum Primer under Acrylic Finishes: Factory-formulated acrylic-based metal primer for exterior application.

1. Benjamin Moore; IronClad Latex Low-Lustre Metal & Wood Enamel No. 363: Applied at a dry film thickness of not less than 1.6 mils .
2. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils .
3. Pittsburgh Paints; 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils .

2.4 INTERIOR PRIMERS

A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.

1. Benjamin Moore; Regal FirstCoat Interior Latex Primer & Underbody No. 216: Applied at a dry film thickness of not less than 1.0 mil .
2. Kelly-Moore; 971 Acry-Prime Interior Latex Primer/Sealer: Applied at a dry film thickness of not less than 1.6 mils .
3. Pittsburgh Paints; 6-2 SpeedHide Interior Quick-Drying Latex Sealer: Applied at a dry film thickness of not less than 1.0 mil .
4. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils .
5. Sherwin-Williams; PrepRite Masonry Primer B28W300 Series: Applied at a dry film thickness of not less than 3.0 mils .

B. Interior Wood Primer for Acrylic-Enamel and Semi-Gloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.

1. Benjamin Moore; Moore's Alkyd Enamel Underbody No. 217: Applied at a dry film thickness of not less than 1.4 mils .
2. Kelly-Moore; 975 Acry Plex Interior Latex Enamel Undercoat: Applied at a dry film thickness of not less than 1.6 mils .
3. Pittsburgh Paints; 6-855 SpeedHide Latex Enamel Undercoater: Applied at a dry film thickness of not less than 1.0 mil .
4. Sherwin-Williams; PrepRite Classic Interior Primer B28W101 Series: Applied at a dry film thickness of not less than 1.6 mils .

C. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.

1. Benjamin Moore; IronClad Alkyd Low Lustre Medal and Wood Enamel No. 163: Applied at a dry film thickness of not less than 1.3 mils .
2. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils .
3. Pittsburgh Paints; 7-858 Pittsburgh Paints Industrial Rust Inhibitive Steel Primer: Applied at a dry film thickness of not less than 1.5 mils .
4. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils .

D. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.

1. Benjamin Moore; IronClad Latex Low Lustre Metal and Wood Enamel No. 363: Applied at a dry film thickness of not less than 1.6 mils .
2. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils .
3. Pittsburgh Paints; 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils .

2.5 EXTERIOR FINISH COATS

A. Exterior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for exterior application.

1. Benjamin Moore; MoorLife Latex House Paint No. 105: Applied at a dry film thickness of not less than 1.5 mils .
2. Kelly-Moore; 1240 Acry-Shield Exterior Acrylic Flat Finish: Applied at a dry film thickness of not less than 2.0 mils .
3. Sherwin-Williams; SuperPaint Exterior Latex Flat House and Trim Paint, A80 Series: Applied at a dry film thickness of not less than 1.4 mils .

B. Exterior Semi-Gloss Acrylic Enamel: Factory-formulated semi-gloss waterborne acrylic-latex enamel for exterior application.

1. Benjamin Moore; MoorGlo Latex House & Trim Paint No. 096: Applied at a dry film thickness of not less than 1.2 mils .
2. Kelly-Moore; 1250 Acry-Lustre Exterior Semi-Gloss Acrylic Finish: Applied at a dry film thickness of not less than 1.6 mils .

3. Pittsburgh Paints; 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint: Applied at a dry film thickness of not less than 1.2 mils .
4. Sherwin-Williams; SuperPaint Exterior Gloss Latex A-84 Series: Applied at a dry film thickness of not less than 1.4 mils.

2.6 INTERIOR FINISH COATS

A. Interior Low-Luster Acrylic Enamel: Factory-formulated satin (eggshell) acrylic-latex interior enamel.

1. Benjamin Moore; Moore's Regal AquaVelvet No. 319: Applied at a dry film thickness of not less than 1.4 mils .
2. Kelly-Moore; 1610 Sat-N-Sheen Interior Latex Low Sheen Wall and Trim Finish: Applied at a dry film thickness of not less than 1.7 mils .
3. Pittsburgh Paints; 89-Line Manor Hall Interior Eggshell Wall and Trim: Applied at a dry film thickness of not less than 1.4 mils .
4. Sherwin-Williams; SuperPaint Interior Latex Satin Wall Paint A87 Series: Applied at a dry film thickness of not less than 1.6 mils .

B. Interior Semi-Gloss Acrylic Enamel: Factory-formulated semi-gloss acrylic-latex enamel for interior application.

1. Benjamin Moore; Regal AquaGlo No. 333 Premium Interior Finishes Latex Semi-Gloss: Applied at a dry film thickness of not less than 1.3 mils .
2. Kelly-Moore; 1685 Dura-Poxy Semi-Gloss Acrylic Enamel: Applied at a dry film thickness of not less than 1.5 mils .
3. Pittsburgh Paints; 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex: Applied at a dry film thickness of not less than 1.1 mils .
4. Sherwin-Williams; SuperPaint Interior Latex Semi-Gloss Enamel A88 Series: Applied at a dry film thickness of not less than 1.6 mils .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as 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 Architect about anticipated problems when 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 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 substrates of substances that could impair 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. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
   c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

D. Material 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 paint 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. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. 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 film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over 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 that 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, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause 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 type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms, occupied spaces, and exterior areas.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.

G. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by 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.

H. 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.

I. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Low-Luster Acrylic Finish: Number of coats as recommended by manufacturer over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coat: Exterior low-luster acrylic paint.

2. Semi-Gloss Acrylic-Enamel Finish: Number of coats as recommended by manufacturer over a rust-inhibitive primer.

   a. Primer: Exterior ferrous-metal primer.
   b. Finish Coats: Exterior semi-gloss acrylic enamel.

B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated metal surfaces:

1. Low-Luster Finish: Number of finish coats as recommended by manufacturer over a galvanized metal primer.

   a. Primer: Exterior galvanized metal primer.
   b. Finish Coat: Exterior low-luster acrylic paint.

2. Semi-Gloss Acrylic-Enamel Finish: Number of finish coats as recommended by manufacturer over a galvanized metal primer.

   a. Primer: Exterior galvanized metal primer.
   b. Finish Coats: Exterior semi-gloss acrylic enamel.

3.7 INTERIOR PAINT SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

   a. Primer: Interior gypsum board primer.
   b. Finish Coats: Interior low-luster acrylic enamel.

B. Wood and Hardboard: Provide the following paint finish systems over new interior wood surfaces:

1. Semi-gloss Acrylic-Enamel Finish: Two finish coats over a wood undercoater.

   a. Primer: Interior wood primer for acrylic-enamel and semi-gloss alkyd-enamel finishes.
   b. Finish Coats: Interior semi-gloss acrylic enamel.

C. Ferrous Metal: Provide the following finish systems over ferrous metal: Primer is not required on shop-primed items.

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

   a. Primer: Interior ferrous-metal primer.
   b. Finish Coats: Interior low-luster acrylic enamel.

END OF SECTION

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SECTION 10801

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

This Section includes the following: Toilet and bath accessories.

1.3 SUBMITTALS

A. 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.

B. Samples: For each accessory item to verify design, operation, and finish requirements. Approved full-size Samples will be returned and may be used in the Work.

C. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

1.4 QUALITY ASSURANCE

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.

1.5 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.

PART 2 - PRODUCTS

2.1 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. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electro-deposited on base metal.

C. 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.

D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

F. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned).

2.2 FABRICATION

A. 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.

B. 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.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless steel hinge. Provide anchorage that is fully concealed when unit is closed.

D. Framed Glass Units: Fabricate frames for glass-door units to accommodate glass edge protection material.

PART 3 - EXECUTION

3.1 INSTALLATION

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. Secure accessories through to framing or solid blocking. The use of gypsum wall board anchors, mollies, expansion anchors or similar other fasteners is not allowed.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

A. Toilet Tissue Dispenser: Provide toilet tissue dispenser complying with the following:

1. Type: Single-roll dispenser.

2. Mounting: Semi-recess mounted designed for location on base cabinet or gypsum wallboard.
3. Material: Chrome-plated zinc alloy (zamac) or steel.
4. Operation: Non-control delivery with mfr's standard spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter-core tissue rolls.

B. Medicine Cabinet: Provide medicine cabinet complying with the following: Recessed Unit: Nominal 18-by-24- or 17-by-27-inch unit designed for recessed mounting in nominal 4-inch wall depth; with hinged, framed mirror door concealing storage cabinet; and minimum of three adjustable shelves. Door equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch. Fabricate mirror frame, door, hinge, cabinet and shelves of stainless steel.

C. Robe Hook: Provide robe hook complying with the following: Double-Prong Unit: Stainless steel, double-prong robe hook with rectangular wall bracket and back plate for concealed mounting.

D. Towel Holder: Provide towel holder complying with the following: Towel Bars: 24-inch- and 30-inch long, stainless steel, 3/4-inch- square tube with rectangular end brackets and galvanized steel back plates for concealed mounting.

E. Shower Door: Provide shower door complying with the following: Shower Door and Side Panels: Tempered obscure glass panels in heavy-duty clear anodized aluminum frames. Pivot door will be equipped with stainless steel hardware.

END OF SECTION

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SECTION 11451

RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUBMITTALS

Product Data: For each appliance type required indicating compliance with requirements. Include complete operating and maintenance instructions for each appliance.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the residential appliance manufacturer for both installation and maintenance of appliances required for this Project.

B. Source Limitations: Obtain residential appliances through one source from a single manufacturer.

1. Provide products from the same manufacturer for each type of appliance required.
2. To the greatest extent possible, provide appliances by a single manufacturer for entire Project.

C. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of residential appliances.

1.4 DELIVERY

Deliver appliances only after utility rough in is complete and construction in the spaces to receive appliances is substantially complete and ready for installation.

1.5 WARRANTIES

A. General Warranty: Special warranties 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 Contractor under requirements of the Contract Documents.

B. Special Warranties: Written warranties, executed by manufacturer of each appliance specified agreeing to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER

Multi-Purpose Fire Extinguisher: Provide one in each unit kitchen, mounted inside the under-sink cabinet. Extinguisher to be disposable, one-time-use type, 2-1/2-pound dry chemical, 8-second spray discharge, with mounting bracket. Extinguisher to be UL Rated 1A: 10-B:C, and Coast Guard approved.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine roughing-in for plumbing, mechanical, and electrical services, with Installer present, to verify actual locations of services before residential appliance installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Government Furnished Contractor Installed Equipment. The Government will purchase the gas ranges, refrigerators with ice maker, and the dishwashers for all housing units. The appliances will be stored in a warehouse facility located on Malmstrom AFB and shall be identified by the Contracting Officer. The Contractor shall be responsible for transporting the appliances from the warehouse and delivering them to the housing units for installation. The Contractor shall provide all labor, equipment, and materials to complete the installation of the appliances.

3.3 ADJUSTING AND CLEANING

A. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from residential appliances and leave units in clean condition, ready for operation.

END OF SECTION

SECTION 12356

KITCHEN AND BATH CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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. Wood-faced kitchen cabinets.
2. Wood-faced vanity cabinets.
3. Plastic-laminate countertops.

B. Related Sections include the following:

1. Division 8 Section “Door Hardware” for coordination with bi-fold door pulls.
2. Division 11 Section "Residential Appliances" for appliances mounted in kitchen casework.
3. Division 15 Section "Plumbing Fixtures" for sink units mounted in countertops.

1.3 DEFINITIONS

A. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including face frames and visible surfaces in open cabinets or behind glass doors.

B. Semi-Exposed Surfaces of Casework: Surfaces behind opaque doors or drawer fronts, including interior faces of doors and interiors and sides of drawers. Bottoms of wall cabinets are defined as "semi-exposed."

C. Concealed Surfaces of Casework: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of cabinets installed directly against and completely concealed by walls or other cabinets. Tops of wall cabinets and utility cabinets are defined as "concealed."

1.4 SUBMITTALS

A. Product Data: For the following:

1. Cabinets
2. Plastic-laminate countertops
3. Cabinet hardware

B. Shop Drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and back splash profiles, cutouts for plumbing fixtures, and methods of joining countertops.

C. 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 exposed to view.

1. Shop applied finishes.

2. Plastic laminates.

D. Samples for Verification: As follows:

1. One full-size, finished base cabinet complete with hardware, doors, and drawers, but without countertop.
2. One full-size, finished wall cabinet complete with hardware, doors, and adjustable shelves.
3. Plastic laminate for countertops, 8 by 10 inches.
4. Plastic laminate post-formed countertop showing front, cove, back splash, end splash, 6 inches wide

E. Product Certificates: Signed by manufacturers of casework certifying that products furnished comply with requirements.

1.5 QUALITY ASSURANCE

A. Source Limitations for Cabinets: Obtain cabinets through one source from a single manufacturer.

B. Quality Standards: Unless otherwise indicated, comply with the following standards:

1. Cabinets: KCMA A161.1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semi-exposed location of each unit and showing compliance with the above standard.

2. Plastic-Laminate Countertops: KCMA A161.2.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install kitchen casework 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. Established Dimensions: Where kitchen casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

C. Field Measurements for Countertops: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 COORDINATION

A. Coordinate layout and installation of blocking and reinforcement in partitions for support of kitchen casework.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to provide products by one of the following: Casework:

1. Haas Cabinet Co., Inc.
2. KraftMaid Cabinetry, Inc.
3. Lanz Cabinets
4. Merillat Industries, LLC

2.2 CABINET MATERIALS

A. Exposed Materials: Comply with the following:

1. Exposed Wood Species: As follows. Do not use two adjacent exposed faces that are noticeably dissimilar in color, grain, figure, or natural character markings: Red oak.
2. Solid Wood: Clear hardwood lumber, 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 and Grade C backs of same species as faces.

B. Semiexposed Materials: Unless otherwise indicated, provide the following:

Thermoset Decorative Panels: Medium-density particleboard complying with ANSI A208.1, Grade M-2; with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

1. Provide thermoset decorative overlay on both sides of shelves, dividers, drawer bodies, and other components with two semiexposed surfaces.
2. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with semiexposed edges.

C. Concealed Materials: Comply with the following:

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.

2.3 BINDERS

Products with urea-formaldehyde shall not be used.

2.4 COLORS, TEXTURES, AND PATTERNS

Colors, Textures, and Patterns: As indicated for cabinets and plastic-laminate countertops on the Drawings.

2.5 COUNTERTOP MATERIALS

A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. Grade: HGP – Post forming .039”
2. Grade for Backer Sheet: BKL. – Unfinished Backing Sheet .020”

B. Particleboard: ANSI A208.1, Grade M-2.

C. Plywood: Exterior softwood plywood complying with PS 1, Grade C-C Plugged, touch sanded.

2.6 CASEWORK HARDWARE

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. BLUM, Self Closing Module 90 (176 deg angle), nickel plated.

C. Wire Pulls: BHMA A156.9, 4 inch long, 5/16 inches in diameter, Stanley, Model 348315 BMHA Finish: 26D (Satin Chromium plated), or Stanley, Model 348311, BMHA Finish: 27 (Satin Aluminum) or as otherwise specified.

D. Adjustable Shelf Standards and Supports: B04071. Knape and Vogt 346, Donnel, nickel plated.

E. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings or epoxy coated steel drawer slides in accordance with BHMA A156.9 and rated for the following loads: Box Drawer Slides: 100 lbf.

2.7 FINISHING MATERIALS

A. Finish System for topcoat(s): Conversion Varnish or better.

B. Sheen: Satin

2.8 CABINET CONSTRUCTION

A. Fabricate to KCMA Quality Standards.

B. Face Style: Reveal overlay; door and drawer faces partially cover cabinet body or face frames.

C. Face Frames: 3/4-by-1-5/8-inch solid wood.

D. Door and Drawer Fronts: Solid-wood stiles and rails of oak, 3/4 inch thick, with solid wood raised door panels of oak.

E. Exposed Cabinet Ends: Veneer-faced plywood.

F. Cabinet Ends: 3/8-inch- thick plywood.

G. Cabinet Tops and Bottoms: 3/8-inch- thick plywood, fully supported by and secured in rabbets in end panels, front frame, and back rail.

H. Back, Top, and Bottom Rails: 3/4-by-2-1/2-inch solid wood, interlocking with end panels and rabbeted to receive top and bottom panels. Back rails secured under pressure with glue and with mechanical fasteners.

I. Wall-Hung Unit Back Panels: 3/16-inch- thick plywood fastened to rear edge of end panels and to top and bottom rails.

J. Base Unit Back Panels: 1/8-inch- thick plywood fastened to rear edge of end panels and to top and bottom rails.

K. Front Frame Drawer Rails: 3/4-by-1-1/4-inch solid wood mortised and fastened into face frame.

L. Drawers: Fabricate with exposed fronts fastened to sub-front with mounting screws from interior of body.

1. Join sub-fronts, backs, and sides with glued dovetail joints.
2. Sub-fronts, Backs, and Sides: 1/2-inch- thick solid wood or 1/2-inch- thick plywood.
3. Bottoms: 1/4-inch- thick plywood.

M. Shelves: 5/8-inch- thick particleboard or 1/2-inch- thick plywood. Mounting or Hanger Strips: 1/2-inch thick plywood, or 1/2-inch thick solid wood

N. Particleboard cores shall not be used in cabinet construction for frame members, doors, drawer fronts, or any other member requiring screw-holding capability.

O. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.

P. Factory Finishing: To greatest extent possible, finish casework at factory. Defer only final touchup until after installation.

2.9 PLASTIC-LAMINATE COUNTERTOPS

A. Fabricate to KCMA Quality Standards.

B. Configuration: Provide countertops with the following front, cove (intersection of top with back splash), back splash, and end-splash style. Provide seamless, rounded corners at countertop nosings and at the intersection of the countertop and back splash:

1. Front: Rolled.
2. Cove: Cove molding (one-piece post-formed laminate supported at junction of top and back splash by wood cove molding).
3. Back splash: Curved or waterfall shaper with scribe.
4. End Splash: Square edge with scribe.

C. Plastic-Laminate Substrate: Particle board not less than 3/4 inch thick. For countertops at sinks and lavatories, use phenolic-resin particleboard or melamine fortified resin particleboard.

D. Paper Backing: Provide paper backing on underside of countertop substrate.

E. Build Down: Seal unfinished faces (back and bottom) of build down (front edge of countertop) with paint: one prime coat and one finish coat.

F. Sink and Lavatory Cut-Outs: Seal exposed particleboard at sink and lavatory cut-outs with paint.

G. Corner Miter Joints: Seal exposed particleboard at corner miter joints with one prime coat and one finish coat prior to joining the countertop sections.

2.10 FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and that is recommended for applied finishes.

C. Finish work in the factory in accordance with KCMA Quality Standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install work in accordance with KCMA Quality Standards.

B. Install casework with no variations in flushness of adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit with maximum gaps of 1/32 inch. Provide filler strips, scribe strips, and moldings in finish to match casework face.

C. Install casework without distortion so doors and drawers fit openings and are aligned. Complete installation of hardware and accessories as indicated.

D. Install casework and countertop level and plumb to a tolerance of 1/8 inch in 8 feet.

E. Fasten cabinets to adjacent units and to backing. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.

F. Fasten plastic-laminate countertops by screwing through corner blocks of base units into underside of countertop. Form seams using splines to align adjacent surfaces, and secure with glue and concealed clamping devices designed for this purpose.

3.2 ADJUSTING AND CLEANING

A. Adjust casework and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

B. Clean casework on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

C. Cabinet and countertop surfaces shall be cleaned in accordance with manufacturer’s instructions.

END OF SECTION

SECTION 12491

HORIZONTAL LOUVER BLINDS AND DRAPERY RODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

This Section includes the following types of venetian blinds and accessories:

1. Mini blinds with aluminum louver slats.
2. Traverse rods: at window openings over 5-feet wide and at exterior terrace door with full sidelight.

1.3 DEFINITIONS

Mini blind: Venetian blind with nominal 1-inch- wide louver slat.

1.4 SUBMITTALS

A. 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.

B. Shop Drawings: Show location and extent of horizontal louver blinds. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.

C. Samples for Initial Selection: For each colored component of each type of horizontal louver blind indicated. Include similar Samples of accessories involving color selection.

D. 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. Corded Window Covering Product Standard: Provide horizontal louver blinds complying with WCMA A 100.1.

C. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Contracting Officer.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver blinds in factory packages, marked with manufacturer and product name, and location of installation using same room designations indicated on Drawings.

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 of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM LOUVER SLATS

A. Louver Slats: Aluminum, alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.

1. Nominal Slat Width: 1 inch for mini blinds. Slat Spacing: Not less than every 20-mm for 15.2 slats or more per foot.

2. Nominal Slat Thickness: Not less than 0.008 inch.
3. Slat Finish: Off white.

B. Head Rail/Valance: Decorative, integrated head rail/valance not requiring a separate valance or end brackets for finished appearance; formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends; capacity for one blind per head rail. Finish Color Characteristics: Match color, texture, pattern, and gloss of louver slats.

C. Bottom Rail: Formed-steel or extruded-aluminum tube, sealed with plastic or metal capped ends top contoured to match crowned shape of louver slat, bottom contoured for minimizing light gaps; with enclosed and protected ladders and tapes to prevent their contact with sill.

D. Tilt Control: Consisting of enclosed worm gear mechanism, slip clutch or detachable wand preventing over rotation, and linkage rod, for the following operation:

1. Tilt Operation: Manual with clear plastic wand.
2. Tilt: Full.

E. Lift Operation: Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.

F. Ladders: Evenly spaced to prevent long-term louver sag. For blinds with nominal slat width 1 inch or less: Braided string.

G. Mounting: End 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. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

H. Bottom Brackets: Provide brackets to secure bottom of blinds on doors to patios. Provide brackets on both active, and inactive, leafs.

2.2 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: Non-corrodible or corrosion-resistant-coated materials. 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: Blind Units Installed Outside Jambs: Width and length as determined by locating bottom edge and side edges of blind units midpoint on window casings (bottom and side casings). Terminations between blinds of end-to-end installations will be at centerlines of mullion or other defined vertical separations between openings.

D. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting head rail, 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 non-corrosive 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: As indicated. 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 plastic matching or coordinating with slat color, unless otherwise indicated.

2.3 TRAVERSE RODS

Traverse Rods: One-inch oval section, heavy duty type, manufacturer’s standard product for width of openings; complete with mounting brackets and hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, 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 2 inches to interior face of glass. Install intermediate support as required to prevent deflection in head rail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.

B. Head-Mounted: Install head rail on face of opening head, except at Garden Window.

C. Flush Mounted: At Garden Window: install blinds with louver edges flush with finish face of opening if slats are tilted open

D. Terrace Door with Full Sidelight (inactive leaf) and French Door: Install bottom brackets on face of doors below glazing.

3.3 ADJUSTING

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, before time of Substantial Completion.

3.5 Horizontal Louver Blind Placement Schedule

A. Horizontal louver blinds shall be provided at all exterior windows.

B. Horizontal louver blinds shall be provided at terrace door and sidelight (active and inactive leaves).

C. Horizontal louver blinds shall be provided at French door (each leaf).

3.6 TRAVERSE ROD INSTALLATION

A. Provide blocking at all locations as required to securely mount rods.

B. Use manufacturer's standard brackets and hardware; install per manufacturer's instructions.

C. Install rods above transom windows where transom windows occur above casement windows.

END OF SECTION

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SECTION 13110

CATHODIC PROTECTION BY GALVANIC ANODES

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. Reference Division 16 - Electrical.

1.2 SUBMITTAL

A. Submit the following in accordance with Section 01330, "Submittal Procedures."
   1. Shop Drawings
      a. Insulating flange sets
      b. Joint bonds
   2. Product Data
      a. Anodes; G
      b. Insulating flange sets
      c. Dielectric unions
      d. Wires
      e. Cable and wire
      f. Casings, insulation, and seals
      g. Shunt resistors
   3. Certificates
      a. Qualifications of Corrosion Engineer; G
   4. Operation and Maintenance Data
      a. Cathodic Protection System, Data Package 5; G
         1) Submit operation and maintenance data in accordance with Section 01701, "Operation and Maintenance Manuals"
   5. Closeout Submittals
      a. Final Cathodic Protection System Field Test Report; G

1.3 SERVICES OF CORROSION ENGINEER

A. The Contractor shall obtain the services of a corrosion engineer to supervise, inspect and test the installation of the cathodic protection system(s). Corrosion Engineer refers to a registered professional engineer with certification of licensing that includes education and experience in cathodic protection of buried or submerged metal structures, or a person accredited or certified by the National Association of Corrosion Engineers at the level of Corrosion Specialist or Cathodic Protection Specialist. Such a person shall have not less than five years experience in the cathodic protection of underground water or gas lines. The contractor shall submit evidence of the qualifications of corrosion engineer to the Contracting Officer for review and approval.

PART 2 - PRODUCTS

2.1 ANODES

A. Magnesium: ASTM B 843 Chemical composition as follows:
   1. Aluminum 0.01 percent maximum
   2. Manganese 0.5-1.3 percent

3.	Zinc	-0- percent maximum
4.	Silicon	0.05 percent maximum
5.	Copper	0.02 percent maximum
6.	Nickel	0.001 percent maximum
7.	Iron	0.03 percent maximum
8.	Other Impurities	0.05 percent each, 0.3 percent maximum total
9.	Magnesium	Remainder

a. Bare Anode Weight: 17 lbs not including core.

B. Anode Wires and Core:
1. Anode Lead Wires: UL 83, Type THWN THHN solid copper conductors, not less than No. 12 AWG, 20 feet long, of sufficient length to extend to the accompanying junction box without splicing. Anode lead wire shall be factory installed. Silver solder the lead wire to the anode core, and seal the soldered connection and recessed end of the anode with a dielectric sealing compound.
2. Anode Core: Spring spiral 10 ga galvanized steel core.

C. Anode Backfill: Chemical composition as follows:
1. Hydrated Gypsum: 75 percent
2. Bentonite Clay: 20 percent
3. Sodium Sulfate: 5 percent

Provide granular backfill with 100 percent passing through a 150 micrometers screen. Provide prepackaged anode in a cloth bag containing the anode and backfill. Center the anode in the firmly packed backfill using spacers. Overall dimensions of the bagged 17 lb. anode shall be 165 by 6-1/2 by 17 inches with a total minimum weight of 45 lbs nominal.

2.2 TEST STATIONS

A. Flush Mounted Type: NEMA ICS 6. Metallic or non-metallic with terminal board, 6 terminal posts and lockable lid. The unit shall be CP Test Srvs ‘Glen 4’ of standard design, manufactured for use as a cathodic protection test station, complete with cover, terminal board, shunts, and nickel plated brass hardware. The terminal board shall be removable for easy access to wires. Provide cast iron locking valve box cover. The yellow cover shall have a cast in legend “CP TEST”.

B. Terminal Boards: Provide terminal boards for test stations made of phenolic. Insulated terminal boards shall have 6 terminals. Install copper lugs, copper buss bars and shunts on the terminal board as indicated. Test station terminal connections shall be permanently tagged to identify each termination of conductors (e.g. identify the conductors connected to the protected structure, anodes, and reference electrodes). Conductors shall be permanently identified by means of plastic Panduit PLF1MA marker ties to indicate termination. Each conductor shall be color coded as follows:
1. Anode Lead Wire: Black
2. Structure Lead Wire: White
3. Reference Electrode Lead Wire: Yellow or orange

C. Shunt Resistors: One/tenth (.1), two ampere, read Cott type shunts.

D. Cast-In-Place Concrete: Flush mount type test stations, shall be centered in a 460 x 460 x 102 mm concrete slab. Concrete shall be 20 Mpa minimum ultimate 28-day compressive strength with 25 mm minimum aggregate conforming to Section 03300, “Cast-in-Place Concrete”.

2.3 CABLE AND WIRE OTHER THAN ANODE LEAD WIRES

A. THWN or THHN stranded copper conductor, color coded and #12 sized Test Station Lead Wire. Copper wires shall conform to ASMT B2 and ASTM B8. No. 12 or 14 AWG lead wires terminating at a junction box or test station shall have a cable identification tag. Do not use bare copper wire for joint continuity bonds. Refer to anode lead wires. Joint bond wires shall be #8 AWG stranded copper with HMWPE insulation.

2.4 CABLE AND WIRE IDENTIFICATION TAGS

A. Panduit PLF1MA Marker Ties. Print letters with Panduit PFX-0 Pen.

2.5 WIRE CONNECTORS

A. Use soldered terminal or solderless copper lugs for terminating test station leads.

2.6 UNDERGROUND SPLICES

A. Provide splices with a compression connector on the conductors, and insulation and waterproofing using one of the following methods which are suitable for continuous submersion in water and comply with ANSI C119.1.
   1. Provide cast-type splice insulation by means of molded casting process employing a thermosetting epoxy resin insulating material applied by a gravity poured method or pressure injected method. Provide component materials of the resin insulation in a packaged form ready for convenient mixing without removing from the package.
      a. Gravity poured method shall employ materials and equipment contained in and approved commercial splicing kit which includes a mold suitable for the cables to be spliced. When the mold is in place around the joined conductors, prepare the resin mix and pour into the mold.
   2. Provide heavy wall heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which shall be applied by a clean burning propane gas torch.

2.7 CONDUIT

A. Reference related specification sections.

B. Buried Cable Warning and Identification Tape: Polyethylene tape, manufactured for warning and identification of buried cable and conduit. Tape shall be 3 inches wide, Yellow in color and read “Caution Buried Cable Below” or similar. Color and lettering shall be permanent and unaffected by moisture or other substances in backfill materials.

2.8 INSULATING TAPE

A. UL 510.

2.9 INSULATING FLANGE SETS

A. Provide full-faced gaskets, insulating sleeves and washers, and steel washers. Provide insulating flange sets rated for operation at the rated pressure and temperature.

B. Gaskets: ASME B16.21. Neoprene faced phenolic material rated service application (gas or water).

C. Insulating Washers and Sleeves: Two sets 3 mm laminated phenolic for operation at 450 degrees F. Insulating washers shall fit within the bolt facing on the flange over the outside of the fabric reinforced phenolic sleeve.

D. Washers: Steel, cadmium plated, to fit within the bolt facing on the flange.

2.10 STEEL FLANGES AND BOLTING

A. Steel Flanges: ASME B16.5, 150 lb. or 300 lb as required by application.

B. Bolting: ASMT A307, Grade B for bolts; ASTM A 194/A 194M, Grade 2 for nuts. Dimensions: ASME B18.2.1 for bolts, ASME B18.2.2 for nuts. Threads: ASME B1.1, Class 2A fit for bolts, Class 2B fit for nuts. Bolts shall extend completely through the nuts and may have reduced shanks of a diameter not les than the diameter at the roof of threads.

2.11 DIELECTRIC UNIONS

A. ASME B16.39, Class 1 or 2, for dimensional, strength, and pressure requirements. Insulation barrier shall limit galvanic current to one percent of the short-circuit current in a corresponding metallic joint. Provide insulating material impervious to water or gas.

2.12 EXOTHERMIC WELD KITS

A. Exothermic weld kits specifically designed by the manufacturer for welding the types of materials and shapes provided.

2.13 ELECTRICALLY INSULATING COATINGS

A. Comfortable water tight sealant having dielectric strength not less than 15 kV for a 3 mm thick layer.

2.14 CASING INSULATORS AND SEALS

A. Casing insulators shall have a minimum 12 inch band width, constructed of heat fused plastic coated steel and multi-segmented to attach firmly around the pipe. Casing end seals shall be S-shaped rubber seals with stainless steel straps.

PART 3 - EXECUTION

3.1 INSTALLATION

A. IEEE C2.

B. Anodes and Lead Wires: Provide each anode and lead wires as follows:
1. Excavate hole to a minimum 3 inches larger than the packaged anode diameter, at or below the protected structure depth.
2. Excavate lead wire trench to 24 inches deep, to suitable installation width.
3. Do not lift or support anode by the lead wire. Where applicable, remove manufacturer's plastic wrap/bag from the anode. Exercise care to preclude damaging the cloth bag and the lead wire insulation.
4. Center the packaged anode in the hole with native soil in layers not exceeding 6 inches. Hand tamp each layer to remove voids taking care not to strike the anode lead wire. When the backfill is 6 inches above the top of the anode, pour not less than ten gallons of water into the hole to saturate the anode backfill and surrounding soil. Anodes shall not be backfilled prior to inspection and approval by the Contracting Officer.
5. Cover the lead wire trench bottom with a 3 inch layer of sand or stone free earth. Center wire on the backfill layer, do not stretch or kink the conductor. Place backfill over wire in layers not exceeding 6 inches deep, compact each layer thoroughly. Do not place tree roots, wood scrap, vegetable matter and refuse in backfill. Place cable warning tape within 18 inches of finished grade, above cable and conduit.
6. Connect anode lead wire(s) to the test station terminal board(s), directly to the protected structure(s) by use of exothermic weld kit(s). Clean the structure surface by scraping, filling or wire brushing to produce a clean, bright surface. Weld connections using exothermic kit(s) in accordance with the kit manufacturer's instructions. Check and verify adherence of the bond to the substrate for mechanical integrity by striking the weld with a 2 lb hammer. Cover connections with an electrically insulating coating which is compatible with the existing coating on the structure. Allow sufficient slack in the lead wire to compensate for movement during backfilling operation.
7. Connect structure leads to structure by use of exothermic weld kit(s). Clean the structure surface by scraping, filing or wire brushing to produce a clean, bright surface. Weld connections using exothermic kit(s) in accordance with the kit manufacturer's instructions. Conform to the safety precautions of paragraph 3.1.2. Check and verify adherence of the bond to the substrate for mechanical integrity by striking the weld with a 2 lb hammer. Cover connections with an electrically insulating coating which is compatible with the existing coating on the structure. Connect structure lead wires to the test station terminal board(s).

C. Safety Precautions for Welding: Contractor shall take proper safety precautions prior to and during welding. Exothermic weld connections shall be spaced a minimum of 6 inches apart. In the event of an unsuccessful weld, the new weld location shall be located a minimum of 6 inches from the unsuccessful weld and any other existing welds.

D. Test Stations: Provide test stations as indicated on drawings:

E. Insulating Flange Sets: Provide insulating flange sets aboveground as indicated. Locate insulating flanges on lines entering buildings at least 12 inches above grade or floor level. Cut piping and provide flanges into place. Carefully align flange bolt holes and weld flange to pipe

in accordance with ASME B16.25. Electrically isolate pipelines entering buildings from the structure wall either below or above ground with an electrically isolating wall sleeve. Provide insulating flange sets into place without springing or forcing. Carefully install flange bolt sleeves to avoid damage to the sleeves.

F. Dielectric Unions: Cut pipe ends square, remove fins and burrs, cut taper pipe threads in accordance with ASME B1.20.1. Provide insulating unions as indicated. Work piping into place without springing or forcing. Apply joint compound or thread tape to male threads only. Backing off to permit alignment of threaded joints shall not be permitted. Engage threads so that not more than three threads remain exposed. Cover unions with an electrically insulating coating.

G. Joint Bonds: Provide 2 each #8 AWG joint bonds on metallic pipe to and across buried flexible couplings, mechanical joints, flanged joints except at places where insulating joints are specified and joints not welded or threaded to provide electrical continuity. Connect bond wire(s) to the structure(s) by use of exothermic weld kit(s). Clean the structure surface by scraping, filing or wire brushing to produce a clean, bright surface. Weld connections using exothermic kits in accordance with the kit manufacturer's instructions. Check and verify adherence of the bond to the substrate for mechanical integrity by striking the weld with a 2 lb hammer. Cover connections with an electrically insulating coating which is compatible with the existing coating on the structure.

H. Casings, Insulation, and Seals: Where the pipeline is installed in a casing under a roadway or railway, insulate the pipeline from the casing, and seal the annular space against intrusion of water.

I. Concrete: Concrete shall be 3000 psi minimum ultimate 28-day compressive strength with one inch minimum aggregate conforming to Section 03300, "Cast-in-Place Concrete".

J. Reconditioning of Surfaces:
1. Restoration of Sod: Restore unpaved surfaces disturbed during the installation of anodes and wires to their original elevation and condition. Preserve sod and topsoil carefully and replace after the backfilling is completed. Where the surface is disturbed in a newly seeded area, re-seed the area with the same quality and formula of seed as that used in the original seeding.
2. Restoration of Pavement: Repair pavement, sidewalks, curbs, and gutters where existing surfaces are removed or disturbed for construction.

3.2 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by the Contracting Officer or his designated representative. Advise the Contracting Officer 5 days prior to performing each field test. Quality control for the cathodic protection system shall consist of the following:
1. Initial field testing by the contractor upon construction.
2. Final field testing by the contractor.

B. Testing:
1. Final Cathodic Protection System Field Testing: Systems shall be tested and inspected by the Contractor's corrosion engineer in the presence of the Contracting Officer's corrosion protection engineer or an approved representative. Record test data, including date, time, and locations of testing. Contractor shall correct and retest, at his expense,

deficiencies in the materials and installation observed by these tests and inspections. Testing shall include the following measurements.

a. Base Potential Test: At least 24 hours after backfilling of the pipe and installation of the anodes, but before connection of anodes to the structure, measure base (native) structure-to-electrolyte potentials of the pipe and casing structure. Perform measurements at test stations and other locations suitable for test purposes (such as service risers or valves). The locations of these measurements shall be identical to the locations specified for potential measurements with anodes connected. Use the same measuring equipment that is specified for measuring protected potential measurements.

b. Insulation Joint Testing: Perform insulation testing at each insulating joint or fitting prior to burying the joint of fitting and during the connection of anodes to the pipe at anode junction box and/or test station. After connection, test by measuring the potential shift on both sides of the insulating joint. These tests shall demonstrate that no metallic contact or short circuit exists between the two insulated sections of the pipe. Report and repair defective insulating flanges at the Contractor's expense.

c. Electrical Continuity Testing: Perform electrical continuity testing for joint bonded pipe prior to backfilling of the pipe by the potential shift method.

d. Pipe Casing Testing: Before final acceptance of the installation, test the electrical insulation of the carrier pipe from casings and correct any short circuits.

e. Anode-to-Soil Potential and Anode Output Testing: Measure anode-to-soil potential of each anode with the anode disconnected through the test stations. After connecting the anodes to the pipe, measure current output of each anode across the shunt installed.

f. Protected Potential Measurement Tests: With the entire galvanic protection system put into operation for at least 1/2 hour, measure potentials along the pipeline and at all casings using a portable copper-copper sulfate and all permanent reference electrodes and a voltmeter having an input impedance of not less than 10 megohm. The locations of these measurements shall be identical to the locations used for the base potential measurements.

g. Interference Testing: Perform interference testing with respect to any crossing and nearby foreign pipes in cooperation with the owner of the foreign pipes. The testing shall verify that the cathodic protection system does not have a deleterious effect on the foreign pipelines, and vice versa. Prepare a full report of the tests giving all details including remedial actions taken or recommendations to correct noted interference problems.

2. Final Cathodic Protection System Field Test Report: The contractor shall submit a field test report of the cathodic protection system. All structure-to-electrolyte measurements, including initial potentials and anode outputs, shall be recorded on applicable forms. Identification of test locations, test station and anode test stations shall coordinate with the as-built drawings and be provided on system drawings included in the report. The contractor shall locate, correct, and report to the Contracting Officer any short circuits encountered during the checkout of the installed cathodic protection system.

C. Criteria for Cathodic Protection: Conduct in accordance with NACE REP0169 or NACE RP0285. Criteria for determining the adequacy of protection shall be selected by the corrosion engineer as applicable:

1. A negative voltage of at least 850 millivolts as measure between the structure surface and a saturated copper-copper sulfate reference electrode contacting the earth electrolyte. Determination of this voltage is to be made with the protective current applied to the structure pipeline for a minimum of 1/2 hour. Voltage drops must be considered for valid interpretation of this voltage drop consideration shall be identified by the Contractor's corrosion engineer and approved by the Government corrosion engineer.
2. A negative polarized potential of at least 850 millivolts as measured between the structure surface a saturated copper-copper sulfate reference electrode contacting the earth electrolyte. Determination of this voltage is to be made after the protective current has been applied to the structure pipeline for a minimum of 1/2 hour.
3. A minimum polarization voltage shift of 100mV measured between the structure surface and a saturated copper-copper sulfate reference electrode contacting the earth electrolyte. This voltage shift shall be determined by interrupting the protective current and measuring the polarization decay. At the instant the protective current is interrupted ("instant off"), an immediate voltage shift will occur. The voltage reading just after the immediate shift shall be used as the base reading from which to measure the polarization decay. The polarization decay shall be the difference between the base reading and a voltage measurement made ½ hour after the interruption of protective current.

3.3 DEMONSTRATION

A. Instructing Government Personnel: During the warranty testing and at a time designated by the Contracting Officer, make available the services of a technician regularly employed or authorized by the manufacturer of the Cathodic Protection System for instructing Government personnel in the proper operation, maintenance, safety, and emergency procedures of the Cathodic Protection System. The period of instruction shall be not less than one 8-hour working days. Conduct the training at the jobsite or at another location mutually satisfactory to the Government and the Contractor. The field instructions shall cover all of the items contained in the operation and maintenance manual

3.4 SCHEDULE

A. Some metric measurements in this section is based on a mathematical conversion of an English unit measurement, and not on metric measurement commonly agreed upon by the manufacturers or other parties. The English and metric units for the measurements shown are as follows:
   1. Reference Electrodes:
      a. Diameter: 1-1/4 inches
      b. Length: 10 inches
   2. Warning Tape:
      a. Width: 3 inches

End of Section

SECTION 13280

ASBESTOS ABATEMENT

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2	(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z87.1	(1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection
ANSI Z88.2	(1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 732	(1995) Aging Effects of Artificial Weathering on Latex Sealants
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 1331	(1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E 84	(1998e1) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 119	(1998) Fire Tests of Building Construction and Materials
ASTM E 736	(1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E 1368	(1997) Visual Inspection of Asbestos Abatement Projects

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 61	National Emissions Standards for Hazardous Air Pollutants
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(1990) Compressed Air for Human Respiration
CGA G-7.1	(1997) Commodity Specification for Air

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) Safety and Health Requirements Manual

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90-018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 340/1-90-019	(1990) Asbestos/NESHAP Adequately Wet Guidance
EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(1996; TIA 96-1, 96-2) Methods of Fire Tests for Flame-Resistant Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 84-100	(1984; Supple 1985, 1987, 1988 & 1990) NIOSH Manual of Analytical Methods

UNDERWRITERS LABORATORIES (UL)

UL 586	(1996) High-Efficiency, Particulate, Air Filter Units

1.2 DEFINITIONS

a. Adequately Wet: A term defined in 40 CFR 61, Subpart M, and EPA 340/1-90-019 meaning to sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.

b. Aggressive Method: Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).

c. Amended Water: Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter when tested in accordance with ASTM D 1331.

d. Asbestos: Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophylite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

e. Asbestos-Containing Material (ACM): Any materials containing more than one percent asbestos.

f. Asbestos Fiber: A particulate form of asbestos, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.

g. Authorized Person: Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

h. Building Inspector: Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) "Building Inspector" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

i. Certified Industrial Hygienist (CIH): An Industrial Hygienist certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

j. Class I Asbestos Work: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

k. Class II Asbestos Work: Activities defined by OSHA involving the removal of ACM, which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos - containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic,

flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials, which would fit into a glove bag may be classified as a Class III job.

l. Class III Asbestos Work: Activities defined by OSHA as involving repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

m. Class IV Asbestos Work: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean-up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists and cleaning up loose ACM debris from TSI or surfacing ACM following construction.

n. Clean room: An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

o. Competent Person: In addition to the definition in 29 CFR 1926, Section .32(f), a person who is capable of identifying existing asbestos hazards as defined in 29 CFR 1926, Section .1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

p. Contractor/Supervisor: Individual who supervises asbestos abatement work and has EPA Model Accreditation Plan "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

q. Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.

r. Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

s. Demolition: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

t. Disposal Bag: A 0.15 mm 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926, Section .1101, used for transporting asbestos waste from containment to disposal site.

u. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in 1 standard sized glove bag or waste bag, not larger than 1.5 m 60 inches in length and width in order to access a building component.

v. Equipment Room or Area: An area adjacent to the regulated area used for the decontamination of employees and their equipment.

w. Employee Exposure: That exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

x. Fiber: A fibrous particulate, 5 micrometers or longer, with a length to width ratio of at least 3 to 1.

y. Friable ACM: A term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent, as determined by a method other than point counting by PLM, the asbestos content is verified by point counting using PLM.

z. Glove Bag: Not more than a 1.5 by 1.5 m 60 by 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

aa. High-Efficiency Particulate Air (HEPA) Filter: A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

bb. Homogeneous Area: An area of surfacing material or thermal system insulation that is uniform in color and texture.

cc. Industrial Hygienist: A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

dd. Intact: ACM, which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.

ee. Model Accreditation Plan (MAP): USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763, Subpart E, Appendix C.

ff. Modification: A changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system.

gg. Negative Exposure Assessment: A demonstration by the Contractor to show that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).

hh. NESHAP: National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61, Subpart M.

ii. Non-Friable ACM: A NESHAP term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light

Microscopy, that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

jj. Non-Friable ACM (Category I): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

kk. Non-Friable ACM (Category II): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning any material, excluding Category I non-friable ACM, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

ll. Permissible Exposure Limits (PELs):

(1) PEL-Time weighted average(TWA): Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8 hour time weighted average (TWA), as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

(2) PEL-Excursion Limit: An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

mm. Regulated Area: An OSHA term defined in 29 CFR 1926, Section .1101 meaning an area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted; also any adjoining area where debris and waste from such asbestos work accumulate; and an area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limit.

nn. Removal: All operations where ACM is taken out or stripped from structures or substrates and includes demolition operations.

oo. Repair: Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM attached to structures or substrates. If the amount of asbestos so "disturbed" cannot be contained in 1 standard glove bag or waste bag, Class I precautions are required.

pp. Spills/Emergency Cleanups: Cleanup of sizable amounts of asbestos waste and debris which has occurred, for example, when water damage occurs in a building, and sizable amounts of ACM are dislodged. A Competent Person evaluates the site and ACM to be handled, and based on the type, condition and extent of the dislodged material, classifies the cleanup as Class I, II, or III. Only if the material was intact and the cleanup involves mere contact of ACM, rather than disturbance, could there be a Class IV classification.

qq. Surfacing ACM: Asbestos-containing material which contains more than 1% asbestos and is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on

ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

rr. Thermal system insulation (TSI) ACM: ACM which contains more than 1% asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain or water condensation.

ss. Transite: A generic name for asbestos cement wallboard and pipe.

tt. Worker: Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926, Section .1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation required by 40 CFR 763, Subpart E, Appendix C, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

1.3 DESCRIPTION OF WORK

The work covered by this section includes the removal of asbestos-containing materials (ACM) which are encountered during demolition activities associated with this project and describes procedures and equipment required to protect workers and occupants of the regulated area from contact with airborne asbestos fibers and ACM dust and debris. Activities include OSHA Class I and Class II work operations involving ACM. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Accident Prevention Plan and its sub-components, the Asbestos Hazard Abatement Plan and Activity Hazard Analyses required in paragraph SAFETY AND HEALTH PROGRAM AND PLANS.

1.3.1 Abatement Work Tasks

Malmstrom Air Force Base environmental policy requires the removal of all disturbed asbestos containing material (friable) prior to demolition. The specific ACM to be abated is identified in Table 1 and Section 2220 DEMOLITION. Abatement will consist of removal of underground asbestos concrete waterlines. Category 1 asbestos-containing material (ACM) may be demolished in place. OSHA Class II work practices shall be followed when dealing with these materials. If a composite of the entire system is less than 1% asbestos, then the system is not regulated under NESHAP. However, all OSHA and NESHAP requirements, including those described within this specification, shall be followed. All ACM shall be disposed appropriately, i.e., no grinding.

1.3.2 Unexpected Discovery of Asbestos

For any previously untested and unidentified materials suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer (CO) who will have the option of ordering up to 10 bulk samples to be obtained at the Contractor's expense and delivered to a laboratory accredited under the National Institute of Standards and Technology (NIST) "National Voluntary Laboratory Accreditation Program (NVLAP)" and analyzed by PLM at no additional cost to the Government. Any additional components identified as ACM that have been approved by the Contracting Officer for removal shall be removed by the Contractor and will be paid for by an equitable adjustment to the contract price under the CONTRACT CLAUSE titled "changes". Sampling activities undertaken to determine the presence of additional ACM shall be conducted by personnel who have successfully completed the EPA Model Accreditation Plan (MAP) "Building Inspector" training course required by 40 CFR 763, Subpart E, Appendix C.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Respiratory Protection Program; G

Records of the respirator program.

Cleanup and Disposal; G

Waste shipment records. Weigh bills and delivery tickets shall be furnished for information only.

Detailed Drawings; G

Descriptions, detail project drawings, and site layout to include worksite containment area techniques as prescribed on applicable SET-UP DETAIL SHEETS, local exhaust ventilation system locations, decontamination units and load-out units, other temporary waste storage facility, access tunnels, location of temporary utilities (electrical, water, sewer) and boundaries of each regulated area.

Materials and Equipment; FIO

Manufacturers' catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information. Test results and certificates from the manufacturer of encapsulants substantiating compliance with performance requirements of this specification. Material Safety Data Sheets for all chemicals to be used onsite in the same format as implemented in the Contractor's HAZARD COMMUNICATION PROGRAM. Data shall include, but shall not be limited to, the following items:

a. High Efficiency Filtered Air (HEPA) local exhaust equipment

b. Vacuum cleaning equipment

c. Pressure differential monitor for HEPA local exhaust equipment

d. Air monitoring equipment

e. Respirators

f. Personal protective clothing and equipment

(1) Coveralls
(2) Underclothing
(3) Other work clothing

(4) Foot coverings
(5) Hard hats
(6) Eye protection
(7) Other items required and approved by Contractors Designated IH and Competent Person

g. Glove Bag

h. Duct Tape

i. Disposal Containers

(1) Disposal bags
(2) Fiberboard drums
(3) Paperboard boxes

j. Sheet Plastic

(1) Polyethylene Sheet - General
(2) Polyethylene Sheet - Flame Resistant
(3) Polyethylene Sheet - Reinforced

k. Wetting Agent

(1) Amended Water
(2) Removal encapsulant

l. Strippable Coating

m. Prefabricated Decontamination Unit

n. Other items

o. Chemical encapsulant

p. Chemical encasement materials

q. Material Safety Data Sheets (for all chemicals proposed)

Qualifications; G,

A written report providing evidence of qualifications for personnel, facilities and equipment assigned to the work.

Training Program; FIO

A copy of the written project site-specific training material as indicated in 29 CFR 1926, Section .1101 that will be used to train onsite employees. The training document shall be signed by the Contractor's Designated IHand Competent Person.

Medical Requirements; FIO

Physician's written opinion.

Encapsulants; G,

Certificates stating that encapsulants meet the applicable specified performance requirements.

SD-06 Test Reports

Exposure Assessment and Air Monitoring; G

Initial exposure assessments, negative exposure assessments, air-monitoring results and documentation.

Local Exhaust Ventilation; FIO

Pressure differential recordings.

Licenses, Permits and Notifications; G

Licenses, permits, and notifications

SD-07 Certificates

Vacuum, Filtration and Ventilation Equipment; FIO

Manufacturer's certifications showing compliance with ANSI Z9.2 for:

a. Vacuums

b. Water filtration equipment

c. Ventilation equipment

d. Other equipment required to contain airborne asbestos fibers

1.5 QUALIFICATIONS

1.5.1 Written Qualifications and Organization Report

The Contractor shall furnish a written qualifications and organization report providing evidence of qualifications of the Contractor, Contractor's Project Supervisor, Designated Competent Person, supervisors and workers; Designated IH (person assigned to project and firm name); independent testing laboratory (including name of firm, principal, and analysts who will perform analyses); all subcontractors to be used including disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. The report shall include an organization chart showing the Contractor's staff organization for this project by name and title, chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor's onsite project manager, Designated Competent Person, Designated IH, designated testing laboratory and the principals of all subcontractors

to be used. The Contractor shall include the following statement in the report: "By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and the federal, state and local requirements specified in paragraph SAFETY AND HEALTH PROGRAM AND PLANS for those asbestos abatement activities that they will be involved in."

1.5.2 Specific Requirements

The Contractor shall designate in writing, personnel meeting the following qualifications:

a. Designated Competent Person: The name, address, telephone number, and resume of the Contractor's Designated Competent Person shall be provided. Evidence that the full-time Designated Competent Person is qualified in accordance with 29 CFR 1926, Sections .32 and .1101, has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and is experienced in the administration and supervision of asbestos abatement projects, including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite, etc. The duties of the Competent Person shall include the following: controlling entry to and exit from the regulated area; supervising any employee exposure monitoring required by 29 CFR 1926, Section .1101; ensuring that all employees working within a regulated area wear the appropriate personal protective equipment (PPE), are trained in the use of appropriate methods of exposure control, and use the hygiene facilities and decontamination procedures specified; and ensuring that engineering controls in use are in proper operating conditions and are functioning properly. The Designated Competent Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan and Asbestos Hazard Abatement Plan. The Designated Competent Person shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that this person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

b. Project and Other Supervisors: The Contractor shall provide the name, address, telephone number, and resume of the Project Supervisor and other supervisors who have responsibility to implement the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses, the authority to direct work performed under this contract and verify compliance, and have EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C. The Project Supervisor and other supervisors shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that the Project Supervisor has a minimum of 2 years of on-the-job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a

minimum of 1 year on-the-job asbestos abatement experience commensurate with the responsibilities they will have on this project.

c. Designated Industrial Hygienist: Contractor shall provide the name, address, telephone number, resume and other information specified below for the Industrial Hygienist (IH) selected to prepare the Contractor's Asbestos Hazard Abatement Plan, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who is [board certified in the practice of industrial hygiene] [or] [board eligible (meets all education and experience requirements)] as determined and documented by the American Board of Industrial Hygiene (ABIH), has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and has a minimum of 2 years of comprehensive experience in planning and overseeing asbestos abatement activities. The Designated IH shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Designated IH shall be completely independent from the Contractor according to federal, state, or local regulations; that is, shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. A copy of the Designated IH's current valid ABIH [certification] [confirmation of eligibility in writing from the ABIH] shall be included. The Designated IH shall be onsite for the duration of asbestos activities and shall be available for emergencies. In addition, the Designated IH shall prepare, and the Contractor shall submit, the name, address, telephone numbers and resumes of additional IH's and industrial hygiene technicians (IHT) who will be assisting the Designated IH in performing onsite tasks. IHs and IHTs supporting the Designated IH shall have a minimum of 2 years of practical onsite asbestos abatement experience. The formal reporting relationship between the Designated IH and the support IHs and IHTs, the Designated Competent Person, and the Contractor shall be indicated.

d. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment" in this paragraph.

e. Worker Training and Certification of Worker Acknowledgment: Training documentation will be required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

f. Physician: The Contractor shall provide the name, medical qualifications, address, telephone number and resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician shall be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconiosis and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926, Section .1101 and paragraph MEDICAL

REQUIREMENTS. The physician shall be familiar with the site's hazards and the scope of this project.

g. First Aid and CPR Trained Persons: The names of at least 2 persons who are currently trained in first aid and CPR by the American Red Cross or other approved agency shall be designated and shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030 and shall be included in the Contractor's Bloodborne Pathogen Program. These persons may perform other duties but shall be immediately available to render first aid when needed. A copy of each designated person's current valid First Aid and CPR certificate shall be provided.

h. Independent Testing Laboratory: The Contractor shall provide the name, address and telephone number of the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor, shall be submitted:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926, Section .1101, OSHA method ID-160, the most current version of NIOSH Pub No. 84-100 Method 7400, and NIOSH Pub No. 84-100 Method 7402, transmission electron microscopy (TEM); the laboratory is currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program; the names of the selected microscopists who will analyze airborne samples by PCM with verified documentation of their proficiency to conduct PCM analyses by being judged proficient in counting samples as current participating analysts in the AIHA PAT Program, and having successfully completed the Asbestos Sampling and Analysis course (NIOSH 582 or equivalent) with a copy of course completion certificate provided; when the PCM analysis is to be conducted onsite, documentation shall be provided certifying that the onsite analyst meets the same requirements.

(2) Polarized light microscopy (PLM): The laboratory is fully equipped and proficient in conducting PLM analyses of suspect ACM bulk samples in accordance with 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for bulk asbestos analysis and will use analysts (names shall be provided) with demonstrated proficiency to conduct PLM to include its application to the identification and quantification of asbestos content.

(3) Transmission electron microscopy (TEM): The laboratory is [fully equipped and proficient in conducting TEM analysis of airborne samples using the mandatory method specified by 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for airborne sample analysis of asbestos by TEM; the laboratory will use analysts (names shall be provided) that are currently evaluated as competent with demonstrated proficiency under the NIST NVLAP for airborne sample analysis of asbestos by TEM.] [proficient in conducting analysis for low asbestos concentration, enhanced analysis of floor tiles and bulk materials where multiple layers are present, using an improved EPA test method titled, "Method for the Determination of Asbestos in Bulk Building Materials".]

(4) PCM/TEM: The laboratory is fully equipped and each analyst (name shall be provided) possesses demonstrated proficiency in conducting PCM and TEM analysis of airborne samples using NIOSH Pub No. 84-100Method 7400 PCM and NIOSH Pub No. 84-100 Method 7402 (TEM confirmation of asbestos content of PCM results) from the same filter.

i. Disposal Facility, Transporter: The Contractor shall provide written evidence that the landfill to be used is approved for asbestos disposal by the USEPA and state regulatory agencies. Copies of signed agreements between the Contractor (including subcontractors and transporters) and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste generated during the performance of this contract shall be provided. Qualifications shall be provided for each subcontractor or transporter to be used, indicating previous experience in transport and disposal of asbestos waste to include all required state and local waste hauler requirements for asbestos. The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61, Section .150(b), and other applicable state or local requirements.

1.5.3 Federal, State or Local Citations on Previous Projects

The Contractor and all subcontractors shall submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company shall be provided.

1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. This includes, but is not limited to, OSHA standards, 29 CFR 1926, especially Section .1101, 40 CFR 61, Subpart M and 40 CFR 763. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.7 SAFETY AND HEALTH PROGRAM AND PLANS

The Contractor shall develop and submit a written comprehensive site-specific Accident Prevention Plan at least 30 days prior to the pre-construction conference. The Accident Prevention Plan shall address requirements of EM 385-1-1, Appendix A, covering onsite work to be performed by the Contractor and subcontractors. The Accident Prevention Plan shall incorporate an Asbestos Hazard Abatement Plan, and Activity Hazard Analyses as separate appendices into 1 site specific Accident Prevention Plan document. Any portions of the Contractor's overall Safety and Health Program that are referenced in the Accident Prevention Plan, e.g., respirator program, hazard communication program, confined space entry program, etc., shall be included as appendices to the Accident Prevention Plan. The plan shall take into consideration all the individual asbestos abatement work

tasks identified in Table 1. The plan shall be prepared, signed (and sealed, including certification number if required), and dated by the Contractor's Designated IH, Competent Person, and Project Supervisor.

1.7.1 Asbestos Hazard Abatement Plan Appendix

The Asbestos Hazard Abatement Plan appendix to the Accident Prevention Plan shall include, but not be limited to, the following:

a. The personal protective equipment to be used

b. The location and description of regulated areas including clean and dirty areas, access tunnels, and decontamination unit (clean room, shower room, equipment room, storage areas such as load-out unit)

c. Initial exposure assessment in accordance with 29 CFR 1926, Section .1101

d. Level of supervision

e. Method of notification of other employers at the worksite

f. Abatement method to include containment and control procedures

g. Interface of trades involved in the construction

h. Sequencing of asbestos related work

i. Storage and disposal procedures and plan

j. Type of wetting agent and asbestos encapsulant to be used

k. Location of local exhaust equipment

l. Air monitoring methods (personal, environmental and clearance)

m. Bulk sampling and analytical methods (if required)

n. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations

o. Fire and medical emergency response procedures

p. The security procedures to be used for all regulated areas

1.7.2 Activity Hazard Analyses Appendix

Activity Hazard Analyses, for each major phase of work, shall be submitted and updated during the project. The Activity Hazard Analyses format shall be in accordance with EM 385-1-1 (Figure 1-1). The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity

Hazard Analyses has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the onsite Government representatives. The Activity Hazard Analyses shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

1.8 PRECONSTRUCTION CONFERENCE AND ONSITE SAFETY

The Contractor and the Contractor's Designated Competent Person, Project Supervisor, and Designated IH shall meet with the Contracting Officer prior to beginning work at a safety pre-construction conference to discuss the details of the Contractor's submitted Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses appendices. Deficiencies in the Accident Prevention Plan will be discussed and the Accident Prevention Plan shall be revised to correct the deficiencies and resubmitted for acceptance. Any changes required in the specification as a result of the Accident Prevention Plan shall be identified specifically in the plan to allow for free discussion and acceptance by the Contracting Officer, prior to the start of work. Onsite work shall not begin until the Accident Prevention Plan has been accepted. A copy of the written Accident Prevention Plan shall be maintained onsite. Changes and modifications to the accepted Accident Prevention Plan shall be made with the knowledge and concurrence of the Designated IH, the Project Supervisor, Designated Competent Person, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Designated IH shall bring such hazard to the attention of the Project Supervisor, Designated Competent Person, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Once accepted by the Contracting Officer, the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses will be enforced as if an addition to the contract. Disregarding the provisions of this contract or the accepted Accident Prevention Plan will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

1.9 SECURITY

Fenced and locked security area shall be provided for each regulated area. A logbook shall be kept documenting entry into and out of the regulated area. Entry into regulated areas shall only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas shall be trained, be medically evaluated, and wear the required personal protective equipment for the specific regulated area to be entered.

1.10 MEDICAL REQUIREMENTS

Medical requirements shall conform to 29 CFR 1926, Section .1101.

1.10.1 Medical Examinations

Before being exposed to airborne asbestos fibers, workers shall be provided with a medical examination as required by 29 CFR 1926, Section .1101 and other pertinent state or local requirements. This requirement shall have been satisfied within the last 12 months. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. X-ray films of asbestos workers shall be identified to the consulting radiologist and medical record jackets shall be marked with the word "asbestos."

1.10.1.1 Information Provided to the Physician

The Contractor shall provide the following information in writing to the examining physician:

a. A copy of 29 CFR 1926, Section .1101 and Appendices D, E, G, and I

b. A description of the affected employee's duties as they relate to the employee's exposure

c. The employee's representative exposure level or anticipated exposure level

d. A description of any personal protective and respiratory equipment used or to be used

e. Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician

1.10.1.2 Written Medical Opinion

For each worker, a written medical opinion prepared and signed by a licensed physician indicating the following:

a. Summary of the results of the examination

b. The potential for an existing physiological condition that would place the employee at an increased risk of health impairment from exposure to asbestos

c. The ability of the individual to wear personal protective equipment, including respirators, while performing strenuous work tasks under cold and/or heat stress conditions.

d. A statement that the employee has been informed of the results of the examination, provided with a copy of the results, informed of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure, and informed of any medical condition that may result from asbestos exposure

1.10.2 Medical and Exposure Records

Complete and accurate records shall be maintained of each employee's medical examinations, medical records, and exposure data, as required by 29 CFR 1910, Section .1910.20 and 29 CFR 1926, Section .1101 for a period of 50 years after termination of employment. Records of the required medical examinations and exposure data shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health (OSHA) or authorized representatives of the employee and an employee's physician upon request of the employee or former employee. A copy of the required medical certification for each employee shall be maintained on file at the worksite for review, as requested by the Contracting Officer or the representatives.

1.11 TRAINING PROGRAM

1.11.1 Project Specific Training

Prior to commencement of work, each worker shall be instructed by the Contractor's Designated IH and Competent Person in the following project specific training:

a. The hazards and health effects of the specific types of ACM to be abated

b. The content and requirements of the Contractor's Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses and site-specific safety and health precautions

c. Hazard Communication Program

d. Hands-on training for each asbestos abatement technique to be employed

e. Heat and/or cold stress monitoring specific to this project

f. Air monitoring program and procedures

g. Medical surveillance to include medical and exposure record-keeping procedures

h. The association of cigarette smoke and asbestos-related disease

i. Security procedures

j. Specific work practice controls and engineering controls required for each Class of work in accordance with 29 CFR 1926, Section .1101

1.12 RESPIRATORY PROTECTION PROGRAM

The Contractor's Designated IH shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926, Section .1101, 29 CFR 1910, Section .134, ANSI Z88.2, CGA G-7, CGA G-7.1 and. The Contractor's Designated IH shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations encountered during the performance of the asbestos abatement work. The Contractor's respiratory protection program shall include, but not be limited to, the following elements:

a. The company policy used for the assignment of individual responsibility, accountability and implementation of the respiratory protection program.

b. The standard operating procedures covering the selection and use of respirators. Respiratory selection shall be determined by the hazard to which the worker is exposed.

c. Medical evaluation of each user to verify that the worker may be assigned to an activity where respiratory protection is required

d. Training in the proper use and limitations of respirators.

e. Respirator fit-testing, i.e., quantitative, qualitative and individual functional fit checks.

f. Regular cleaning and disinfection of respirators

g. Routine inspection of respirators during cleaning and after each use when designated for emergency use.

h. Storage of respirators in convenient, clean, and sanitary locations

i. Surveillance of regulated area conditions and degree of employee exposure (e.g., through air monitoring)

j. Regular evaluation of the continued effectiveness of the respiratory protection program.

k. Recognition and procedures for the resolution of special problems as they affect respirator use (e.g., no facial hair that comes between the respirator face piece and face or interferes with valve function; prescription eye wear usage; contact lenses usage; etc.).

l. Proper training in putting on and removing respirators.

1.12.1 Respiratory Fit Testing

A qualitative or quantitative fit test conforming to 29 CFR 1926, Section 1101, Appendix C shall be conducted by the Contractor's Designated IH for each Contractor worker required to wear a respirator. If physical changes develop that will affect the fit, a new fit test for the worker shall be performed. Functional fit checks shall be performed by employees each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.12.2 Respirator Selection and Use Requirements

The Contractor shall provide respirators, and ensure that they are used as required by 29 CFR 1926, Section .1101 and in accordance with the manufacturer's recommendations. Respirators shall be jointly approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (MSHA/NIOSH), or by NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. Personnel who handle ACM, enter regulated areas that require the wearing of a respirator, or who are otherwise carrying out abatement activities that require the wearing of a respirator, shall be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne asbestos concentration level to be encountered. For air-purifying respirators, the particulate filter portion of the cartridges or canister approved for use in airborne asbestos environments shall be high-efficiency particulate air (HEPA). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered. Recommendations made by the Contractor 's Designated IH to downgrade respirator type shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person in consultation with the Designated IH, shall have the authority to take immediate action to upgrade or downgrade respiratory type when there is an immediate danger to the health and safety of the wearer.

1.12.3 Class I Work

The Contractor shall provide: (1) a tight-fitting, powered air purifying respirator equipped with high efficiency filters, or (2) a full-face piece supplied air respirator operated in the pressure demand mode, equipped with HEPA egress cartridges, or (3) an auxiliary positive pressure self-contained breathing apparatus, for all employees within the regulated area where Class I work is being performed; provided that a negative exposure assessment has not been produced, and that the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full-face piece supplied air respirator, operated in the pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus

shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

1.12.4 Class II Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment; and Class III jobs where TSI or surfacing ACM is being disturbed.

1.12.5 Sanitation

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator face pieces whenever necessary to prevent skin irritation associated with respirator use.

1.13 HAZARD COMMUNICATION PROGRAM

A hazard communication program shall be established and implemented in accordance with 29 CFR 1926, Section .59. Material safety data sheets (MSDSs) shall be provided for all hazardous materials brought onto the worksite. One copy shall be provided to the Contracting Officer and 1 copy shall be included in the Contractor's Hazard Communication Program.

1.14 LICENSES, PERMITS AND NOTIFICATIONS

1.14.1 General Legal Requirements

Necessary licenses, permits and notifications shall be obtained in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. The Contractor shall notify the Regional Office of the USEPA, Idaho's environmental protection agency responsible for asbestos air emissions, the local air pollution control district/agency and the Contracting Officer in writing, at least 10 days prior to the commencement of work, in accordance with 40 CFR 61, Subpart M, and state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notification shall be by Certified Mail, Return Receipt Requested. The Contractor shall furnish copies of the receipts to the Contracting Officer, in writing, prior to the commencement of work. Local fire department shall be notified 3 days before fireproofing material is removed from a building and the notice shall specify whether or not the material contains asbestos. A copy of the rental company's written acknowledgment and agreement shall be provided as required by paragraph RENTAL EQUIPMENT. For licenses, permits, and notifications that the Contractor is responsible for obtaining, the Contractor shall pay any associated fees or other costs incurred.

1.14.2 Litigation and Notification

The Contractor shall notify the Contracting Officer if any of the following occur:

a. The Contractor or any of the subcontractors are served with notice of violation of any law, regulation, permit or license which relates to this contract;

b. Proceedings are commenced which could lead to revocation of related permits or licenses; permits, licenses or other Government authorizations relating to this contract are revoked;

c. Litigation is commenced which would affect this contract;

d. The Contractor or any of the subcontractors become aware that their equipment or facilities are not in compliance or may fail to comply in the future with applicable laws or regulations.

1.15 PERSONAL PROTECTIVE EQUIPMENT

Contractor workers shall be provided with personal protective clothing and equipment and the Contractor shall ensure that it is worn properly. The Contractor's Designated IH and Designated Competent Person shall select and approve all the required personal protective clothing and equipment to be used.

1.15.1 Respirators

Respirators shall be in accordance with paragraph RESPIRATORY PROTECTION PROGRAM.

1.15.2 Whole Body Protection

Personnel exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn properly. The Contractor's Designated IH and Competent Person shall select and approve the whole body protection to be used. The Competent Person shall examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the work suit shall be immediately replaced. Disposable whole body protection shall be disposed of as asbestos contaminated waste upon exiting from the regulated area. Reusable whole body protection worn shall be either disposed of as asbestos contaminated waste upon exiting from the regulated area or be properly laundered in accordance with 29 CFR 1926, Section .1101. Whole body protection used for asbestos abatement shall not be removed from the worksite by a worker to be cleaned. Recommendations made by the Contractor's Designated IH to downgrade whole body protection shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person, in consultation with the Designated IH, has the authority to take immediate action to upgrade or downgrade whole body protection when there is an immediate danger to the health and safety of the wearer.

1.16 HYGIENE FACILITIES AND PRACTICES

The Contractor shall establish a decontamination area for the decontamination of employees, material and equipment. The Contractor shall ensure that employees enter and exit the regulated area through the decontamination area.

1.16.1 Shower Facilities

Shower facilities, when provided, shall comply with 29 CFR 1910, Section .141(d)(3).

1.16.2 3-Stage Decontamination Area

A temporary, negative-pressure decontamination unit that is adjacent and attached in a leak-tight manner to the regulated area shall be provided. Utilization of prefabricated units shall have prior

approval of the Contracting Officer. The decontamination unit shall have an equipment room and a clean room separated by a shower that complies with 29 CFR 1910, Section .141 (unless the Contractor can demonstrate that such facilities are not feasible). Equipment and surfaces of containers filled with ACM shall be cleaned prior to removing them from the equipment room or area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste. Two separate lockers shall be provided for each asbestos worker, one in the equipment room and one in the clean room. Should sufficient hot water be unavailable, the Contractor shall provide a minimum 160 L 40 gallon electric water heater with minimum recovery rate of 80 L 20 gal. per hour and a temperature controller for each showerhead.] The Contractor shall provide a minimum of 1 shower. Instantaneous type, in-line water heater may be incorporated at each showerhead in lieu of hot water heater, upon approval by the Contracting Officer. Flow and temperature controls shall be located within the shower and shall be adjustable by the user. The wastewater pump shall be sized for 1.25 times the showerhead flow-rate at a pressure head sufficient to satisfy the filter head loss and discharge line losses. The pump shall supply a minimum 1.6 L/s 25-gpm flow with 10.7 m 35 ft. of pressure head. Used shower water shall be collected and filtered to remove asbestos contamination. Filters and residue shall be disposed of as asbestos contaminated material. Filtered water shall be discharged to the sanitary system. Wastewater filters shall be installed in series with the first stage pore size of 20 microns and the second stage pore size of 5 microns. The floor of the decontamination unit's clean room shall be kept dry and clean at all times. Water from the shower shall not be allowed to wet the floor in the clean room. Surfaces of the clean room and shower shall be wet-wiped 2 times after each shift change with a disinfectant solution. Proper housekeeping and hygiene requirements shall be maintained. Soap and towels shall be provided for showering, washing and drying. Any cloth towels provided shall be disposed of as ACM waste or shall be laundered in accordance with 29 CFR 1926, Section 1101.

1.16.3 Load-Out Unit

A temporary, load-out unit that is adjacent and connected to the regulated area and shall be provided. Utilization of prefabricated units shall have prior approval of the Contracting Officer. The load-out unit shall be attached in a leak-tight manner to each regulated area. Surfaces of the load-out unit and access tunnel shall be adequately wet-wiped 2 times after each shift change. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.4 Single Stage Decontamination Area

A decontamination area (equipment room/area) shall be provided for Class I work involving less than 7.5 m 25 feet or 0.9 square meters 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment produced before the operation. The equipment room or area shall be adjacent to the regulated area for the decontamination of employees, material, and their equipment, which is contaminated with asbestos. The equipment room or area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal-working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.5 Decontamination Area Entry Procedures

The Contractor shall ensure employees enter the decontamination area through the clean room or clean area:

a. Remove street clothing in the clean room or clean area and deposit it in lockers.

b. Put on protective clothing and respiratory protection before leaving the clean room or clean area.

c. Pass through the equipment room to enter the regulated area.

1.16.6 Decontamination Area Exit Procedures

The Contractor shall ensure that the following procedures are followed:

a. Before leaving the regulated area, respirators shall be worn while employees remove all gross contamination and debris from their work clothing using a HEPA vacuum.

b. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers (see Detail Sheets 9 and 14) for disposal and/or laundering.

c. Employees shall not remove their respirators in the equipment room.

d. Employees shall shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, the Contractor shall ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning work suits, and proceed to a shower that is not adjacent to the work area.

e. After showering, employees shall enter the clean room before changing into street clothes.

1.16.7 Lunch Areas

The Contractor shall provide lunch areas in which the airborne concentrations of asbestos are below 0.01 f/cc.

1.16.8 Smoking

Smoking, if allowed by the Contractor, shall only be permitted in designated areas approved by the Contracting Officer.

1.17 REGULATED AREAS

All Class I and II asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they shall demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.18 WARNING SIGNS AND TAPE

Warning signs and tape printed in English shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs, as shown and described in DETAIL SHEET 11, shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 500 by 350 mm 20 by 14 inches, and displaying the following legend in the lower panel:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

Spacing between lines shall be at least equal to the height of the upper of any two lines. Warning tape shall be provided. Decontamination unit signage shall be shown.

1.19 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall be as described in DETAIL SHEET 14, shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1.20 LOCAL EXHAUST VENTILATION

Local exhaust ventilation units shall conform to ANSI Z9.2 and 29 CFR 1926, Section .1101. Filters on local exhaust system equipment shall conform to ANSI Z9.2 and UL 586. Filter shall be UL labeled.

1.21 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system, or has otherwise been approved for use by the Contracting Officer. Residual asbestos shall be removed from reusable tools prior to storage and reuse. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

1.22 RENTAL EQUIPMENT

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment. A written acceptance of the terms of the Contractor's notification shall be obtained from the rental agency.

1.23 AIR MONITORING EQUIPMENT

The Contractor's Designated IH shall approve air-monitoring equipment to be used to collect samples. The equipment shall include, but shall not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute when equipped with a sampling train of tubing and filter cassette.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands, to be used with low flow pumps in accordance with 29 CFR 1926, Section .1101 for personal air sampling.

d. Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands, to be used with high flow pumps when conducting environmental area sampling using NIOSH Pub No. 84-100 Methods 7400 and 7402, (and the transmission electric microscopy method specified at 40 CFR 763 if required).

e. Appropriate plastic tubing to connect the air-sampling pump to the selected filter cassette.

f. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 20 to plus 60 degrees C minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

1.24 EXPENDABLE SUPPLIES

1.24.1 Glove Bag

Glove bags shall be provided as described in 29 CFR 1926, Section .1101 and SET-UP DETAIL SHEET 10. The glove bag assembly shall be 0.15 mm 6 mil thick plastic, prefabricated and seamless at the bottom with preprinted OSHA warning label.

1.24.2 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container shall be provided.

1.24.3 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926 Section .1101 and DETAIL SHEETS 9A, 9B, 9C and 14.

1.24.4 Disposal Bags

Leak-tight bags, 0.15 mm 6 mil thick, shall be provided for placement of asbestos generated waste as described in DETAIL SHEET 9A.

1.24.5 Cardboard Boxes

Heavy-duty corrugated cardboard boxes, coated with plastic or wax to retard deterioration from moisture, shall be provided, if required by state and local requirements. Boxes shall fit into selected ACM disposal bags. Filled boxes shall be sealed leak-tight with duct tape.

1.24.7 Sheet Plastic

Sheet plastic shall be polyethylene of 0.15 mm 6 mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams, as indicated on the project drawings. Film shall be clear and conform to ASTM D 4397, except as specified below:

1.24.7.2 Reinforced

Reinforced sheets shall be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

1.24.8 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

1.24.9 Mastic Removing Solvent

Mastic removing solvent shall be nonflammable and shall not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite shall have a flash point greater than 60 degrees C. 140 degrees F.

1.24.10 Leak-tight Wrapping

Two layers of 0.15 mm 6 mil minimum thick polyethylene sheet stock shall be used for the containment of removed asbestos-containing components or materials such as reactor vessels, large tanks, boilers, insulated pipe segments and other materials too large to be placed in disposal bags as described in DETAIL SHEET 9B. Upon placement of the ACM component or material, each layer shall be individually leak-tight sealed with duct tape.

1.24.11 Viewing Inspection Window

Where feasible, a minimum of 1 clear, 3-mm 1/8-inch thick, acrylic sheet, 450 by 610 mm 18 by 24 inches, shall be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows shall be sealed leak-tight with industrial grade duct tape.

1.24.12 Wetting Agents

Removal encapsulant (a penetrating encapsulant) shall be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant shall be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS.

1.25 MISCELLANEOUS ITEMS

A sufficient quantity of other items, such as, but not limited to: scrapers, brushes, brooms, staple guns, tarpaulins, shovels, rubber squeegees, dust pans, other tools, scaffolding, staging, enclosed chutes, wooden ladders, lumber necessary for the construction of containments, UL approved temporary electrical equipment, material and cords, ground fault circuit interrupters, water hoses of sufficient length, fire extinguishers, first aid kits, portable toilets, logbooks, log forms, markers with indelible ink, spray paint in bright color to mark areas, project boundary fencing, etc., shall be provided.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Encapsulants shall conform to USEPA requirements, shall contain no toxic or hazardous substances and no solvent and shall meet the following requirements:

ALL ENCAPSULANTS

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Combustion Toxicity Zero Mortality	Univ. of Pittsburgh Protocol
Life Expectancy, 20 yrs Accelerated Aging Test	ASTM C 732
Permeability, Min. 23 ng per Pa-sec-square m	ASTM E 96

Additional Requirements for Penetrating Encapsulant

Requirement	Test Standard
Cohesion/Adhesion Test, 730 N/m	ASTM E 736
Fire Resistance, Negligible affect on fire resistance	ASTM E 119

rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	
Impact Resistance, Min. 4.7 N-m (Gardner Impact Test)	ASTM D 2794
Flexibility, no rupture or cracking (Mandrel Bend Test)	ASTM D 522

Additional Requirements for Lockdown Encapsulant

Requirement	Test Standard
Fire Resistance, Negligible affect on fire resistance rating over 3 hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E 119
Bond Strength, 1.5 kN/m (Tests compatibility with cementitious and fibrous fireproofing)	ASTM E 736

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Asbestos abatement work tasks shall be performed as shown on the detailed plans and drawings, as summarized in paragraph DESCRIPTION OF WORK and the Contractor's Accident Prevention Plan, Asbestos Hazard Abatement Plan, and the Activity Hazard Analyses. The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize protective clothing and equipment as specified. The Contractor shall not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. All hot work (burning, cutting, welding, etc.) shall be conducted under controlled conditions in conformance with 29 CFR 1926, Section .352, Fire Prevention. Personnel of other trades, not engaged in asbestos abatement activities, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the Contractor's Accident Prevention Plan are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal. The Contractor shall stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. The Contractor shall correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work shall resume only upon notification by the Contracting Officer. Corrective actions shall be documented.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, as verified by the Contracting Officer using

visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government, as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the Contracting Officer, work shall proceed.

3.4 BUILDING VENTILATION SYSTEM AND CRITICAL BARRIERS

Building ventilating systems supplying air into or returning air out of a regulated area shall be isolated by airtight seals to prevent the spread of contamination throughout the system. Air-tight critical barriers shall be installed on building ventilating openings located inside the regulated area that supply or return air from the building ventilation system or serve to exhaust air from the building. The critical barriers shall consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces shall be sealed with industrial grade duct tape.

3.6 METHODS OF COMPLIANCE

3.6.1 Mandated Practices

The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M, and the specified requirements. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including, but not limited to, details of construction materials, equipment, and handling procedures. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters to collect debris and dust containing ACM.

b. Wet methods or wetting agents to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup; except where it can be demonstrated that the use of wet methods is unfeasible due to, for example, the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean up and disposal in leak-tight containers of wastes and debris contaminated with asbestos.

d. Inspection and repair of polyethylene in work and high traffic areas

e. Cleaning of equipment and surfaces of containers filled with ACM prior to removing them from the equipment room or area.

3.6.2 Control Methods

The Contractor shall use the following control methods to comply with the PELs:

a. Local exhaust ventilation equipped with HEPA filter dust collection systems;

b. Enclosure or isolation of processes producing asbestos dust;

c. Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;

d. Use of other work practices and engineering controls;

e. Where the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the PELs, the Contractor shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with paragraph, RESPIRATORY PROTECTION PROGRAM.

3.6.3 Unacceptable Practices

The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean up of dust and debris containing ACM.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.6.4 Class I Work Procedures

In addition to requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the installation and operation of the control system.

b. For jobs involving the removal of more than 7.5 m 25 feet or 0.9 square meters 10 square feet of TSI or surfacing material, the Contractor shall place critical barriers over all openings to the regulated area.

c. HVAC systems shall be isolated in the regulated area by sealing with a double layer of plastic or airtight rigid covers.

d. Impermeable drop cloths (0.15 mm 6 mil or greater thickness) shall be placed on surfaces beneath all removal activity.

e. Objects within the regulated area shall be handled as specified in paragraph OBJECTS.

f. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area shall be ventilated to move contaminated air away from the employee's breathing zone toward a HEPA unit or collection device.

3.6.5 Specific Control Methods for Class I Work

In addition to requirements of paragraph Class I Work Procedures, Class I asbestos work shall be performed using the control methods identified in the subparagraphs below.

3.6.5.1 Negative Pressure Enclosure (NPE) System

The system shall provide at least 4 air changes per hour inside the containment. The local exhaust unit equipment shall be operated 24 hours per day until the containment is removed, and shall be leak-proof to the filter and equipped with HEPA filters. Air movement shall be directed away from the employees and toward a HEPA filtration device. The NPE shall be smoke tested for leaks at the beginning of each shift. Local exhaust equipment shall be sufficient to maintain a minimum pressure differential of minus 0.5 mm 0.02 inch of water column relative to adjacent, unsealed areas. Pressure differential shall be monitored continuously, 24 hours per day, with an automatic manometric recording instrument. Pressure differential recordings shall be provided daily on the same day collected. Readings shall be reviewed by the Contractor's Designated Competent Person and IH prior to submittal. The Contracting Officer shall be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system shall not be used as the local exhaust system for the regulated area. The local exhaust system shall terminate outdoors unless an alternate arrangement is allowed by the Contract Officer. All filters used shall be new at the beginning of the project and shall be periodically changed as necessary and disposed of as ACM waste.

3.6.5.3 Mini-Enclosures

Single bulkhead containment or Mini-containment (small walk-in enclosure) as to accommodate no more than 2 persons, may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices. The mini-enclosure shall be inspected for leaks and smoke tested before each use. Air movement shall be directed away from the employee's breathing zone within the mini-enclosure.

3.6.6 Class II Work

In addition to the requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the work.

b. For indoor work, critical barriers shall be placed over all openings to the regulated area.

c. Impermeable drop cloths shall be placed on surfaces beneath all removal activity.

3.6.7 Specific Control Methods for Class II Work

In addition to requirements of paragraph Class II Work, Class II work shall be performed using the following methods:

3.6.7.1 Vinyl and Asphalt Flooring Materials

Not Used

3.6.7.2 Roofing Material

Not Used

3.6.7.3 Cementitious Siding and Shingles or Transite Panels

Not Used

3.6.7.4 Gaskets

Gaskets shall be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glove bag. Any scraping to remove residue shall be performed wet.

3.6.7.5 Other Class II Jobs

The Contractor shall use the following work practices when performing Class II removal of ACM: The material shall be thoroughly wetted with amended water prior and during its removal. The material shall be removed in an intact state. Cutting, abrading or breaking the material is prohibited. The ACM removed shall be immediately bagged or wrapped.

3.6.10 Alternative Methods for Roofing Materials and Asphaltic Wrap

Not Used

3.7 FINAL CLEANING AND VISUAL INSPECTION

Upon completion of abatement, the regulated area shall be cleaned by collecting, packing and storing all gross contamination. A final cleaning shall be performed using HEPA vacuum and wet cleaning of all exposed surfaces and objects in the regulated area. Upon completion of the cleaning, the Contractor shall conduct a visual pre-inspection of the cleaned area in preparation for a final inspection before final air clearance monitoring and recleaning, as necessary. Upon completion of the final cleaning, the Contractor and the Contracting Officer shall conduct a final visual inspection of the cleaned regulated area in accordance with ASTM E 1368 and document the results on the Final Cleaning and Visual Inspection. If the Contracting Officer rejects the clean regulated area as not meeting final cleaning requirements, the Contractor shall reclean as necessary and have a follow-on inspection conducted with the Contracting Officer. Recleaning and follow-up reinspection shall be at the Contractor's expense.

3.9 EXPOSURE ASSESSMENT AND AIR MONITORING

3.9.1 General Requirements For Exposure

Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926, Section .1101, the Contractor's air monitoring plan, and as specified. Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be performed by the Contractor's Designated IH. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section. The Contractor shall provide an onsite independent testing laboratory with qualified analysts and appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926, Section .1101,

to include NIOSH Pub No. 84-100 Method 7400. Pre-abatement and abatement environmental air monitoring shall be performed by the Contractor's Designated IH. Final clearance environmental air monitoring, shall be performed by the Contractor's Designated IH. Environmental and final clearance air monitoring shall be performed using NIOSH Pub No. 84-100 Method 7400 (PCM) with optional confirmation of results by NIOSH Pub No. 84-100 Method 7402 (TEM) or the EPA TEM Method specified in 40 CFR 763. For environmental and final clearance, air monitoring shall be conducted at a sufficient velocity and duration to establish the limit of detection of the method used at 0.005 f/cc. Confirmation of asbestos fiber concentrations (asbestos f/cc) from environmental and final clearance samples collected and analyzed by NIOSH Pub No. 84-100 Method 7400 (total f/cc) may be conducted using TEM in accordance with NIOSH Pub No. 84-100 Method 7402. When such confirmation is conducted, it shall be from the same sample filter used for the NIOSH Pub No. 84-100 Method 7400 PCM analysis. For all Contractor required environmental or final clearance air monitoring, confirmation of asbestos fiber concentrations, using NIOSH Pub No. 84-100 Method 7402, shall be at the Contractor's expense. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. Results of breathing zone samples shall be posted at the job site and made available to the Contracting Officer. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with the Contracting Officer to determine the cause. At the discretion of the Contracting Officer, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by the Contracting Officer.

3.9.2 Initial Exposure Assessment

The Contractor's Designated IH shall conduct an exposure assessment immediately before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation.

3.9.3 Negative Exposure Assessment

The Contractor shall provide a negative exposure assessment for the specific asbestos job, which will be performed. The negative exposure assessment shall be provided within 2 days of the initiation of the project and conform to the following criteria:

a. Objective Data: Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the PEL-TWA and PEL-Excursion Limit under those work conditions having the greatest potential for releasing asbestos.

b. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-Excursion Limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations; the operations were conducted by employees whose training and experience are no more extensive than that of employees

performing the current job; and these data show that under the conditions prevailing and which will prevail in the current workplace, there is a high degree of certainty that the monitoring covered exposure from employee exposures will not exceed the PEL-TWA and PEL-Excursion Limit.

c. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job, made from breathing zone air samples that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee. The monitoring covered exposure from operations, which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

3.9.6 Environmental Air Monitoring During Abatement

Until an exposure assessment is provided to the Contracting Officer, environmental air monitoring shall be conducted at locations and frequencies that will accurately characterize any evolving airborne asbestos fiber concentrations. The assessment shall demonstrate that the product or material containing asbestos minerals, or the abatement involving such product or material, cannot release airborne asbestos fibers in concentrations exceeding 0.01 f/cc as a TWA under those work conditions having the greatest potential for releasing asbestos. The monitoring shall be at least once per shift at locations including, but not limited to, close to the work inside a regulated area; pre-abatement sampling locations; outside entrances to a regulated area; close to glove bag operations; representative locations outside of the perimeter of a regulated area; inside clean room; and at the exhaust discharge point of local exhaust system ducted to the outside of a containment (if used). If the sampling outside regulated area shows airborne fiber levels have exceeded background or 0.01 f/cc, whichever is greater, work shall be stopped immediately, and the Contracting Officer notified. The condition causing the increase shall be corrected. Work shall not restart until authorized by the Contracting Officer.

3.9.7 Final Clearance Air Monitoring

Prior to conducting final clearance air monitoring, the Contractor and the Contracting Officer shall conduct a final visual inspection of the regulated area where asbestos abatement has been completed. Final clearance air monitoring shall not begin until acceptance of the Contractor's final cleaning by the Contracting Officer. The Contractor's Designated IH shall conduct final clearance air monitoring using aggressive air sampling techniques as defined in EPA 560/5-85-024 or as otherwise required by federal or state requirements.

3.9.7.3 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, the Contractor shall pay all costs associated with the required recleaning, resampling, and analysis, until final clearance requirements are met.

3.9.8 Air-Monitoring Results and Documentation

Air sample fiber counting shall be completed and results provided within 24 hours (breathing zone samples), and 48 hours (environmental clearance monitoring) after completion of a sampling period. The Contracting Officer shall be notified immediately of any airborne levels of asbestos fibers in excess of established requirements. Written sampling results shall be provided within 5 working days of the date of collection. The written results shall be signed by testing laboratory analyst, testing laboratory principal and the [Contractor's Designated IH] [Contracting Officer's IH]. The air sampling

results shall be documented on a Contractor's daily air monitoring log. The daily air-monitoring log shall contain the following information for each sample:

a. Sampling and analytical method used

b. Date sample collected

c. Sample number

d. Sample type: BZ = Breathing Zone (Personal), P = Pre-Abatement, E = Environmental, C = Abatement Clearance

e. Location/activity/name where sample collected

f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (L/min)

g. Calibration date, time, method, location, name of calibrator, signature

h. Sample period (start time, stop time, elapsed time (minutes)

i. Total air volume sampled (liters)

j. Sample results (f/cc and S/mm square) if EPA methods are required for final clearance

k. Laboratory name, location, analytical method, analyst, confidence level. In addition, the printed name and a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log verifying the accuracy of the information.

3.10 CLEARANCE CERTIFICATION

When asbestos abatement is complete, ACM waste is removed from the regulated areas, and final clean up is completed, the Contracting Officer will certify the areas as safe before allowing the warning signs and boundary warning tape to be removed. After final clean-up and acceptable airborne concentrations are attained, but before the HEPA unit is turned off and the containment removed, the Contractor shall remove all pre-filters on the building HVAC system and provide new pre-filters. The Contractor shall dispose of such filters as asbestos contaminated materials. HVAC, mechanical, and electrical systems shall be re-established in proper working order. The Contractor and the Contracting Officer shall visually inspect all surfaces within the containment for residual material or accumulated debris. The Contractor shall reclean all areas showing dust or> residual materials. The Contracting Officer will certify in writing that the area is safe before unrestricted entry is permitted. The Government will have the option to perform monitoring to certify the areas are safe before entry is permitted.

3.11 CLEANUP AND DISPOSAL

3.11.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

3.11.2 Collection and Disposal of Asbestos

All ACM waste shall be collected and including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in leak-tight containers such as double plastic bags; sealed double wrapped polyethylene); sealed fiberboard boxes; or other approved containers. Waste within the containers shall be wetted in case the container is breeched. Asbestos-containing waste shall be disposed of at an EPA, state and local approved asbestos landfill. For temporary storage, sealed impermeable containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e. dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by the Contracting Officer. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional and local standards.

3.11.3 Scale Weight Measurement

Scales used for measurement shall be public scales.

3.11.4 Weigh Bill and Delivery Tickets

Copies of weigh bills and delivery tickets shall be submitted to the Contracting Officer during the progress of the work.

3.11.5 Asbestos Waste Shipment Record

The Contractor shall complete and provide the Contracting Officer final completed copies of the Waste Shipment Record for all shipments of waste material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill. Each Waste Shipment Record shall be signed and dated by the Contracting Officer, the waste transporter and disposal facility operator.

TABLE 1. WORK TASK DATA ELEMENTS

Material Description	Extent	Quantity	Asbestos Content
Asbestos concrete water lines	Throughout	1,150 lf	Assumed ACM

TABLE 2

FORMULA FOR CALCULATION OF THE 95 PERCENT CONFIDENCE LEVEL
(Reference: NIOSH 7400)

Fibers/cc(01.95 percent CL) = X + [(X) * (1.645) * (CV)]

Where: X = ((E)(AC))/((V)(1000))

E = ((F/Nf) - (B/Nb))/Af

CV = The precision value; 0.45 shall be used unless the analytical laboratory provides the Contracting Officer with documentation (Round Robin Program participation and results) that the laboratory's precision is better.

AC = Effective collection area of the filter in square millimeters

V = Air volume sampled in liters

E = Fiber density on the filter in fibers per square millimeter

F/Nf = Total fiber count per graticule field

B/Nb = Mean field blank count per graticule field

Af = Graticule field area in square millimeters

TWA = C1/T1 + C2/T2 = Cn/Tn

Where: C = Concentration of contaminant

T = Time sampled.

TABLE 3

NI0SH METHOD 7400

PCM ENVIRONMENTAL AIR SAMPLING PROTOCOL (NON-PERSONAL)

Sample Location	Minimum No. of Samples	Filter Pore Size (Note 1) (Liters)	Min. Vol. (Note 2) (liters/min.)	Sampling Rate
Inside Abatement Area	0.5/140 Square Meters (Notes 3 & 4)	0.45 microns	3850	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:

1. Type of filter is Mixed Cellulose Ester.

2. Ensure detection limit for PCM analysis is established at 0.005 fibers/cc.

3. One sample shall be added for each additional 140 square meters. (The corresponding I-P units are 5/1500 square feet).

4. A minimum of 5 samples are to be taken per abatement area, plus 2 field blanks.

TABLE 4

EPA AHERA METHOD: TEM AIR SAMPLING PROTOCOL

Location Sampled	Minimum No. of Samples	Filter Pore Size	Min. Vol. (Liters)	Sampling Rate (liters/min.)
Inside Abatement Area	5	0.45 microns	1500	2-16
Outside Abatement Area	5	0.45 microns	1500	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:

1. Type of filter is Mixed Cellulose Ester.

2. The detection limit for TEM analysis is 70 structures/square mm.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____
PROJECT ADDRESS _____
CONTRACTOR FIRM NAME _____
EMPLOYEE'S NAME _____,_____,_____,
(Print) (Last) (First) (MI)

Social Security Number: _____-_____-_____,

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:
_____ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

b. For Workers:
_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
(3) For OSHA Class II work (there will only be abatement of one type of Class II material):
_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926, Section .1101(g) and hands-on training.
_____ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101, and hands-on training.

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101(g) and hands-on training.

_____ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:
_____ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:
_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:
_____ I have been trained in the proper selection, fit, use, care, cleaning, maintenance and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:
_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks.
_____ were identified physical limitations to performing the required work tasks.

Date of the medical examination _____

Employee Signature _____ date _____
Contractor's Industrial
Hygienist Signature _____ date _____

END OF SECTION

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SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes materials, equipment, labor, supervision, tools and items necessary for the construction, installation, connection, testing and operation of mechanical work. This section applies to all sections in Division 15.

B. Contract Requirements: General Conditions, Supplementary Conditions, and Division 1 apply to Work in this section.

1.2 CODES AND ORDINANCES

A. General: Comply with applicable International Residential Codes. Conform to applicable UL or ETL standards, ANSI standards, and other standards as may be noted.
1. Notify the Contracting Officer of deviations in Contract Documents to applicable codes and ordinances prior to installation of the work. Perform changes in the work after initial installation due to requirements of code enforcing agencies at no additional cost to the Government.
2. Arrange for and pay for mechanical permits, fees, and inspections required.
3. Pressure Vessels and Relief Valves: Select, build, install, and label in accordance with the applicable ASME Code. Pay costs and fees for certificates, inspections, filing and labeling.

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1 and the following.

B. Product Data, Design Data:
1. Process: Submit complete mechanical submittal in one complete package. Incomplete, "piece-meal" submittals will not be accepted, and will be returned to Contractor unreviewed.
2. Binding and Format:
a. Bind in 3 ring binder(s). Label front of binder(s) with name of project, name of Government, year of completion, title "MECHANICAL SUBMITTALS", names of Mechanical Engineer and Mechanical Contractor, and Volume No. (if applicable). Label spine of binder with title, name of project, name of Government entity, year of completion, and Volume Number (if applicable). Fold drawings to 8-1/2 inch size and bind as above (with reinforcing at punched holes) or place in clear plastic holder designed for 3 ring binders. Do not pack each binder more than 75 percent full.
b. Include overall table of contents of items submitted, organized by specification section.

c. Include heavy, tabbed divider sheet for each specification section, with specification section number and title on tab. Include table of contents for

each specification section, including catalog numbers or drawing numbers if appropriate.

d. Submittals will not be accepted unless it conforms to these requirements, and will be returned to Contractor unreviewed.

3. Include submittal data on materials and equipment as indicated in individual specification sections. Do not fabricate or install until reviewed by Contracting Officer. Include descriptive bulletins, data sheets, catalog cuts, diagrams, complete dimensional drawings, and other additional information as required.

C. Shop Drawings: Provide minimum 30 days prior to starting fabrication or installation work. Do not fabricate or install until reviewed by Contracting Officer. Include complete location dimensions, and hanger and support sizes and dimensions.

D. Acceptance: The acceptance of a manufacturer's name or product by the Contracting Officer does not relieve the Contractor of the responsibility for providing materials and equipment which comply in detail with the requirements of the Contract Documents.

E. Re-Submittals: Clearly identify re-submittals. Provide revised tabs, indexes, page renumbering, and other formats to interface with original submittal. Identify changes and include date for project tracking.

F. Test Reports and Certificates: Submit in 1 comprehensive package prior to Substantial Completion.

G. Balancing and Testing Reports: Submit as indicated in the Contract Documents.

H. Documents at Job Site: Maintain on the site, in good condition, a complete file of reviewed design drawings and specifications, submittal data, shop drawings, and other such items bearing Engineer’s stamp. Retain these documents at the site until final acceptance of work. Make them available for use of the Government’s Representative and Contracting Officer.

I. Operation and Maintenance Manual: Comply with requirements in Section 01701.

J. Record Drawings:
1. Comply with requirements in Division 1, with additional requirements as indicated in this paragraph.
2. Record corrections and changes made during the progress of the work, showing work as actually installed. In general, tolerance plus-or-minus 1'-0" from actual location. Indicate installed invert elevations for underground piping. Neatly hand-draft on a daily basis, on a set of prints kept readily available at the project site. Use the latest revisions and keep neat and clean. Do not use Contractor's working drawings.
3. Note and make corrections for change orders, clarifications, sizes, schedules, and equipment identification.
4. Record drawings are subject to review by the Contracting Officer on a regular basis throughout the construction period. At the end of the construction period, check drawings for completeness and accuracy.

5. At Project Close-Out, submit in AutoCAD format along with set of prints, sheet size same as contract drawings. Each sheet with large lettered note "RECORD DRAWING", including date, Contractor, and subcontractor names.

K. Substantial Completion: Comply with Article “Substantial Completion” in this section.

L. Certifications: Submit written certifications from the governing building authorities stating that work has been inspected, accepted, and complies with applicable codes and ordinances.

1.4 DEFINITIONS AND ABBREVIATIONS

A. Refer to Division 1 for definitions and abbreviations. Additional definitions and abbreviations are as follows.

B. The word "Contractor", as used in Division 15 specifications, means the mechanical subcontractor.

C. Engineer: Mechanical Engineer responsible for mechanical contract documents.

D. Concealed: Spaces out of sight. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.

E. Exposed: Open to view. For example, pipe installed in a tunnel or pipe installed in a room and not covered by other construction.

F. Coordination, Coordinating, and Coordinate: To bring, or the bringing, into a common action, movement, or combination so as to act together in a smooth concerted way.

G. Indicated and Indicated in the Contract Documents: Shown on Drawings by notes, graphics or schedules, or written into other portions of Contract Documents. Terms such as “shown”, “noted”, “scheduled” and “specified” have same meaning as “indicated”, and are used to assist the reader in locating particular information.

H. Directed, Requested, Approved, Accepted, and Similar Terms: These terms imply “by the Contracting Officer” unless otherwise indicated.

I. Furnish (Materials): Supply and deliver to the project site ready for unloading, unpacking, assembly, installation, and similar activities.

J. Install (Services or Labor): To place in position for service or use. Operations at project site, including unloading, unpacking, assembly, erection, placing, preserving, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar activities.

K. Provide: To furnish and install, complete and ready for intended use. When neither *furnish*, *install*, nor *provide* is stated, provide is implied.

L. Abbreviations:

AHJ	Authorities Having Jurisdiction
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CISPI	Cast Iron Soil Pipe Institute
ETL	Environmental Technology Laboratory
F	Degrees Fahrenheit
FM	Factory Mutual Engineering Corporation
HVAC	Heating, Ventilating, and Air Conditioning
LEC	Local Energy Code (Enforced by AHJ)
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
psi	Pounds per square inch
psig	Pounds per square inch gauge pressure
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association, Inc.
IRC	International Residential Code
UL	Underwriters Laboratories Inc.
IRC	International Residential Code
IRC	International Residential Code
V	Volts
WOG	Water Oil Gas
WSP	Working Steam Pressure

1.5 SEQUENCING/SCHEDULING

A. General: Phase in properly with Contracting Officer reviewed/accepted Construction Schedule.

1.6 WARRANTY

A. General: Conform to requirements in General Conditions, Supplementary Conditions, and Division 1. Where not so prescribed or defined, the period shall be 1 year after final acceptance except for longer warranty periods specified in individual sections.

B. Responsibility: Pursue, handle, process, and implement warranty repairs on behalf of the Government during the warranty period.

1.7 STANDARDS OF QUALITY

A. General: Use the best trade methods throughout. Correct or replace work not in conformance with the Contract Documents.

B. Products and Materials: Furnish products and materials of high quality and free from defects, designed to ensure satisfactory operation and operation life in the environmental conditions which will prevail where they are being installed. Unless otherwise indicated, furnish products and materials that are the standard products of manufacturers regularly engaged in the production of such products and materials, and of the manufacturer's latest standard design. Products shall be asbestos free.

C. Quantity Items: Furnish products of a single manufacturer only for items of any 1 classification, which are used in quantity. A product, for the purpose of this paragraph, is an assembly of components such as fans, air handling units, chillers, valves, and similar items. Materials such as pipe, fittings, pipe and duct insulation, and similar items not requiring maintenance are not included in the single manufacturer requirement of this paragraph.

1.8 CONTRACT DOCUMENTS

A. General: The Contract Documents are intended to include the complete extent of mechanical work, unless otherwise indicated in the Contract Documents.

B. Specifications: These specifications are written in imperative mood and streamlined form. The imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

C. Depiction of Work: Drawings do not show exact characteristics of the work, piping and air distribution configurations, or necessary number of fittings. Provide work required to complete the installation.

D. Dimensions: Do not scale drawings. Dimensional accuracy is not guaranteed, and field verification of dimensions, locations, and levels to suit field conditions is required.

E. Minor Changes in Locations: Minor changes in location of items such as grilles, registers, diffusers, thermostats, and sensors from those indicated shall be made without extra charge, if so directed by the Contracting Officer before installation.

F. Discrepancies: Bring to the Contracting Officer’s attention any discrepancies within the Contract Documents and between the Contract Documents and field conditions. Also for any design and layout changes required due to specific equipment selection, prior to the Contractor’s work (equipment and material purchasing and installation). Any work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor’s expense.

1.9 COORDINATION

A. General: Coordinate activities with application sections in Division 1. Notify Contracting Officer at least 48 hours prior to covering concealed work and conducting tests.

B. Work of Other Trades and Existing Conditions: The mechanical drawings do not show complete details of the building construction. Refer to the Drawings of other disciplines for details, which may affect the execution of this work. Report any discrepancies to the Contracting Officer along with suggested revisions. Obtain written response from the Contracting Officer before proceeding with the changes. Field verify existing conditions prior to commencement of work. Obtain specific locations of structural and architectural features or equipment items from the referenced drawings, field measurements, or the trade providing the material or equipment. No extra payments will be allowed for failure to obtain this information.

C. Cooperation: Plan and execute work in cooperation with other trades. Make every reasonable effort to provide other trades with timely notice of work affecting their trades, and to prevent conflicts or interference as to space requirements, dimensions, openings, block-outs, sleeving or other matters which will cause delays or necessitate work-around methods.

1.10 SAFETY AND PROTECTION

A. Safety Measures: The Contracting Officer has not been retained to provide design and construction services relating to the Contractor's safety precautions, or to means, methods, techniques, sequences or procedures required for the Contractor to perform his work. Contractor is solely and completely responsible for conditions of the job site, including safety of persons and property during performance of the work. This requirement applies continuously and is not limited to normal working hours. Comply with "Safety and Health Regulations for Construction", Volume 36, No. 75, Part II of the Federal Register by the U.S. Department of Labor. Provide required safety measures and consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether compliance with state or federal regulations exists.

B. Personnel Protection: Comply with requirements in Section 15050.

1.11 DEMONSTRATION

A. General: Comply with requirements in Division 1. Following installation of mechanical work and prior to final acceptance demonstrate that equipment and systems operate as indicated in the Contract Documents and in accordance with manufacturer's recommendations. Perform in the presence of the Contracting Officer and the Government’s Representative, unless otherwise directed by the Contracting Officer; give minimum 1 week notice prior to demonstrations. Provide instruments and personnel required to conduct the demonstrations.

B. Pre-Final Work: Notify Contracting Officer at least 48 hours prior to covering of concealed work and conducting tests.

1.12 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Description: Following installation of mechanical work and prior to final acceptance, conduct operation and maintenance instruction periods for Government's Representatives. Commence the instruction periods with accepted Operation and Maintenance Manuals.

B. Contractor's Personnel: Qualified foremen or superintendents from the trade involved. For control systems specified in Section 15780, the representative shall be the technician who performed the testing and adjustment. Submit qualifications before conducting the instruction, if requested by Contracting Officer.

C. General Description of Instruction Periods: Include preliminary discussion and presentation of information from operation and maintenance manuals, with appropriate references to Contract Documents, followed by tour of building areas explaining maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures, temperature control settings, and available adjustments. Conduct instructions in appropriate sessions. If applicable, comply with the total minimum hours specified in individual sections.

D. Scheduling of Instruction Periods: Provide notice of readiness to conduct such instruction with written lesson plan and instruction schedule to Contracting Officer at least 2 weeks prior to the earliest instruction periods. Coordinate schedule of instructions with the Government's Representative prior to submitting the notice of readiness.

1.13 ALTERNATES

A. General: See Bid Form and Optional Bid Items described in Division 1 for possible effect on work of this Division.

1.14 SUBSTANTIAL COMPLETION

A. General: Submit Mechanical Project Completion Form (immediately following this section) properly filled out at least 3 days prior to request for Substantial Completion review of the Work. Substantial Completion project review will not be started until this form is received by Contracting Officer.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

MECHANICAL PROJECT COMPLETION FORM

PROJECT NAME:_____Date:_____

PROJECT LOCATION:_____

Inspector's Final Acceptance _____
Name Date

_____
Agency

Fire Marshal's Final Acceptance _____
Name Date

_____
Agency

A. The following systems have been demonstrated to the Government's Representative:

1. Plumbing System: _____
Government's Rep Signature Date
2. HVAC System: _____
Government's Rep Signature Date

B. Record Drawings: Quantity _____
Attached: Transmitted previously to:

C. Certificates: Quantity: _____
Attached: Transmitted previously to:

D. O & M Manuals: Quantity: _____
Attached: Transmitted previously to:

E. Spare Parts & Keys: Quantity: _____
Attached: Transmitted previously to:

F. The Work is complete and in accordance with Contract Documents and authorized changes except for:

_____

and the Government's Representative is requested to meet with:

_____
(Supervisor of Mechanical Work)

at:_____
(Date) (Time)

_____
Mechanical Subcontractor's Representative's Signature Date

END OF SECTION

SECTION 15050

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes coordination, electric motors, supports, appurtenances, identification, and miscellaneous work.

B. Contract Requirements: General Conditions, Supplementary Conditions, and Division 1 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code
2. NFPA 90B

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Product Data: Piping Identification.

C. Test Reports: As required in specific specification sections.

D. Certificates: Submit a certificate stamped and signed by a professional engineer stating that the seismic calculations for equipment have been completed and meet all requirements of the International Residential Code.

1.4 TESTING LABORATORY LISTED EQUIPMENT

A. General: Whenever UL or ETL standards exist for equipment with electrical components, provide UL or ETL approved equipment bearing the UL or ETL label. Otherwise provide equipment certified by the manufacturer as complying with UL or ETL standards for similar items and complying with ANSI standards.

1.5 MECHANICAL - ELECTRICAL INTERFACE

A. General: Separation of work between trades and subcontractors is not within the scope of these Contract Documents. The following is proposed for assistance in bidding only.

B. Mechanical and Electrical Work: Unless otherwise indicated, mechanical equipment and controls are suggested to be furnished, installed, and wired in accordance with the following schedule. Coordinate work with Division 16, Electrical:

MECHANICAL EQUIPMENT - ELECTRICAL POWER AND CONTROLS

ITEM	FURNISHED BY:	INSTALLED BY:	POWER WIRING BY:	CONTROL WIRING BY:
1. Equipment Motors:	M	M	E	M
2. Equipment Connections:				
a. Manually controlled:	E	E	E	E
3. Disconnect switches and 120-volt receptacles per IRC and NEC:	E	E	E	--
4. Manual motor starters, thermal overload switches:	E	E	E	--
5. Section 15780 Controls - General: Damper actuators, low voltage electric thermostats, switches, other miscellaneous controls:	M	M	M	M

M = Division 15, Mechanical
E = Division 16, Electrical

C. Electrical Work Requirements: Provide electrical work in accordance with the requirements of Division 16 Electrical.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. General: Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

B. Containers: Deliver products to the site in the manufacturer's original containers, complete with labels.

C. Inspection: Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

D. Storage: Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 ACCEPTABLE MANUFACTURERS

A. Listed manufacturers with products equivalent to specific product indicated (if any) are acceptable; Contracting Officer is sole judge of equivalency.

B. Non-listed manufacturers may be considered by the Contracting Officer if prior approval request is received in accordance with Section 15010.

2.3 SUPPORTS

A. Formed Steel Channels:
   1. General: 12 gage minimum, 1-3/8 inch by 1-5/8 inch minimum cross-section size, zinc electroplated per ASTM B633.

B. Anchor Bolts: Provide for equipment. Number and size per manufacturer's recommendations or as indicated in the Contract Documents.

C. Supplementary Steel Framing: Standard structural steel shapes or Schedule 40 steel pipe.

2.4 IDENTIFICATION OF PIPING

A. General: Identify piping which is accessible for maintenance operations, including piping concealed above suspended ceilings and in crawl spaces with color-coded semirigid pressure sensitive adhesive identification labels. Color and sizes of labels per Tables I and II.

B. Acceptable Manufacturers: Conform to ASME A13.1, Scheme for the Identification of Piping Systems.

C. Flow Direction: Include direction of flow arrows on each label.

D. Legend: Paint in uppercase black letters as listed in Table I.

TABLE I. COLOR CODES FOR MARKING PIPE

Material	Band	Arrow*	Letters and Legend
Cold water (potable)	Green	White	POTABLE WATER
Hot water (domestic)	Green	White	H.W.
Natural gas	Yellow	Black	NAT. GAS
Refrigerants	Blue	White	REFRIGERANT

* Point in direction of flow.

TABLE II. COLOR CODE MARKING SIZES

Outside Diameter Length of Pipe Covering (Inches)	Arrow Color Band (Inches)	Size of Legend Length x Width (Inches)	Letters and Numerals (Inches)
Less than 1-1/2	8	8 x 2-1/4	1/2
1-1/2 to 2-3/8	8	8 x 2-1/4	3/4
2-1/2 to 7-7/8	12	8 x 2-1/4	1-1/4

2.5 PERSONNEL PROTECTION

A. General: Where support angles, hangers, equipment supports and appurtenances, and similar items are exposed above floors, in walkways, or in maintenance access ways, cover such protrusions less than 6'-6" above the floor with protective padding.

B. Protective Padding: Soft elastomeric foam material or equivalent with composite and component ratings per NFPA 255, ASTM E84 or UL 723 as follows: Flame spread 25, smoke developed 50. Acceptable manufacturers: Armstrong, Rubatex, or equivalent.

C. Finish: White field-applied finish of the same manufacturer as the protective padding.

2.6 PAINTING

A. General: Painting of work specified in mechanical sections which is exposed, including exterior exposed mechanical work, is specified in Division 9.

B. Touch-up: Cover scratches, abrasions, etc. of mechanical equipment with factory finished surfaces using matching factory furnished paint.

C. Grilles and Registers: Paint inside surface of ducts, visible through grilles, registers, diffusers, and other openings with 1 coat of flat black paint to a point 2 feet from opening on straight ducts or around bend.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

3.4 CUTTING AND PATCHING

A. General: Except where specifically shown on architectural drawings, cutting, coring, patching, and painting of existing walls, ceilings and floors as required to accommodate work as indicated in the Contract Documents or specified in Division 15 work, shall be included in the cost of this work. Employ skilled workmen to perform cutting and patching and restore disturbed surfaces to original condition. The material and workmanship for patching shall be as specified in the respective sections general construction.

3.5 ACCESSIBILITY

A. General: Locate valves, dampers, controls, and similar components, to be easily accessible. Provide access doors to achieve accessibility. Coordinate access door locations with the Contracting Officer.

B. Equipment: Install equipment which requires periodic servicing or repairs to be readily accessible. Otherwise, obtain Contracting Officer approval of location.

3.6 INSTALLATION OF EQUIPMENT AND DISTRIBUTION SYSTEMS

A. Equipment Installation:
   1. General: Provide supports for equipment and appurtenances as required.
   2. Floor-Mounted Equipment, General:
      a. Install equipment at the locations and to the dimensions indicated in the Contract Documents. Set equipment accurately with principle centerlines, and level using manufacturer's leveling screws, blocks, shims, or wedges. Do not distort equipment or baseplates.

B. Pipe and Duct Supports: Attach hangers and support rigidly to the building structure. Install supplementary steel framing as required. Install seismic bracing as required by codes and as indicated in the Contract Documents.

3.7 FLASHING AT ROOF PENETRATIONS

A. General: Coordinate flashing for pipes through the roof surface with Division 7.

B. Pipe Penetrations: Install galvanized steel weatherproof rainhood around pipes through roof, overlapping flashing.

3.8 IDENTIFICATION OF PIPING

A. Locate pipe labels as follows:
1. Adjacent to each valve.
2. At straight pipe runs at intervals not exceeding 40 foot spacing.
3. Adjacent to changes in direction.
4. On each side where pipes pass through walls and floors.

B. Do not install pipe markers on piping exposed to view in finished spaces.

C. Place legend in frame under glass and install in mechanical room for each unit.

3.9 PERSONNEL PROTECTION

A. General: Secure and permanently fasten elastomeric foam material in a neat and smooth manner, using band straps, clamps, snaps, or similar methods.

B. Finish: One or 2 coats to result in uniform white color.

3.10 TEMPORARY SERVICES

A. Temporary Heat: Comply with requirements in Division 1.

B. Air Systems: Do not use air systems during construction. Cover duct and grille openings with taped-on plastic sheet or equivalent to keep construction dust out of the ductwork.

3.11 EARTHWORK

A. Description: Perform earthwork required for installation of mechanical work in the ground. Coordinate with Division 2.

B. Trench Excavation: Excavate trenches of necessary width for proper laying of pipe, with banks as nearly vertical as possible. Accurately grade trench bottoms to provide uniform undisturbed bedding for each section of pipe, along entire length. Form holes and depressions for joints after trench bottom as been graded. Provide temporary pumping equipment to keep excavation free from water. Install pipe bedding in rock excavation consisting of not less than 6 inch of sand or equivalent material.

C. Bracing and Shoring: Provide as necessary to maintain stability of excavation.

D. Backfilling: Backfill trenches only after completion of pressure tests and inspection by the Contracting Officer. Fill spaces between pipe and sides of trench by hand, shovel tamped in place. Cover in 6 inch layers to thickness of 12 inch over top of pipe. Fill and tamp remainder of backfill material in 6 inch layers. Provide backfill materials generally consisting of clean earth or sand relatively free of clods or stones. For sewer and water

piping, use pea gravel; for gas piping, use sand. Backfill under, around and to 6 inch above top of piping. In addition, wherever paving or future paving is indicated over backfill, provide the remainder of the backfill of granular subgrade backfill material (Butler fill).

E. Compacting:
1. Perform compacting individually, for each 6 inch layer (maximum) loose thickness of backfill. Where roadway or parking area surfaces will be placed over backfill, provide a moisture condition which will produce a compacted density of 95 percent of maximum density. Elsewhere, 90 percent. Test in accordance with Divisions 1 and 2.
2. Take special care in compacting under services where they enter building to prevent settling. Contractor shall be fully responsible for any damage to piping or property as a result of settling around service piping.

F. Surplus Earth: Dispose off-site in a suitable location.

G. Barricades: Place and maintain barricades, construction signs, torches, lanterns and guards, as required during periods of open excavation as necessary to protect persons from injury and to avoid property damage.

H. Clean-Up: Leave premises thoroughly clean at completion of earthwork.

I. Installation of Piping in Backfilled Areas: Wherever piping is to be installed in areas which have been excavated below pipe inverts, for any purpose, install piping in a manner which will prevent subsequent settlement. Do not install piping until backfill is to full compaction, completed up to a level of 18 inch or more above the level of the installed pipe. Install the piping in re-excavated trenches through the backfill.

3.12 MISCELLANEOUS EQUIPMENT AND FIXTURE CONNECTIONS

A. General: Install piping, ductwork, and make final mechanical connections in accordance with manufacturer's recommendations for Government-furnished equipment and fixtures, and equipment and fixtures specified in Divisions 1 through 14. This applies to work of Sections 15400 and 15880.

B. Coordination: Perform on-site review and refer to manufacturer's Shop Drawings for details of connections. Perform rough-in at locations to conveniently serve items.

3.13 CLEAN UP

A. General: Remove debris, cuttings, crates, cartons, and similar items, created by the work of this section at regular intervals. Perform at sufficient frequency to eliminate hazard to the public, other trades people, the building, and the Government's employees. Before requesting acceptance of the installation, carefully clean equipment, fixtures, exposed ductwork, exposed piping, and similar items. Remove construction labels, dirt, dust, cuttings, paint, plaster, mortar, concrete, and similar items.

End of Section

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SECTION 15060

PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes piping and associated appurtenances.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable Government requirements. In case of conflict with drawings or specifications, the requirements govern.

B. Basis:
1. International Residential Code
2. ASME B31.1

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Product Data:
1. Pipe and Fittings
2. Valves
3. Unions
4. Pipe Hangers and Supports
5. Dielectric Unions and Nipples
6. Escutcheon Plates
7. Gas Flexible Connectors

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

B. Pressure Ratings: Provide components with minimum pressure rating of 125 psig working pressure.

2.2 STEEL PIPING, GENERAL

A. Pipe: Black steel, Schedule 40, standard weight for 10 inch and smaller and 0.375 inch wall for 12 inch and larger, ASTM A53, Grade A or B, or ASTM A106, Grade A, B, or C.

B. Fittings:
   1. 2 Inch and Smaller: 150 pound WSP, black malleable iron, screwed, ANSI B16.3 and ASTM A197; 3000 pound forged steel socket weld, ANSI B16.11 and ASTM A105 II.

C. Unions, 2 inch and Smaller: 150 pound WSP, black malleable iron, screwed, ASTM A197, brass seat.

D. Joint Compound: Teflon tape.

2.3 COPPER TUBING, GENERAL

A. Tubing, Above Grade: Type L copper water tube, hard-drawn, ASTM B88.

B. Tubing, Underground: Type K copper water tube, soft-drawn, ASTM B88. No joints allowed underground except where located in an access enclosure.

C. Fittings: Wrought copper solder fittings and screwed adapters, ANSI B16.22; cast bronze solder joint fittings and screwed adapters, ANSI B16.18.

D. Unions: Wrought copper solder joint unions, ANSI B16.22; cast bronze solder joint fittings, ANSI B16.18.

E. Joint Compound: Teflon tape.

F. Solder: 95 percent tin, 5 percent antimony solder, or 96 percent tin, 4 percent silver.

G. Valves:
   1. Ball: 200 pound WOG, bronze body, chrome plated ball and stem. solder or screwed ends, 2 piece construction, lever handle, Teflon seat and seal.

2.4 POLYVINYL CHLORIDE (PVC), GENERAL

A. Polyvinyl chloride pipe, Schedule 40, Type 1 per ASTM F891. Joints sealed with solvent cement.

2.5 PIPE HANGERS AND SUPPORTS

A. Description: Conform to Federal Specification WW-H-171E and MSS SP-69 requirements.

B. Materials:
   1. Match piping material at point of contact with piping; carbon steel, cast iron or malleable iron for black steel pipe; carbon steel, cast iron or malleable with zinc coating or cadmium-plated for galvanized steel pipe; carbon steel or malleable iron with copper finish, or plastic coated, or copper for copper pipe; galvanized steel or plastic for plastic pipe.

Rods: Hot rolled steel, ASTM A36. Size as follows:

Rod Diameter (Inch)	Pipe Size (Inch)	Load at 650 F (Pounds)
3/8	2 and smaller	610

C. Components:
1. Ring Hangers, 2 Inch Pipe Size and Smaller: Adjustable swivel type.
2. Clevis Hangers, 2-1/2 Inch Pipe Size and Larger:
3. Trapeze Hangers and Multiple Pipe Supports: Structural steel shapes in conformance with Section 15050, supported by rods or structural steel shapes as required.
4. Horizontal Pipes at Walls:
   a. 2-1/2 Inch and Smaller: Galvanized, iron 1 hole clamp.
   b. 3 Inch and Larger: Welded steel bracket.
5. Vertical Pipes at Walls:
   a. 2-1/2 Inch and Smaller: Galvanized steel preformed metal shapes. Grinnell PS500 with PS1200 clamps for O.D. tubing or PS1100 clamps for pipe, Eristrut C-14 with O.D. clamps for O.D. tubing or R1GD/SK clamps for pipe, or equivalent.
   b. 3 Inch and Larger: Welded steel brackets as specified for horizontal pipes at walls, connected to pipe clamps.
6. Vertical Pipes Between Floors: Riser clamp at each floor penetration.

2.6 DIELECTRIC UNIONS AND NIPPLES

A. 2 Inch and Smaller: Capital Series CS; Epco Dielectric Unions, or Victaulic Clearflow Dielectric Waterway.

B. Ratings: Select temperature and pressure applicable for the systems in which they are installed.

2.7 ESCUTCHEON PLATES

A. Description: Metal chrome plated, spring clip type at ceilings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements in Section 15050.

3.5 INSTALLATION OF PIPING

A. General: Install pipe generally sloped to permit drainage at low points, free from traps, and in a manner to conserve space for other work. Cap or plug open ends.

B. Location of Piping:

1. Piping plans, sections, details and diagrams are diagrammatic indicating general arrangement of piping installation. Locate piping and include offsets to avoid interference with building structural members, equipment, building openings, light fixtures, ductwork, electrical work, and other obstructions.

2. Arrange piping to allow access for operation, service, disconnection, and removal and replacement of valves, fixtures and equipment.

3. In general, maintain the maximum possible headroom in ways of egress, including pedestrian walkways and maintenance aisles, minimum headroom of 6'-8" from the floor to the bottom of any component.

4. Within buildings, conceal piping in walls and chases and above ceilings except where indicated in the Contract Documents to remain exposed. Do not cover or enclose work until completely inspected and approved. Should Work be covered or enclosed prior to inspections and approvals, uncover work as directed by the Contracting Officer. After Work has been inspected and approved, make repairs and replacements with materials as necessary to obtain approval of Contracting Officer at no additional cost to Government.

5. Route piping parallel to column lines and perpendicular to floor unless indicated otherwise.

C. Disconnection Provisions: Provide unions or flanges at valves, fixtures and equipment if a means of disconnection is not otherwise provided.

D. Changes in Pipe Size: Provide reducing fittings for changes in pipe size. Bushings are not acceptable.

E. Changes in Direction: Use fittings for changes in direction of piping.

F. Structural Members: Do not cut or reduce size of structural members.

G. Cleaning: Clean interior of piping before making joints and placing in position by blowing clean with steam or compressed air. Maintain cleanliness of piping throughout installation. Install caps or plugs on open ends of cleaned piping.

H. Leaks: Correct leaks immediately, using new materials. Do not peen or use leak-sealing compounds.

I. Valve Stem Position:
   1. Ball Valves: Install horizontal or above.

3.6 JOINTS

A. Screwed:
   1. Use threads on iron and steel pipes, fittings and couplings in accordance with ANSI B31.1.
   2. Produce sufficient lengths of high quality threads to insure full metal-to-metal contacts when screwed home in fittings; countersink, ream and clean ends of pipes after threading.
   3. Make up full connections with not more than 1 full thread exposed, by such method that will not subject pipes or fittings to twisting or cross strains; lubricate male threads only with thread lubricant.

B. Soldered:
   1. Cut ends square and remove fins and burrs. Replace dents and damaged tubing with new tubing.
   2. Remove grease and oil from joints by wiping with clean cloth saturated with a suitable chemical solvent. Clean with emery cloth.
   3. After cleaning, apply non-corrosive flux, apply heat and solder and hold joint rigidly until solder has hardened.
   4. Wipe excess solder from exterior of joint before hardening.
   5. Before soldering, remove stems and washers of solder joint valves.

C. Glued:
   1. Cut pipe square, remove ragged edges and burrs. Chamfer end of pipe, then clean fitting socket and pipe joint area of all dirt, grease, moisture or chips.
   2. After checking pipe and socket for proper fit, wipe socket and pipe with cleaner-primer. Apply a liberal coat of primer to inside surface of socket and outside of pipe. Do not allow primer to dry before applying cement.
   3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting movement until it bottoms out.
   4. Hold the pipe in the fitting for 30 seconds to prevent tapered socket from pushing the pipe out of the fitting.
   5. Wipe all excess cement from the joint with a rag. Allow 15 minutes before handling. Cure time varies according to fit, temperature and humidity.

3.7 PIPE HANGERS AND SUPPORTS

A. Spacing of Hangers and Supports:

1. Maximum spacing between supports for straight runs of piping as follows:

Pipe Size (Inch)	PVC Pipe Maximum Span (Feet) Appliance Venting Services	Steel and Iron Pipe Maximum Span (Feet) Gas Services	Copper Tubing Maximum Span (Feet)
1 and smaller	3	9	6
1-1/2	3	10	6
2	3	13	8
2-1/2	3	14	9
3	3	15	10
4	3	17	12

2. Support piping independent from connected equipment. Provide additional hangers or supports at concentrated loads between supports, such as valves, equipment, and similar items.

B. Pipe Ring Diameter:

1. Uninsulated Pipes: Ring diameter to suit pipe size.
2. Insulated Pipes, in General: Ring diameter to suit outer diameter of insulation.
3. Insulated Hot Pipes 2 Inch and Larger and Cold Pipes: Ring diameter to suit outer diameter of insulation insert and insulation protection shield.

C. Vertical Piping: In general, route vertical piping in a manner in which it can be attached to adjacent walls.

D. Anchoring, Guiding, and Supporting Piping:

1. Anchor piping and support in a manner such that expansion and contraction will take place in direction desired without stressing pipe, joints, and connected equipment.
2. Prevent vibration with vibration dampers and prevent undue strains on equipment served.
3. Fabricate hangers used for the support of 2 inch nominal pipe size and larger piping to permit adequate adjustment after erection while still supporting the load.
4. Use wall brackets where the pipes are adjacent to walls or other vertical surfaces which may be used for supports.
5. Fabricate supports to adequately carry the weight of the lines and maintain proper alignment.
6. Install inserts and sleeves for supports in concrete. Powder-actuated inserts not allowed.
7. Install anchors at points where necessary to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying and undue strain, and per expansion joint manufacturers instructions.

E. Insulation Protection Shield: Install insulated piping with a pipe insulation protection device at each support. Comply with requirements in Section 15250.

3.8 DIELECTRIC UNIONS AND NIPPLES

A. Install at the Following Locations:
   1. At black and galvanized steel piping connections to copper tubing.
   2. At black steel piping connections to bronze valves and similar devices.

3.9 ESCUTCHEON PLATES

A. Description: Install where exposed pipes pass through walls, floors or ceilings of finished rooms. Plates not required where sleeves project above the floor.

3.10 PRESSURE TESTING

A. Provide equipment and apparatus necessary for the tests. Make tests in the presence of the Contracting Officer.

B. Test piping systems before insulation has been applied.

C. Test Pressures and Duration: Test piping systems at pressure of 1-1/2 times the design working pressure or at 50 psig, whichever is greater. Maintain test pressure for sufficient time to permit complete inspection of system under test. Minimum 2 hour duration.

D. Test Procedure:
   1. Before tests, remove or valve off from the system gages, traps, pressure reducing valves, and other apparatus which may be damaged by the test pressure.

   2. Install a calibrated test pressure gage in the system to observe any loss in pressure.

   3. Test piping at metal temperature less than 35 F.

   4. Open vents, and other connections which can serve as vents, during filling so that air is vented prior to applying test pressure to a system.

E. Testing Media Requirements:
   1. Use clean, fresh city water for hydrostatic testing of plumbing piping. Water temperature shall be not less than 60 F and not greater than 100 F.

   2. Use oil-free clean dry compressed air for gaseous testing.

   3. Drain water immediately after hydrostatic testing. Vent system while draining to avoid creating a vacuum.

F. Test Repairs:
   1. Remove materials damaged during tests and flushing and provide new components.

   2. Repair defects which develop during testing and retest the piping systems until they show no defect or weakness and are tight.

G. Test Records: Make and submit records for each piping installation. Include copies in the Operation and Maintenance Manual. Include at a minimum, the following items:
   1. Date of test.

2. Description and identification of piping tested.
3. Test fluid.
4. Test pressure.
5. Test duration.
6. Remarks, to include such items as: Leaks (type, location); repairs made on leaks.
7. Signature and date of person witnessing the test.
8. Certification by Contractor.

End of Section

SECTION 15250

MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes insulation for HVAC and plumbing piping, ductwork, and equipment.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code
2. Applicable Government Energy Conservation Requirements

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Product Data:
1. Insulation
2. Inserts

1.4 STANDARDS

A. ASTM E 84, Standard Test Method for Surface Burn Characteristics of Building Materials

B. ASTM E 96, Standard Test Methods for Water Vapor Transmission of Materials

C. NFPA 90 A, Installation of Air Conditioning and Ventilating Systems

D. NFPA 255, Surface Burning Characteristics Building Materials

E. UL 723, Test for Surface Burning Characteristics of Building Materials

1.5 DEFINITIONS AND ABBREVIATIONS

A. Definitions:
1. "Exposed" is work exposed to view of occupants in normally occupied areas and in mechanical, electrical, equipment rooms.
2. "Concealed" is work located in ceiling spaces, crawl spaces, chases, and other locations not exposed to view.

3. "Cold Piping" includes the following down to 0 F:
   a. Refrigerant suction
   b. Cold water
4. "Hot Piping" includes the following up to 180 F: Hot water.
5. "Conditioned Air Ductwork" is ductwork for air that is heated, cooled, or humidified, and includes supply, return and outdoor air intake ductwork.
6. "Piping" includes pipe, fittings, valves, and appurtenances.

B. Abbreviations:

ASJ	All-Service Jacket
FSK	Foil-Scrim-Kraft Jacket
K	Thermal Conductivity, Btu per hour per square foot per degree F, for each inch of thickness.
PCF	Pound per cubic foot density
Perm	Water vapor transmission rate (permeability)
SSL	Self-sealing lap

1.6 SURFACE BURNING CHARACTERISTICS

A. Provide composite or component ratings per NFPA 255, ASTM E84 or UL 723 as follows: Flame spread 25, smoke developed 50.

B. Composite includes insulation, jacketing and adhesive used to secure jacketing or facing.

C. Components include PVC jacketing and fittings, adhesive, mastic, cement, tape and cloth.

1.7 MINIMUM INSULATION THICKNESSES

A. Thickness of insulation is defined as the thickness of the basic insulating medium not including finishing materials.

B. Plumbing Pipe Insulation, Fiberglass: Comply with the following table:

1. PLUMBING MINIMUM PIPE INSULATION

Insulation Thickness for Pipe Sizes

Service	Fluid Temp. Range, F	1” and less	1-1/4” to 2”
a. Hot Water	105-180	1.0	1.0
b. Cold Water	40-70	1/2	3/4

2. Miscellaneous Pipe Insulation: As indicated in the Contract Documents.

C. HVAC Pipe Insulation, Elastomeric: Refrigerant piping and gas appliance vent piping, 1 inch thickness.

D. Ductwork, Fiberglass: 2 inch thickness within building insulation envelope, 3 inch thickness outside building insulation envelope.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 PIPING INSULATION

A. Fiberglass: One-piece, molded heavy density with ASJ/SSL; K value not greater than 0.23 at 75 F mean temperature. Factory applied pressure sensitive closure system for permanent seal of laps and butt strips.

B. Elastomeric: One-piece, molded with only one longitudinal joint; K value not greater than 0.27 at 75 F mean temperature.

C. Fittings:
1. General: Provide insulation of equal thickness to adjacent pipe insulation.
2. Indoor: Preformed fiberglass, mitered sections of pipe insulation, or fiberglass blanket; with ASJ/SSL or finish with PVC fitting covers or glass fabric with suitable mastic.

2.3 EXTERNAL DUCTWORK INSULATION

A. General: Fiberglass, maximum 0.02 perms vapor transmission rate.

B. Indoor Exposed Conditioned Air Ductwork, Rectangular: Rigid board, 6 PCF, ASJ facing, K value not greater than 0.24 at 75 F mean temperature.

C. Indoor Exposed Conditioned Air Ductwork, Round: Flexible wrap, 1 PCF, ASJ facing, K value not greater than 0.28 at 75 F mean temperature.

D. Concealed Conditioned Air Ductwork, Rectangular and Round: Flexible wrap, 1.5 PCF, FSK facing, K value not greater than 0.25 at 75 F mean temperature.

2.4 INSERTS (LOAD-BEARING INSULATION) BETWEEN PIPES AND PIPE HANGERS/SUPPORTS

A. General: Coordinate with Work of Sections 15400.

B. Material: Hydrous calcium silicate insulation or other heavy density insulating material, minimum 12 inch long inserts, thickness equal to the adjoining insulation. Insulating material suitable for required temperature range.

2.5 INSULATION PROTECTION SHIELDS

A. General: Minimum 12 inch long, 18 gage galvanized steel.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements in Section 15050.

3.5 TIME OF APPLICATION

A. Apply insulation only after piping has been tested and certified by the Contracting Officer as ready for insulation. If insulation is applied prior to testing, necessary removals, repairs and modifications to insulation due to leaks that may occur in piping systems shall be made without additional cost to the Government.

3.6 EXTENT OF INSULATION

A. Insulate piping and conditioned air ductwork completely, except as indicated in the Contract Documents.

B. Do not insulate the following:
   1. Piping:
      a. Valve stems, handwheels and operators.
      b. Unions on hot water.
      c. Natural gas piping.

   2. Ductwork:
      a. Exhaust ductwork.
      b. Return ductwork located within the building insulation envelope.

3.7 INSTALLATION, GENERAL

A. Apply in a workmanlike manner by skilled workmen regularly engaged in this type of work.

B. Apply to clean and dry surfaces.

C. On cold surfaces, apply with continuous, unbroken moisture and vapor seal. Insulate and vapor seal hangers, supports, anchors, and other projections that are secured to cold surfaces to prevent condensation.

D. Extend surface finishes to protect raw edges, ends, and surfaces of insulation.

E. Install piping and duct insulation continuous through walls, ceilings, and floor openings and sleeves, except where firestop materials are required.

F. Install insulation through pipe hanger ring for pipe sizes 1-1/2 inch and smaller. Install insulation protection shield between ring and insulation. At Contractor's option, install insulated pipe supports.

G. Install insulation for cold pipes for all pipe sizes with insulation insert at pipe hanger ring and insulation protection shield between insulation insert and ring. At Contractor's option, install insulated pipe supports.

H. Install with joints tightly butted.

I. Tuck and tuft edges of insulation.

J. Install insulation to allow easy access to equipment for inspection and repairs.

3.8 INDOOR PIPING INSULATION

A. PVC Covers For Fittings and Valves: Seal circumferential edges by an overlap of at least 2 inch onto adjacent pipe insulation, using PVC tape or ASJ/SSL butt strip material.

B. Glass Fabric Finish for Fittings and Valves: Lap 2 inch onto adjacent pipe insulation.

C. Cold Piping:
   1. Secure ends with SSL butt strips, minimum 3 inch wide.
   2. Secure joints and exposed ends at fittings, valves, and equipment with vapor barrier mastic.

D. Hot Piping:
   1. Secure ends with ASJ or SSL butt strips, minimum 3 inch wide; secure ASJ laps and butt strips with outward clinch staples at 4 inch spacing, or with suitable lap adhesive.
   2. Secure PVC covers with tacks, outward clinch staples, or solvent type PVC adhesive.

End of Section

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SECTION 15400

PLUMBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes building drainage systems, potable water system, plumbing fixtures, and associated equipment and appurtenances.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code (IRC)

1.3 SUBMITTALS

A. General: Submit in accordance with Division 1, Section 15010, and the following.

B. Product Data:
1. Potable Water Piping
2. Building Drainage Systems
3. Natural Gas Piping
4. Pipe Hangers and Supports
5. Cleanouts
6. Vents Through Roof
7. Water Hammer Arresters
8. Relief Valves
9. Plumbing Trim
10. Plumbing Fixtures
11. Wall Seal
12. Plumbing Equipment

C. Certificates:
1. Certificates of Inspection by Local Authorities
2. Certificates of Satisfactory Bacteriological Test

1.4 PIPING, GENERAL

A. Description: Comply with requirements in Section 15060.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 POTABLE WATER PIPING

A. Description: Piping for potable and non-potable water usage.

B. 3 Inch and Smaller: Comply with requirements in Section 15060. Use copper tubing.

C. Underground Piping: Type K soft drawn copper tubing.

2.3 BUILDING DRAINAGE SYSTEMS

A. Description: Provide the following piping systems.
1. Waste and vent.
2. Indirect drain, including equipment, air vent, appurtenance, and cooling coil condensate drains.

B. Piping Materials:
1. Polyvinyl Chloride (PVC) pipe, Schedule 40 per ASTM D2665, and DWV fittings conforming to ASTM D2665. Joined with solvent cement.
2. Copper:
a. Pipe: Hard drawn drainage tubing, ASTM B 306.
b. Fittings: Cast bronze, ANSI B16.23.

C. Underground and Above-Grade Waste and Vent Piping:
1. 4 Inch and Smaller: PVC.

D. Indirect Drain Piping: Copper, except PVC where noted in Contract Documents.

2.4 NATURAL GAS PIPING

A. Description: Comply with requirements in Section 15060. Use steel piping with the following exceptions.
1. Unions: Use only type approved by IRC and Authority Having Jurisdiction.
2. Valves:
a. Plug: 200 psig w.o.g., screwed, cast iron body, lubricated, UL listed and labeled for 175 psi working pressure, regular port or full pipe area port, material ASTM A 126, Grade B, wrench operated. Basis of Design: Mueller H-1 1175.
b. Ball: Two-piece brass body, screwed connections, tee handle, PTFE seats and packing, UL approved for natural gas at 5 psig. Basis of Design: Watts Series GBV.

3. Pressure Regulator: Cast iron body, adjustable spring with seal cap, fiberglass reinforced nylon valve stem, Buna-N soft valve seat and diaphragm, aluminum orifice, internal relief valve, die cast aluminum alloy diaphragm case, and vent valve and vent connection. Regulator selected for capacity and inlet and outlet pressures indicated in the Contract Documents.

B. Gas Flexible Connectors: Flexible stainless steel hose, size and length to suit connected natural gas appliance. AGA approved for natural gas.

2.5 PIPE HANGERS AND SUPPORTS

A. Comply with requirements in Section 15060.

B. Building Drainage Piping: Minimum 1 hanger or support between any 2 joints or fittings.

C. Plumbing Chases: Manufactured pipe support and alignment system.

2.6 CLEANOUTS

A. Wall Cleanouts:
1. Tee: PVC cleanout tee with plug.
2. Frame and Cover: Chrome plated bronze square frame with anchor lugs, secured stainless steel face-of-wall cover.

B. Clean Out to Grade (COTG): PVC with plug.

2.7 VENTS THROUGH ROOF

A. General: Rubberized boot flashing.

2.8 WATER HAMMER ARRESTERS

A. General: Factory-sealed shock arresters with direct action bellows or piston, rated in accordance with Plumbing Drainage Institute Standard P.D.I. WH-201 Standard or ASSE 1010.

2.9 RELIEF VALVES

A. General: ASME Code rated water relief valves. Select for capacity to exceed rating of connected equipment.

2.10 PLUMBING FIXTURES AND TRIM, GENERAL

A. Fixture Color: White unless otherwise indicated in the Contract Documents.

B. Trim: Defined as any part used with a fixture, i.e., faucets, drains, traps, and supplies. Brass material, except Federal Specifications grade zinc-aluminum may be furnished for faucet handles.

C. Exposed Metal Parts: Chromium over nickel finish.

D. Stops: Include in each water connection to each fixture, except where a fitting has integral stops, loose key pattern with shield, polished finish where exposed and rough where concealed.

E. Exposed Supplies: 1/2 inch outside diameter tubing or braided stainless steel flexible plumbing connector.

F. Escutcheons: Include at each point where pipe or other fitting enters wall at fixture.

G. Tailpiece Extension, Trap, and Arm to Wall: 17 gage (0.043 inch), seamless tubing.

H. Vacuum Breaker: Include on the water supply to each fixture which has a water connection located below the rim or a hose attachment, flow-through pattern.

I. Faucets: Seals and seats of single control faucets shall be combined in one replaceable cartridge designed to be interchangeable with all lavatories, bathtubs and kitchen sinks, or having replaceable seals and seats removable either as a seat insert or as part of a replaceable valve unit.

2.11 PLUMBING FIXTURES AND TRIM, WATER CLOSETS

A. WC-1, Floor Mounted Water Closet: 1.6 gallons per flush; vitreous china; round front siphon action bowl; close coupled tank, float-type water control; and left hand chrome plated trip lever. Provide Kohler 3423 or approved equal.
   1. Closet Seat: White, closed front, with cover.

2.12 PLUMBING FIXTURES AND TRIM, LAVATORIES

A. L-1, Lavatory, Countertop, Barrier-Free:
   1. Description: Oval size 20 inch by 17 inch.
   2. Construction: Vitreous china, self-rimming, 4 inch faucet centers.
   3. Components:
      a. Faucet: Chrome finish, washerless, single lever-type metal handle, 4 inch centerset exposed deck mounting, red/blue handle indicators, lift rod hole, with 2.0 gpm at 60 psi aerator and 1/2 inch IPS adapters.
      b. Drain: Metal pop-up drain with lift rod and 1-1/4 inch tailpiece.
   4. Basis of Design: American Standard Aqualyn with Delta 520 faucet.

2.13 PLUMBING FIXTURES AND TRIM, SINKS

A. S-1, Double Compartment Counter Mounted Sinks: Double compartment counter mounted sink; 20 gage, Type 304 or 302 stainless steel; self-rimming, integral flange and ledge; with 1-hole drilling centered between compartments for faucet, 1 hole offset to the left for a dishwasher air gap fitting, and 1 hole offset to the right for a hose spray; overall dimensions of 19 inches front to back by 33 inches left to right by 7 inches deep; inside dimensions of each compartment of 14 inches front to back by 14 inches left to right by 7 inches deep; underside of sink shall be sound deadened. Basis of Design: Elkay Pacemaker.

1. Faucet: Single control faucet with diverter hose and spray, chrome finish, soft closing valve, 8 inch spout swings 360 degrees, and a 2.0 gpm aerator. Basis of Design: Delta 300.
2. Supplies: Angle supply with stop and annealed vertical tube.
3. Drain: Type 304 stainless steel perforated grid strainer on one side and crumb cup strainer on the other, and 1-1/2 inch diameter tailpiece.
4. Garbage Disposal: Continuous feed, automatic reversing action; 3/4 horsepower split phase motor, corrosion protection shield, stainless steel lugs.
5. Dishwasher Air Gap Fitting: ASSE 1021, plastic body, chrome plated brass cover, rated for 5 psi at 140 degrees F and 5 gpm minimum.
6. Dishwasher Hose: Rubber hose suitable for dishwasher drain; length as required for connection to dishwasher.

B. S-2, Sink, Countertop, Laundry:
1. Description: Rectangular size 21 inch by 19 inch, bowl 16 inch L by 16 inch W by 7-1/2 inch D.
2. Construction: Type 304, 18-8 stainless steel, 18 gage, self-rimming, polished finish, sound deadened.
3. Components:
   a. Faucet: Single control faucet, soft closing valve, 8 inch spout with 360 degree swing, 2.0 gpm aerator, without spray attachment. Basis of Design: Delta 101.
   b. Supplies: Angle supply with stop and annealed vertical tube.
   c. Drain: Brass fitting with perforated grid strainer and 1-1/2 inch tailpiece.

2.14 PLUMBING FIXTURES AND TRIM, SHOWERS

A. B-1, Tub Bath and Shower:
1. Tub and Shower: One-piece tub/shower unit, white in color; unit construction shall have a backing of molded, reinforced fiberglass with a cellular inner core; finished surface shall be of a sanitary-grade methyl-acrylate (acrylic); flame spread rating of less than 200 as tested to ASTM E162 and shall achieve a flame spread index rating of “C”; unit shall comply with HUD UM Bulletin 73A and have a smoke generated rating of less that 450. Unit shall be provided with a molded soap dish and a textured floor. Furnish with a 1 inch outside diameter Type 304 stainless steel curtain rod. Basis of Design: Maax Hydroswirl Concerto II.
2. Mixing Valve, Shower Head, and Diverter Tub Sprout: Pressure balancing mixing valve with integral stops and adjustable stop screw to limit handle turn. Metal blade type handle rotates 120 degree to control temperature. Basis of Design: Delta 1437. Shower head with arm and flange, 2.5 gpm flow control; diverter tub spout; solid brass body with chrome plated finish.
3. Drain: Adjustable pop-up drain; polished chrome finish.

B. SH-1, Shower:
1. Description: Corner installation 36 inch by 36 inch, neo-angle arrangement.
2. Construction: Acrylic, with fiberglass reinforced plastic backing, hinged door, clear tempered glass, 3 built-in shelves, and 3-piece wall and base.
3. Components: Mixing Valve and Showerhead: Delta 1323 series, washerless, pressure-balancing type, single metal blade vandal-resistant handle. Mixer type

which opens to cold water first, then through warm (mix) to hot. Operating parts separately replaceable from outside the wall. Combination screwdriver / check stops and adjustable high temperature limit stop. Shower assembly with adjustable volume control showerhead.

2.15 PLUMBING FIXTURES AND TRIM, FLOOR DRAINS

A. FD-1, Floor Drain:
1. Description: PVC body with integral trap, steel anchor flange, cast iron frame and grate. Acid resistant coating on metal components. Suitable for installation in wood decks.
2. Basis of Design: Zurn FD-2240 with aftermarket coating by Superliner.

2.16 PLUMBING FIXTURES AND TRIM, MISCELLANEOUS

A. HB-1, Exterior Hose Bibb:
1. Description: Freezeless wall faucet, brass construction, molded nitrile valve with metal handle, Delrin stem screw, vacuum breaker, 10 inch length. Separate drain hole to provide freeze protection if hose is attached.
2. Basis of Design: Woodford Model 25.

WV-1, Washer Valve Box:
1. Description: Recessed wall box with supply valves and drain.
2. Construction and Components: 16 gauge steel with epoxy finish. Bottom ½ inch supply, ½ inch brass supply sweat connections and valves with single operating lever for hot and cold water, 2 inch drain pipe, and overflow tip.
3. Basis of Design: Guy Gray Model WB200.

VB-1, Icemaker Valve Box:
4. Description: Recessed wall box with shutoff valve.
5. Construction and Components: 16 gauge steel with epoxy finish. Bottom ½ inch inlet, 1/4 inch outlet brass compression angle valve.
6. Basis of Design: Guy Gray Model BIM875.

2.17 PLUMBING EQUIPMENT

A. Water Heater, Gas-Fired (DWH-1 and DWH-2):
1. General: Residential, through-the-wall power vented, natural gas-fired water heater with integral storage tank.

2. Venting: Field adjustable blower/motor assembly that provides direct horizontal discharge or vertical discharge of exhaust gases in PVC pipe.

3. Construction:
a. Tank: Interior lined continuous over entire inner surface with ceramic coating, fiberglass insulation to meet Government energy conservation requirements.
b. Controls: Electronic ignition burner, with fully automatic temperature control, high temperature energy cutoff switch, combination gas valve with pressure regulator.

4. Components:
   a. Brass drain valve.
   b. Temperature and pressure safety relief valve.
   c. Factory installed dielectric waterway fittings.
   d. Protective magnesium rod.

5. Basis of Design: Bradford White TTW1.

2.18 WALL SEAL

A. Type: Commercial grade Silicone Building Sealant.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

B. Do not cover up or enclose work until completely inspected and approved. If non-compliance, uncover work and replace to satisfaction of A/E at no additional cost to Government.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements in Section 15050.

3.5 POTABLE WATER PIPING

A. Comply with requirements in Section 15060.

B. Space pipe supports in accordance with MSS SP-69.

3.6 BUILDING DRAINAGE PIPING

A. General: Install with uniform pitch of at least 1/4 inch per foot for horizontal waste piping within building, unless otherwise indicated in the Contract Documents. Pitch vents for proper drainage.

B. Above-Grade Piping:
1. Support horizontal piping to maintain alignment, prevent grade reversals, and prevent sagging.
2. Support vertical stacks at floors with clamp anchors.
3. Support at 3 feet maximum centers and at each joint.

C. Underground Piping: Perform trenching and backfilling associated with plumbing installation in strict accordance with pertinent provisions of excavating, filling and grading specifications in Division 2 and Section 15050.

3.7 CLEANOUTS

A. Waste: Install as required by IRC.

3.8 VENTS THROUGH ROOF

A. General: Install to be weatherproof (reference Architectural specifications).

3.9 WATER HAMMER ARRESTERS

A. General: Install in accordance with Plumbing and Drainage Institute Standard PDI-WH 201 and ASSE 1010 recommendations.

3.10 RELIEF VALVES

A. General: Install and pipe outlet to nearest drain.

3.11 FIXTURES

A. General: Locate fixtures where indicated on the Architectural drawings.

B. Floor-Mounted Fixtures: Secure floor outlet rigidly to drainage connections and floor.

C. Connections: Make gas- and watertight. Use 1 piece special molded gaskets for connections between earthenware of fixtures and soil pipe flanges. Do not use bulk material, including putty and plastic, for gaskets.

D. Vents: Install for each fixture, as indicated in the Contract Document or as allowed by IRC.

E. Trap: Install where manufacturer does not include trap for fixture.

F. Silicone Wall Sealer: Apply between top and sides of plumbing fixtures and adjacent wall surfaces. Apply per manufacturer's recommendations to form smooth unobtrusive

joint. Install 1 sample joint on each type of fixture for the Contracting Officer's review before proceeding with installation of remainder of sealant.

3.12 WATER HEATERS

A. General: Install within a sheet metal drain pan.

B. Components: Install as indicated in the Contract Documents.

3.13 PRESSURE TESTING

A. Drainage Piping: Pressure test in accordance with IRC and local Authority Having Jurisdiction requirements.

B. Water Piping: Test at full working pressure in accordance with IRC.

3.14 STERILIZATION AND FLUSHING

A. Description: After completion of water piping installation, flush system. Comply with requirements in Section 15060. Take sample of water from system to determine compliance with Health Department standards. Obtain necessary tests from governing Health Department. If sample is not in compliance, perform sterilization as follows.

B. Sterilization: 8 hour sterilization contact time, 50 parts per million chlorine concentration. Open valves several times; follow by flushing with clean water until residual chlorine is less than 0.2 parts per million.

C. Results: After flushing and sterilization are complete, conduct tests to determine compliance with Health Department standards for sterilization results. If pipe system is found to be contaminated, correct defects and perform additional flushing and sterilization until satisfactory results are obtained.

3.15 CLEANING

A. Cleaning: Prior to acceptance of work, thoroughly clean exposed items. Remove labels and traces of foreign material, using only cleaning solutions approved by manufacturers of plumbing items being careful to avoid damage to finished surfaces.

3.16 DEMONSTRATION AND OPERATION AND MAINTENANCE INSTRUCTIONS

A. Comply with requirements in Section 15010. Total of 2 hours.

End of Section

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SECTION 15535

REFRIGERANT PIPING AND SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes refrigerant piping and specialties.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis: International Residential Code

1.3 SUBMITTALS

A. General: Submit in accordance with Division 1, Section 15010, and the following.

B. Product Data:
1. Refrigerant Piping
2. Refrigerant

C. Test Reports: Testing and charging reports for each system. Include copy of reports in the Operation and Maintenance Manual.

1.4 BASIC PIPING REQUIREMENTS

A. Description: Comply with requirements of Section 15060.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 ACCEPTABLE MANUFACTURERS

A. Listed manufacturers with products equivalent to specific product indicated (if any) are acceptable; Contracting Officer is sole judge of equivalency.

B. Non-listed manufacturers may be considered by the Contracting Officer if substitution request is received in accordance with Section 15010.

2.3 REFRIGERANT PIPING

A. Pipe: Copper, Type ACR hard drawn or annealed, ASTM B280, cleaned and dehydrated for refrigeration service with ends capped and sealed, 300 psig working pressure rating.

B. Fittings: Wrought copper solder joint, ASME B16.22.

C. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 F.

2.4 REFRIGERANT

A. Description: Comply with ASHRAE 34. Type as indicated in the Contract Documents.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

3.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with requirements in Section 15050.

3.5 REFRIGERANT PIPING

A. Requirements: Comply with requirements in Section 15060.

B. Installation:
1. Ream pipe and tube ends. Remove burrs.
2. Remove scale and dirt on inside and outside before assembly.
3. Prepare piping connections to equipment with flanges, unions, or flared connections.

4. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment and to prevent compressor piping vibration being transmitted to the building construction.
5. Provide clearance for installation of insulation and access to valves and fittings.
6. Install refrigeration specialties factory furnished with the equipment specified in Section 15780.

C. Oil Return:
1. Arrange piping to return oil to compressor.
2. Provide traps and loops in piping as required by the refrigeration equipment manufacturer.
3. Slope horizontal piping at 0.40 percent in direction of flow.

D. Pipe Supports: Provide per equipment manufacturer's instructions.

3.6 TESTING AND CHARGING

A. Testing:
1. Test refrigeration system in accordance with ASME B31.5.
2. Pressure test system with dry nitrogen to 200 psig.
3. Perform final tests at 27 inch vacuum and 200 psig using halide torch or electronic leak detector.
4. Test to no leakage. If leakage occurs, repair and retest until leakage is zero.

B. Charging:
1. Fully charge completed system with refrigerant after testing.
2. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.

End of Section

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SECTION 15780

PACKAGED HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes package HVAC equipment and appurtenances, design, components, and hardware, and construction for complete installation of operational control systems; system type is electric.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

C. Extent: Provide new control systems including associated equipment and accessories. Provide control system complete and operating as required by the Contract Documents. Manufacturer's products, including design, materials, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with ANSI B31.1 and NFPA 70, except as indicated otherwise in the Contract Documents.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code
2. NFPA-90B
3. Government Energy Conservation Requirements
4. NFPA 70, National Electrical Code.
5. Applicable Government Energy Conservation Requirements.
6. National Electrical Manufacturers Association.
7. Underwriter’s Laboratory.

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Product Data:
1. Gas-Fired Furnace with Cooling Coil
2. Air Cooled Condensing Unit
3. Thermostat
4. Motor Operated Damper

1.4 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 15880 – Air Distribution: Motor operated dampers including damper channel supports and sheet metal collars for multi-section dampers. Supervision of installation of these components by control system subcontractor.

1.5 RELATED WORK

A. Testing, Adjusting, and Balancing (TAB) Work: Furnish 4 hours personnel to TAB organization specified in Section 15990 to provide adjustments to control system for setup of TAB work. Adjustments to control system following completion of TAB work shall maintain settings of TAB work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

B. Listed manufacturers with products equivalent to specific product indicated (if any) are acceptable; Contracting Officer is sole judge of equivalency.

C. Non-listed manufacturers may be considered by the Contracting Officer if substitution request is received in accordance with Section 15010.

2.2 GAS-FIRED FURNACE WITH COOLING COIL

A. General: High efficiency, two-stage heating, direct vent condensing natural gas-fired furnace; AGA certified. Cased direct expansion (DX) cooling coil connected to outdoor air cooled condensing unit. Unit shall be designed for a downflow installation. Unit shall include the following.
   1. Casing: One piece, wrap around construction of steel with baked-on enamel.
   2. Insulated blower compartment; slide-out blower assembly.
   3. Blower with direct drive, 4 speed motor.
   4. Low energy power venter.
   5. Blower: Door safety switch.
   6. Cased Coil: ARI 410 certified coil designed for direct expansion cooling with refrigerant; copper tubing with aluminum fins; galvanized steel casing; tested to 500 psig pressure and factory sealed and charged with a minimum of 5 psig nitrogen or refrigerated air. Coil shall be matched with the air cooled condensing unit. Provide coil with a stainless steel drain pan.
      a. Thermostatic Expansion Valves: ARI 750 diaphragm spring-loaded type with external temperature and pressure sensor bulb and tubing, and external superheat adjustment with seal cap.
      b. Solenoid Valves: ARI 760, UL-listed, two position, direct-acting or pilot-operated type.
      c. Basis of Design: Trane TXC036 (Units 2J) and TXC048 (Unit 4J).

7. Control Center: Microprocessor shall control sequencing and operation of the furnace and the direct expansion cooling coil; equipped with a component test feature and status light to assist in troubleshooting. Vent proving differential switch.
8. Direct-Vent Sealed Combustion: Unit shall use 100 percent outside air for combustion in a sealed combustion system. Provide sidewall vent termination kit by furnace manufacturer. Basis of Design: Trane Bayvent 200B.
9. Hot surface igniter.
10. Dual solenoid combination gas valve and regulator.
11. Multiport in-shot burners.
12. Heavy gage aluminized steel primary heat exchanger and 29-4C type stainless steel secondary condensing heat exchanger.
13. One inch thick cleanable filter(s). Minimum efficiency reporting valve (MERV) of 5 or greater.
14. Condensate drain connection, field adaptable to left or right side drainage.
15. 115 volt electrical power supply.
16. 24 volt transformer to provide low voltage power to furnace control center and thermostat.
17. Thermostats:
    a. Programmable Room Thermostats:
        1) 7-day programming with 2 occupied/unoccupied periods per day.
        2) Proportional plus integral control.
        3) Optimizer start time depending upon building load.
        4) Automatic heat/cool changeover.
        5) Air conditioning control.
        6) Battery backup.
        7) Subbase with auto-on fan switch, heat-off-cool-auto system switch, and auxiliary relay of output.
    b. Programmable thermostat for remote wall mounting where shown on Drawings.

B. Basis of Design: Trane TDX100.

2.3 AIR COOLED CONDENSING UNITS

A. Type: Outdoor, concrete pad mounted, factory assembled, single piece, air-cooled air conditioner; UL listed. Unit shall consist of a reciprocating compressor, an air cooled coil, propeller type condenser fan, and controls. Unit shall be complete with wiring, piping, controls, and compressor. Unit shall use R22 refrigerant. Unit shall be used in a refrigeration circuit to match the direct expansion cooling coil in associated gas fired furnace specified in this section.

B. Unit Cabinet: Constructed of galvanized steel and coated with a powder coated paint. Provide access to compressor, fan, coil, and controls.

C. Fan:
1. Condenser fan shall be direct-drive propeller type with vertical discharge.
2. The totally enclosed fan motor shall be a permanent split capacitor type motor.
3. Bearings: Fan motor shall have ball bearings which permit speed reduction while maintaining bearing lubrication.

4. Condenser fan openings shall be equipped with a coated steel wire guard.

D. Compressor: Reciprocating type. Compressor shall be suitable for continuous operation from 40 degrees F to 125 degrees F in the cooling mode. Provide evaporator defrost control or other means for low outdoor ambient cooling.

E. Condenser Coil:
1. Condenser coil shall be air cooled and shall be all-aluminum construction.
2. Coil shall be protected by a coated steel wire coil guard.

F. Refrigeration Components: Refrigeration circuit components shall include liquid line service valve, suction line service valve, and filter dryer. Provide wall penetration thimble, rectangular configuration with foam gasket, sized to suit wall and refrigerant piping. Seal watertight. Basis of Design: Thermothimble by Thermo Manufacturing Inc.

G. Controls: Provide all controls to provide complete operation of the unit.
1. High and Low Pressure Controls: Solid state safety controls.
2. Cycle Protector: A solid state timing device shall prevent compressor from rapid recycling.

H. Electrical Requirements: Unit shall be suitable for a single point electrical power connection.

I. Basis of Design: Trane 2TTB2036 (Units 2J) and 2TTB2048 (Units 4J).

2.4 SENSING AND CONTROL HARDWARE - ELECTRIC/ELECTRONIC

A. Control Relays:
1. UL listed, rated for application, with minimum 2 sets of Form C contacts rated minimum 10 amps at 120 volt. NEMA 1 enclosure unless otherwise required in the Contract Documents or as required to meet NEC.
2. Rated for continuous duty, compatible with control voltage applied. Rated for minimum 1 million operations.
3. Operating time 20 milliseconds or less with release time of 10 milliseconds or less. Equip with coil transient suppression devices to limit transients to 150 percent of rated coil voltage.
4. For time delay relays, include configuration to perform functions intended.
5. Include indicator light to indicate when coil is energized. For time delay relay, lamp to flash when timing out and glow steady when timing cycle has been completed.

B. Contactors:
1. Single coil, electrically operated.
2. Contacts double break, silver-to-silver type. Number of contacts and rating selected for application.
3. Operating and release times 100 milliseconds or less.
4. Equip with coil transient suppression devices to limit transients to 150 percent of rated coil voltage.

2.5 CONTROLLED HARDWARE

A. Motor Operated Dampers:
1. Description: Butterfly type circular blade mounted to a shaft.

2. Construction:
   a. Frame: Galvanized steel. Include rolled stiffener beads. Inside surface shall be clean and smooth.
   b. Bearings: Corrosion resistant, molded synthetic or nylon.
   c. Seals: Polyethylene foam.
   d. Damper: galvanized steel; firm fine-cell foam seal sandwiched between two blade-skins.
   e. Leakage: Leakage through damper in closed position shall not exceed 0.15 cfm per inch of blade circumference of a differential pressure of 4 inch w.g.
   f. Basis of Design: Ruskin CDRS25.

B. Electric Actuators:
1. Description: Direct drive (direct shaft mounted) electric actuators for damper control applications.
2. Positive means of preventing slippage of actuated device shaft (other than friction clamping): Flat spot for set screw or drilled for cotter pin.
3. UL listed and labeled with NEMA 2 enclosure.
4. When operated at rated voltage, capable of delivering torque required for continuous uniform movement of valve or damper, with end switch to limit travel or withstand continuous stalling without damage.
5. Proper function with range of 85 to 110 percent of line voltage.
6. Fiber or reinforced nylon gears may be used for torques less than 16 inch pounds.
7. Mechanical spring return.
8. Proportioning operators capable of stopping at points in cycle and starting in either direction, from any point, stall type.
9. Normally closed to result in valve or damper position under failure of control power to device.

2.6 AUXILIARY COMPONENTS

A. Control Panels:
1. NEMA 1, hinged door with nameplate, key locking with single key to operate all locks, logically assembled at one or more locations.
2. Include terminal strips with 25 percent spare capacity for external connections.
3. Push buttons, maintained contact type, spring return. Contacts rated minimum 10 amps at 120 Volt.
4. Record control drawings secured to inside of panel door, enclosed in plastic jackets, for each system at each panel.
5. Laminated engraved plastic labels at interior control devices on panel (not on the device) for identification in conjunction with record control drawings. Include device number, its normal operation, and setpoint (example, "TC-7, DIRECT-ACTING, 60 F, RESET"). Include reset schedules for devices with reset.
6. Coordinate electrical power supply with work of Division 16. Include single 120 Volt, 15 amp service to each panel.

2.7 ELECTRIC POWER AND DISTRIBUTION

A. Source: 120 Volt or less, 60 Hz, two-pole, 3 wire with ground. Devices UL listed and labeled or FM approved. Coordinate with Division 16.

B. Transformers:
1. Limited energy type step down type with capacity to operate simultaneously connected apparatus with 25 percent overload for 1 hour.
2. Comply with UL 506.
3. Coordinate with Division 16.

2.8 CONTROL WIRING

A. General:
1. Include wire and cable not shown on electrical drawings as required for a complete and operable control system including wiring to transformer primaries.
2. Conform to NEC and Division 16 requirements.
3. Circuits operating at more than 100 Volt in accordance with Division 16.
4. Circuits operating at 100 Volt or less defined as low voltage and run in rigid or flexible conduit, metallic tubing, metal raceways or wire trays, armored cable, or multiconductor cable.
5. Include transformers to supply power for low voltage circuits.
6. Use multiconductor cable for concealed accessible locations only.
7. Include circuit and wiring protection as required by NFPA 70.

B. Control Wiring:
1. Copper No. 18 AWG minimum with 300 Volt insulation, stranded.
2. Wire used for analog functions twisted and shielded, 2, 3, or 4 wire to match analog function hardware.
3. Copper No. 16 AWG within control panels for binary outputs and pilot relay.
4. Multi-conductor wire with outer PVC jacket.
5. Insulation rating for control wiring installed in control panels and other enclosures with power circuit conductors no less than that for power circuit conductors.

C. Aluminum Wiring: Prohibited.

D. Line Voltage Wiring: Wiring for 120 Volt single conductor, copper No. 14 AWG minimum, rated for 600 Volt service.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

B. Coordination: Coordinate required electrical and control installation work with Division 16 and Section 15780.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements in Section 15050.

3.5 CONTROL SYSTEM

A. Description: Install devices and hardware required to insure a complete and operating system in accordance with the sequences of operation.

B. Quality: Install components and wiring in neat and workmanlike manner, using trained mechanics, conforming to applicable codes. Perform installation under supervision of competent technicians regularly employed in installation of control systems.

3.6 INSTRUMENTATION AND CONTROLS

A. Installation, General:
1. Install devices to be easily accessible.
2. Install to protect instruments, switches, transmitters, and other devices from vibration and high temperatures.
3. Panel mount devices unless devices are installed directly on duct or piping.
4. In no case shall sensors designed for one application be installed for another application.

B. Relays and Contactors: Install interposing relays and contactors required to accomplish the sequences of operation.

C. Thermostat Locations:
1. General locations are indicated in the Contract Documents.
2. Relocate if thermostat performance is unsatisfactory at no additional cost to the Government.

D. Room Thermostats:
1. Install on interior walls to sense average room temperature conditions.
2. Avoid locations which may be covered by office furniture.
3. Locate devices at same elevation.

E. Motor Operated Dampers and Actuators:
1. Do not install actuators in air stream.
2. Install actuator on control shaft with positive locking mechanism; set screw to flat spot or cotter pin through shaft and actuator connection.

3.7 CONTROL WIRING

A. General: Install to comply with NEC requirements.

B. Conduit and Wireways:
1. Conduit and couplings in exposed interior locations, including mechanical equipment rooms, in crawl spaces, attic, and in HVAC plenums shall be electrical metallic tubing (EMT), hot-dipped galvanized, or electro-galvanized steel tubing with steel compression fittings. Minimum 3/4 inch conduit size.
2. Install offsets and fittings necessary to accomplish installation of control system.
3. Seal conduit with glass fiber where conduits leave heated area and enter unheated area.
4. Alter conduit routing to avoid structural obstructions and minimize cross-overs.
5. Allow minimum 6 inch of clearance at flues, and heat sources.

C. Wiring within Control Panels: Arrange neatly in grouped horizontal and vertical directions, secured or under removable covers. Rewire non-conforming work as directed by the Contracting Officer. Protect exposed wiring from abuse and damage.

D. Wire Terminations: Make bare to screw terminals specifically designed for bare stranded wire connections, or with self-insulated spade lugs where connected to screw type terminals not specifically designed for bare stranded wire connection.

E. Splicing:
1. Minimize and perform only in accessible outlet, junction, or cabinet boxes that are included in the Contract Drawings.
2. Spring connectors with steel cap and PVC insulation.
3. When splicing is necessary, match insulation colors and mechanically secured conductors to each other so that no stress is applied to the splice.

F. Wire Runs: Parallel or perpendicular to walls, pipes and sides of openings. Use right angle turns. Do not block passage ways for access and servicing. Do not install control wiring in power circuit raceways. Do not use motor starters and disconnect switches as junction boxes. Install additional junction boxes.

G. Fill: No conduit shall be filled such that maximum bundled cross sectional dimension exceeds 65 percent of conduit inside diameter. No raceway filled to more than 40 percent, except that maximum fill for surface raceway shall be 20 percent.

H. Wire Length: Wire run or circuit no longer than 80 percent of maximum allowable length or power consumption for wire size and application. Output circuit not to exceed 80 percent of maximum load capacity specified by manufacturer.

I. Identification: Conduits entering and leaving terminal cabinets and junction boxes identified in logical and consecutive manner. Use same number only once. Identify conductors with typed or machine lettered labels, Brady or equivalent. Tag numbers agree with wire numbers assigned on wiring diagrams and installation drawings. Number wires at each connection, termination, and junction box.

J. Grounding: Ground controllers and cabinets to a good earth ground. Ground controller to ground in accordance with requirements in Division 16. Grounding of green AC ground wire, at the electrical circuit breaker panel alone, not acceptable. Run metal conduit from controller panels to adequate building grounds. Ground sensor drain wire shields at controller end.

K. Electric Power for Controls:
1. Coordinate electrical power source required for work of this section with Division 16.
2. Where not shown on the electrical drawings, provide power wiring from electrical panel circuit breakers to controls system panels and devices requiring line voltage power. Provide limited energy transformers. Comply with NEC. Provide a disconnect on primary side of transformer and a resettable, fused cut-out on the secondary side of the transformer.
3. Do not connect control wiring to receptacle or lighting circuits.
4. Transformers and line voltage controllers used to control a specific piece of equipment may be fed from power leads to that specific piece of equipment.

L. Devices Specified in Division 2 Through 14, Other Sections of Division 15, Division 16, and for Existing Installations: Provide connections between control system components and sensor and control and alarm devices which require connections to controls system. Coordinate specific requirements with device or unit manufacturer.

M. Low Voltage Wiring: Refer to Article “Mechanical – Electrical Interface” in Section 15050. Unless otherwise indicated in the Contract Documents or in Division 16, provide low voltage wiring for work of Division 15, including but not limited to:
1. Temperature and damper control wiring.

N. Line Voltage Wiring: Refer to Article “Mechanical – Electrical Interface” in Section 15050. Unless otherwise indicated in the Contract Documents, provide line voltage wiring from equipment control panels and devices including but not limited to: Humidifier

3.8 SEQUENCES OF OPERATION

A. Description: Refer to the Contract Documents for the sequences of operation.

3.9 FIELD TESTING AND VERIFICATION

A. Field Tests: Calibrate field equipment and devices and verify equipment and system operation before placing the system on-line.

B. Include the Following Tests: Observe the HVAC system in its shutdown condition. Check dampers and valves for proper normal positions.

C. Performance Verification Tests:
   1. Conduct performance verification tests to demonstrate that controls system maintains setpoints.
   2. Conduct performance verification test during one week of continuous controls system operation and before final acceptance of work.
   3. Include the following tests:
      a. Execution of Sequences of Operation: Demonstrate that mechanical system operates properly through complete sequences of operation (for example, seasonal, occupied/unoccupied, and warm-up cycles). Demonstrate that hardware interlocks and safeties operate properly. Demonstrate that control system performs sequences of operation after loss of power.
      b. Opposite Season Test: Repeat performance verification test during opposite season to first performance verification test. Test procedures of performance verification test shall be used for opposite season test.

3.10 START-UP SERVICES

A. Start-Up Services: Coordinate start-up services with AHU unit operation as specified in Division 1 and Section 15010 and TAB work specified in Section 15990.

3.11 DEMONSTRATION AND OPERATION AND MAINTENANCE INSTRUCTIONS

A. Comply with requirements in Section 15010. Total of 4 hours.

B. As soon as practical after startup, conduct a separate session to demonstrate that equipment operates as indicated in the Contract Documents and in accordance with manufacturer's recommendations. Perform demonstrations in the presence of the Contracting Officer and Government. Give minimum one week notice prior to demonstration. Furnish instruments and personnel required to conduct the demonstration.

C. Demonstrate the proper performance of operating and safety controls, as well as stable equipment performance over the entire operating range to the satisfaction of the Government and the Contracting Officer prior to final acceptance.

D. Include instruction session to identify locations of servicing points and required maintenance requirements to Government's personnel.

E. Include preliminary discussion and presentation of information from instruction manuals, with appropriate references to the Contract Documents, followed by tour explaining maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures, control settings and available adjustments.

End of Section

SECTION 15850

AIR HANDLING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes air handling units, fans, and related appurtenances.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with Drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code
2. NFPA 90B

C. General Requirements: Units factory built and tested. Fans comply with AMCA bulletins regarding testing and construction. Airfoil and plug fans bear the AMCA certified rating seal.

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Product Data: Include dimensions, weights, capacities, certifications, component performance, electrical characteristics, casing construction details, wiring interconnections, gages and finishes of materials.
1. Ceiling Exhaust Fans
2. Range Hood

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, Specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 CEILING EXHAUST FANS

A. Description: Direct drive centrifugal fan.

B. Contract documents are based upon Greenheck SP Series.

C. Ratings: AMCA 210, 300 and 301 with seals and UL label.

D. Airflow Arrangement: Integral bottom intake ceiling grille, designed for access to fan components, white plastic or aluminum construction.

E. Construction: Steel housing, 1/2 inch acoustic insulation liner, mounting brackets, backdraft damper with cushion stops; horizontal discharge; baked enamel finish.

F. Motor: Shaded pole, sleeve bearing, permanently lubricated, suspension brackets with neoprene isolators.

G. Terminal Box: Mounted within housing with receptacle, plug and cord.

H. Accessories: Solid state variable speed controller factory or field installed and connected within housing.

2.3 WALL RANGE HOODS

A. Residential wall-mounted unit with fan and motor, washable aluminum grease filter, two halogen cooktop lights with nightlight, and control switches. Two-speed fan with 190 cfm top or rear exhaust; max 4.0 sone rating. 30 inches wide by 17-1/2 inches deep hood with 7 inch round and 3-1/4 inch by 10 inch rectangular vent outlets; white on white finish. Basis of Design: GE JV535CWW.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

B. Coordination: Coordinate required electrical and control installation work with Division 16 and Section 15780.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements in Section 15050.

3.5 CLEANING

A. Protection: Fans shall remain sealed except during installation. When the daily activities have been completed, clean and seal unit.

B. Cleaning: Thoroughly clean units of all debris and blow free of all small particles of rubbish and dust before installing and making final duct connections. Prior to startup, clean to remove traces of oil, dust, and dirt.

3.6 ADJUSTING

A. Adjust fans to deliver the airflow required. Comply with requirements in Section 15990.

End of Section

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SECTION 15880

AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes sheet metal work and related appurtenances.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code
2. NFPA 90B

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Product Data:
1. Turning Vanes
2. Acoustical Turning Vanes
3. Duct Sealer
4. Volume Dampers and Quadrants
5. Spin-in Fittings
6. Grilles and Registers
7. Wall Caps
8. Dryer Caps

C. Shop Drawings:
1. Sheet Metal:
   a. Complete duct installation consisting of detailed drawings on reproducible media same size as Contract Documents, coordinating duct and the work of other trades to result in proper fit in the available space.
   b. Drawings completed in a timely manner and coordinated with the construction schedule.
   c. Minimum scale 1/4 inch per foot.
   d. Show ducts, volume dampers, hangers, supports, equipment, work of other trades in close proximity to ducts, vertical elevations of work above finished floor, reflected ceiling, lights, and other items necessary to fully coordinate the installation.

D. Test Reports: Pressure testing for leakage.

1.4 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 15780 – Controls - General: Motor operated dampers.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 SHEET METAL WORK, GENERAL

A. Duct Construction: Comply with SMACNA HVAC Duct Construction Standards, Metal and Flexible (SMACNA Standards). Galvanized steel in general having G-90 zinc coating, aluminum for shower exhaust ducts. Galvanized steel prepped for field painting where exposed in finished spaces as scheduled in Division 9.

B. Pressure Classification:
1. Low Pressure: Supply air ducts, return air ducts, and exhaust air ducts; 1 inch w.g., Seal Class C.

C. Round Duct: Spiral seam with beaded sleeve at transverse joints, minimum 26 gage.

D. Fittings:
1. Comply with SMACNA Standards and as indicated in the Contract Documents for elbows, tees, and take offs.
2. Bellmouth Fittings: 18 gage spun sheet metal, formed into uniform radius bellmouth. Minimum radius of bell equal to 0.2 times the neck diameter, Spiral Fittings, Inc. or equivalent.
3. Screened Opening: 1/2 inch mesh screen, 14 gage galvanized steel wire. Enclose mesh screen with 20 gage galvanized removable sheet metal frame around perimeter.
4. Ductwork Collars: 2 inch wide galvanized steel, 20 gage; mitered corners for square and rectangular ducts; escutcheon type for round ducts.

E. Clothes Dryer Vent Duct: Minimum 24 gage Type 304 stainless steel or aluminum; with no fasteners protruding into duct.

F. Turning Vanes:
1. Description: Airfoil design, smoothly-rounded entry nose, extended trailing edge, continuous internal tubes for stiffening and rigidity of the section, adaptable to duct sizes, maximum generated sound power level 54 decibels in octave band 4 at 2000 fpm velocity in 24 inch by 24 inch duct size.
2. Assembly Fabrication: Side rails by same manufacturer as turning vanes, vanes installed on 2.4 inch centers across the full diagonal dimension of the elbow.
3. Unequal Elbows: Adjustment to set vanes in the assembly at the correct angle of attack, resulting in the leading and trailing edges in a parallel relationship.

4. Acceptable Manufacturers: H.E.P. - High Efficiency Profile - as manufactured by Aero/Dyne Co. (1-800-522-2423), or equivalent.

G. Acoustical Turning Vanes: Double thickness, perforated, glass fiber fill, mylar liner.

H. Duct Sealer:
1. Indoor Locations: McGill AirSeal United Duct Sealer (Water Based), Biddle Aqua-Crylic HVAC, Hardcast Irongrip 601, Design Polymerics DP1010 or equivalent. UL listed, low odor, non-toxic vapors, surface burning characteristics for maximum flame spread of 25 and maximum smoke developed of 50 when in a dry state. Rated for air temperature range of minus 20 F to plus 150 F. Rated to 10 inches w.g., minimum 65 percent solid content.
2. Outdoor, Attic and Crawl Space Locations: McGill AirSeal Uni-Weather or equivalent. UL listed, 3 inch minimum width surface burning characteristics of 25 maximum flame spread and 50 maximum smoke developed. Rated for air temperature range of minus 40 F to plus 200 F. Sealer with UV inhibitors.

2.3 FASTENERS

A. Description: Use blind rivets, sheet metal screws, or bolted connections where required by SMACNA Standards for attachment purposes for sheet metal. Sheet metal screws and rivets shall be of the minimum length required for a secure fastening. Where rivets are specifically called for in this section, sheet metal screws may be used.

B. Locations: For ducts, grilles, and accessories exposed to view in finished rooms, provide finish-type fasteners.
1. Permanent Work: Blind stainless steel pop rivets.
2. Removable Items and Grilles: Cadmium-plated pan head or countersunk tapping screws.

2.4 VOLUME DAMPERS AND QUADRANTS

A. General: Fabricate in accordance with SMACNA Standards, same material as for duct construction.

B. Quadrants:
1. For Blades with Maximum Dimension Under 10 Inch: Dial regulator with locking nut, round end spring-in bearing and square end damper bearing.
2. For Blades with a Maximum Dimension 10 Inch to 20 Inch: Dial regulator with locking nut, round end spring-in bearing, and square end bearing.

2.5 SPIN-IN FITTINGS

A. Description: Conical type, with volume damper, quadrant and accessories. Complete with insulation guard for installation in lined duct.

2.6 HANGERS FOR SHEET METAL WORK

A. Description: Hangers, supports and anchor bolts for sheet metal work and equipment.

B. Duct Sizes: Refer to maximum cross-section dimension, at location of hangers.

C. Horizontal Low Pressure Rectangular Ducts:
   1. Concealed Ducts 35 Inch Wide and Smaller: Galvanized straps running down the side and turning under the bottom, attached with rivets.
   2. Exposed Ducts 35 Inch Wide and Smaller: 3/8 inch rods, 1 on each side at each point of suspension, end of the rod flattened and riveted at the top.

D. Horizontal Low Pressure Round Ducts:
   1. Ducts 10 Inch Diameter and Smaller: 1 inch by 18 gage encircling strap, wrapped around duct and extended to structure.
   2. Ducts 11 Inch Through 24 Inch Diameter: 1 inch by 18 gage encircling strap with 1/4 inch steel rods bolted through clips attached to the bracing angles or straps.
   3. Spacing: Eight feet maximum, in general.

E. Vertical Ducts: Angles riveted to the sides, in pairs. Size same as bracing, 1 inch by 1 inch by 1/8 inch minimum. In shafts, provide supplementary steel angles or saddles at each floor, to distribute loads from bracing angles or channels to the structure.

2.7 GRILLES AND REGISTERS

A. Finish: White baked enamel.

B. Supply Register (SR): Steel construction; heavy gauge cold-rolled steel, multi-degree louvers, opposed blade damper, foot operated dial control. Contract Documents based on Shoemaker 350.

C. Supply Grilles (SG): Steel 1 piece frame, steel airfoil blades, double deflection with front blades horizontal, 3/4 inch blades, 3/4 inch blade spacing, frames to overlap openings. Contract Documents based on Titus 300RL.

D. Return Grilles (RG): Steel 1 piece frame, steel blades with fixed horizontal deflection of between 35 degrees and 45 degrees, frames to overlap openings. Contract Documents based on Titus 350RL.

2.8 WALL CAPS

A. Wall Cap: Weathertight aluminum construction, integral or field installed birdscreen, and integral backdraft damper.

B. Dryer Cap: Weathertight aluminum construction, integral backdraft damper.

2.9 DRYER WALL BOX:

A. General: 22 gage aluminized steel box designed to contain dryer flexible duct, 19”h x 16-3/4”w x 5-1/8”d, with 7/8” extension rim protruding from nailing flange. Contract Documents based on Dryerbox Model 4D.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Install, apply, erect, and perform the work in accordance with Article “Quality Assurance”, provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

B. Ducts:
1. Install in a workmanlike manner. Fabrications, fittings, joints, take-offs, attachments, turning vanes, dampers, and sealing in accordance with the requirements of SMACNA Standards and as indicated in the Contract Documents.
2. Access: Locate ducts with sufficient clearance around equipment to allow for inspection, repair, replacement, and service.
3. Duct Openings: Cap incompleted duct ends with temporary closures of metal or taped polyethylene to prevent construction dust from entering ducts.
4. Duct Collars: Install where exposed ducts pass through non-fire rated walls and ceilings; fastened tight to ducts.
5. Transitions: Fabricate and install duct transitions for connections to equipment, such as fans, coils and automatic control dampers where the connection sizes are different from the duct sizes indicated in the Contract Documents.
6. Offsets: The drawings do not show offsets which may be required. Make offsets with fittings with as small an angle of offset as possible. Install turning vanes in square corner elbows.

C. Access Doors: Install at motor-operated dampers and plenums. Arrange door swings so that access doors open against air pressure.

D. Duct and Plenum Sealing: Apply duct sealer to transverse joints, longitudinal seams, fitting connections, corners of four-bolt or corner clip duct connection system, and fitting seams except continuous welded type. Spiral seams, continuous welded seams, and transverse joints for 4-bolt or corner clip duct connection system are not required to be sealed unless visible and audible leaks exist or duct leakage exceeds that allowed by the leakage test specified in this section. Comply with manufacturer’s recommendations.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements in Section 15050.

3.5 VOLUME DAMPERS

A. Description: Volume dampers are shown on the drawings.

B. Construction: Tight fitting to walls of duct when fully closed, bearing each end sealed airtight.

C. Location: Install dampers in accessible locations. In general, arrange with the axis of the blade in the long dimension of the duct. Locate as far from the outlet or inlet as possible.

D. Setting: Set and lock in full open position, prior to TAB work.

3.6 LOCATION OF GRILLES AND REGISTERS

A. Location: Locate per architectural drawings in areas with finished ceilings, otherwise where indicated in the Contract Documents. In general, space proportionately with room dimensions.

B. Verification: Verify that grille frames match architectural construction type and finish prior to ordering.

3.7 WALL AND DRYER CAPS

A. Installation: Secure cap to wall and seal weathertight.

3.8 PRESSURE TESTING FOR LEAKAGE

A. Description: Test supply and return ducts.

B. Test Standard: SMACNA HVAC Air Duct Leakage Test Manual (HADLTM), 1st Ed., 1985.

C. Test Apparatus: Portable blower with volume adjustment, flow measuring assembly for determining cfm of air being added to duct consisting of a calibrated orifice mounted in a straight tube with straightening vane and pressure taps, U-tube manometer, calibration curve for orifice assembly.

D. Test Procedures:
1. Test duct before insulation is installed.
2. Close off and seal openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
3. Test for audible leaks as follows:
   a. Start blower with its control damper closed.
   b. Gradually open the control damper until the duct pressure reaches 2 inch w.g. higher than the designed fan static pressure.
   c. Survey joints and seams for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.

4. After audible leaks have been sealed, test in accordance with SMACNA HADLTM. Seal and retest as necessary until maximum leakage is less than 1 percent of the design air quantity of the system has been achieved.
5. Submit duct section data, calculations, and test results for each duct section.
6. Test of each duct section may be witnessed by Contracting Officer. Give Contracting Officer at least 7 calendar days prior notice before such tests.

3.9 CLEANING AND ADJUSTING

A. Cleaning: Clean plenums and equipment casings of debris and small particles of rubbish and dust before installing and making final duct connections. For equipment and ducts, remove shipping and fabrication labels, oil, dust, dirt, and paint spots. Prior to final inspection, clean all ducts of debris and dust.

B. Adjusting: Lubricate bearings with oil or grease as recommended by the manufacturer. Adjust equipment requiring adjustment to setting indicated in the Contract Documents or as directed by the Contracting Officer.

End of Section

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SECTION 15990 - TESTING, ADJUSTING, AND BALANCING (TAB) WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes testing, adjusting, and balancing of mechanical systems.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 15010 and 15050 apply to Work in this section.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
1. International Residential Code
2. NFPA 90B

C. TAB Contractor:
1. General: TAB work shall be performed by an independent Balancing and Testing Contractor, not affiliated with the Mechanical Contractor.
2. Qualifications: Certified by the National Environmental Balancing Bureau, or approved prior to bid.
3. Experience: Minimum 5 years on projects of similar scope and complexity.

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 15010, and the following.

B. Preliminary Data: Submit the following within 30 days after award of contract:
1. Name of TAB Contractor.
2. Individual qualifications of persons responsible for supervising and performing the work of this project.
3. TAB agenda listing methods and procedures, and including blank forms applicable to this project.

C. Pre-Balance System Check-Out Report: Prior to commencement of TAB work, Mechanical Contractor shall confirm in writing to TAB subcontractor, with copies of notice to the Contracting Officer and Government, that equipment and system check-out has been performed as described in Article “Work by Mechanical Contractor”.

D. Balancing Report:
1. Comply with Article "Submittals” in Section 15010 regarding format of TAB report, except title "BALANCING REPORT".
2. Provide complete Balancing Report, including the following:
   a. System Diagrams/Floor Plans.
   b. Gas/Oil Fired Heat Apparatus Test Reports.

c. Fan Test Reports.
d. Rectangular and Round Duct Traverse Reports.
e. Air Outlet Test Reports.
f. Compressor and/or Condenser Test Report.
g. Instrument Calibration Report.

1.4 SEQUENCING/SCHEDULING

A. General: Phase in properly with Contracting Officer reviewed/accepted Construction Schedule.

PART 2 - PRODUCTS

2.1 GENERAL

A. Description: Comply with Article "Quality Assurance" provisions, specifications, and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 TAB INSTRUMENTATION

A. General: Furnish materials and equipment necessary to measure system capacities, electrical voltage and current, fan speeds, static pressures, air velocities, water pressure drops, and other readings necessary to evaluate system performance and adjust quantities to those indicated. Materials and equipment shall remain in possession of TAB subcontractor after project is completed.

B. Instrumentation: Use in accordance with manufacturers instructions. Instrumentation shall be accurate, with calibration histories available for examination upon request.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this Section.

3.3 PERFORMANCE

A. Description: Perform the work in accordance with Article "Quality Assurance" provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

3.4 WORK BY MECHANICAL CONTRACTOR

A. System Performance: Mechanical Contractor is responsible for performance of equipment and systems. Do not assume that supplier will ship equipment adjusted to meet project requirements.

B. Equipment Operation:
1. Check equipment for proper operation as soon as electrical power is available. Perform adjustments required for proper operation.
2. Report malfunctions to manufacturer and take corrective action immediately to prevent delay of work.
3. Check-out equipment for electrical problems, check rotation of motors, read voltage and current in each leg of each motor, heater, and similar devices, and check readings against nameplate. Lubricate per manufacturer's recommendations.
4. Before balancing and testing commences, operate (test run) equipment for minimum 1 week.

C. Air Distribution System Inspection: Check out air distribution system to ensure that fans are connected to ducts, that outlets are connected to branch ducts, and that a volume damper exists for each outlet (supply, return, and exhaust) and is in the wide-open position. Verify installation and function of branch volume dampers.

D. Controls Operation: Check out and calibrate control components under equipment and system operation service. These components include, but are not limited to, thermostats to ensure they are connected to the appropriate devices, respond to temperature changes, and perform correct action compatible with controlled devices.

E. Filters: After equipment and system check-out work has been completed, and prior to commencement of TAB work, perform the following:
1. Remove air filters in air distribution equipment and systems and provide new filters.

F. Access: Provide scaffolds, staging, and accessories required to allow TAB Contractor to gain access to equipment, dampers, and other devices located beyond the range of a 6 foot stepladder.

G. Fan Adjustment and Drive Changes: Perform necessary fan adjustments as directed by TAB subcontractor. Coordinate with Sections 15780 and 15850.

H. Cleaning: Clean equipment and devices after check-out and test run period prior to TAB work.

3.5 WORK BY TAB CONTRACTOR

A. General: Perform TAB of mechanical systems in accordance with NEBB publication or SMACNA publication "HVAC Systems - Testing, Adjusting and Balancing", 2nd Edition, 1993. Adjust quantities to within the percent of design values as follows:

1.	Supply air outlets and fans	0 to plus 10 percent
2.	Return and exhaust air inlets and fans	0 to minus 10 percent

B. Systems: Include, but are not limited to, the following:
   1. Supply air systems.
   2. Return air systems.
   3. Exhaust air systems.

C. Readings:
   1. General: Take readings including, but not limited to, the following:
      a. Air Quantities: Supply, return, exhaust, and outdoor air at each terminal.
      b. Air Temperatures:
         1) Outdoor air at equipment.
         2) Return air at equipment.
         3) Supply air leaving equipment.
         4) Mixture of outdoor and return air before entering cooling coil and heater.
      c. Electrical:
         1) Measured voltage and amps of each motor (for example, pumps and fans) while equipment is under maximum normal load.
         2) The nameplate voltage and current for each motor.
   2. Compare pressure drop readings to manufacturers' rating sheets to determine actual flow through equipment.
   3. Explain readings out of range.

D. Filter Pressure Drop: Following adjustment of supply air outlets, measure initial clean filter pressure drop. Simulate filter loading by covering face of filters to increase filter pressure drop. For constant volume systems, use average of clean and final pressure drops. If final pressure drop is not indicated in the Contract Documents, contact Contracting Officer. Adjust fan to produce design value within allowable range for supply air fans. Remeasure clean filter pressure drop at final fan setting.

E. Inspection and Recheck:
   1. Upon request, recheck random selections of up to 10 percent of readings recorded in Balancing Report in presence of the Government's representative.
   2. Balancing Report will be rejected if more than 20 percent of rechecked readings deviate more than 10 percent of recorded readings in report. In this event, perform complete rebalancing of system.

F. Marking of Adjustments:
   1. Permanently mark dampers and other adjustment devices to allow adjustment to be restored if disturbed in the future.
   2. If recheck requires re-balancing, eradicate previous markings and re-mark.

G. System Difficulties: Obtain readings on each unit or piece of equipment as early as possible, such that discrepancies can be resolved before anticipated close of job. Minor problems often raise questions and doubts in the Government's mind about the system. Such problems are normal, and if corrected without delay, lead to a more successful project.

End of Section 15990

SECTION 16010

ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.1 SUMMARY

A. The work under this division includes furnishing all permits, materials, equipment, labor, supervision, tools, and items necessary for the construction, installation, connection, testing, and operation of all electrical work for this project, as shown on the Electrical Drawings and/or defined in Division 16 of the specifications.

1.2 QUALITY ASSURANCE

A. Contractor shall provide support personnel and equipment as necessary to meet the requirements of system startup. Operation and demonstration of electrical equipment shall be in accordance with manufacturer's recommendations and shall be the responsibility of the electrical contractor.

B. Qualifications: Use sufficient journeyman and competent supervisors in the execution of the work to ensure proper and adequate installation throughout. In the acceptance of installed work, no allowance will be made for lack of skill on the part of the workers.

1.3 WORK OF OTHER TRADES

A. The Drawings do not show complete details of the building construction. Refer to the Architectural, Structural, Civil, and Mechanical Drawings for those details, which affect the execution of this work. Specific locations of Structural or Architectural features or equipment items shall be obtained from the referenced Drawings, field measurements, or the trade providing the material or equipment. No extra payments will be allowed for failure to obtain this information.

B. Coordination: Plan and execute work including, but not limited to, conduit and electrical equipment locations, lighting fixtures and receptacles, and in cooperation with all other trades. Including particularly Division 11 Equipment, Division 13, Special Construction and Division 15 Mechanical. Make every reasonable effort to provide all concerned with timely notice of work affecting other trades to prevent conflicts or interference as to space requirements, dimensions, openings, block-outs, sleeving or other matters which will cause delays or necessitate work-around methods. Failure to coordinate work will be considered sufficient cause for work to be altered at Contractor's expense, as directed by the Contracting Officer.
   1. Provide motor starters and motor circuit protective devices for equipment included in Division 15 unless the starters are supplied (manufactured) as an integral part of the equipment or as specified otherwise. Coordinate with Conveyance and Mechanical Drawings and specifications to determine extent of this work.
   2. Provide disconnect switch for all equipment provided under other Divisions, unless disconnect switch is supplied (manufactured) as an integral part of the equipment or as specified otherwise. Mount independently of that piece of equipment at the equipment's location.

3. Provide power outlet boxes for each piece of equipment. Provide appropriate rough-in, wiring, electrical devices and final electrical connection to the equipment provided under other Divisions for a complete and functional system.

1.4 EXISTING CONDITIONS

A. Maintain service to existing equipment and devices to be retained in area adjacent to the areas scheduled for new construction. Provide temporary services as necessary to meet these conditions.
   1. Remove systems or portions of systems not re-used. Do not abandon systems or portions of systems in-place.

B. Special Protection: Exercise maximum precaution to provide positive protection for the existing building and equipment from damage of any kind, and in particular prevent any water and dust seepage into the existing building.

C. Before starting each portion of the work, carefully compare the Contract Drawings with the actual field conditions. The Contract Drawings show equipment, raceway, and other items that are relocated or replaced because they are in the way of the new equipment, raceway and raceway supports. However, any additional interference's discovered by the Contractor shall be reported promptly to the Contracting Officer as a request for information. The Contracting Officer will issue clarifications or instructions in response to the Contractor's request for information.

1.5 CODES, PERMITS, INSPECTIONS, AND FEES

A. Comply with the requirements of the General Conditions of the Construction Contract.

B. Obtain permits and inspections required by National, State, and Local authorities. Make arrangements for inspections by the Contracting Officer or other authority as required. Obtain a Certificate of Electrical Inspection from the local inspecting authority indicating final acceptance. Submit original certificate to the Contracting Officer, upon completion of the project in accordance with the requirements of Division 1.

C. Provide additional copies of submittals as may be required by the Authority Having Jurisdiction to facilitate the inspection process.

D. All work and materials shall be in accordance with requirements of the latest adopted edition of all applicable codes, regulations, ordinances and standards including, but not limited to, the following:
   1. Uniform Building code (UBC).
   2. National Electrical Code as amended and administered by the State of Montana.
   3. National Electrical Safety Code.
   4. ASHRAE 90.1 – 1999 Energy Standard For Buildings.
   5. NFPA 70B – Recommended Practice for Electrical Equipment Maintenance – 1998 Edition.
   6. NFPA 72 – National Fire Alarm Code – 1999 Edition.
   7. National Electrical Manufacturers Association.
   8. American National Standards Institute.
   9. Underwriters Laboratories, Inc.
   10. The Institute of Electrical and Electronics Engineers.

11. International Electrical Testing Association.
12. National Electrical Contractors Association.
13. Malmstrom AFB Fire Marshall.
14. Occupational Safety and Health Administration (OSHA).
15. FAA Regulations.
16. Malmstrom AFB base regulations.

E. The foregoing codes shall be construed as establishing a minimum or base level of requirements. Where provisions of the various code standards conflict with each other, the more stringent provisions shall govern.

F. Nothing in Drawings and specifications shall be construed to permit work not in conformance with these rules and regulations.

G. Where Drawings or specifications call for material or construction of a better quality or larger sizes than required by the above-mentioned, the provisions of the drawings or specifications take precedence over requirements of the rules and regulations.

H. Utilities: Comply with rules and requirements of local utility companies. Coordinate and pay for connections as required.

1.6 EQUIPMENT APPROVALS

A. Whenever UL standards exist for equipment with electrical components, provide UL approved equipment.

B. All materials, equipment, and processes requiring approval of the State of Montana or other nationally recognized testing agency shall be labeled as so approved in accordance with the authority having jurisdiction.

1.7 DRAWINGS AND SPECIFICATIONS

A. The Electrical Drawings are diagrammatic and do not show exact or complete raceway and wiring configurations, or the necessary number and types of raceway fittings. Provide all labor and material required to execute the work specified herein or described on the Electrical Drawings:
   1. The electrical devices, equipment, apparatus, and conduit runs are shown in their approximate locations, unless dimensioned. In general locate these items symmetrically on floors, walls, and ceilings where not dimensioned, and coordinate with work of other trades to prevent interferences. The final location of all items is subject to the approval of the Contracting Officer. Do not scale electrical drawings to establish locations. Refer to architectural project drawings for locations and dimensions as applicable. Items positioned incorrectly, and without the Contracting Officer's approval are subject to be moved at the Contractor's expense.
   2. It is the responsibility of the Contractor to provide equipment that fits into the space allotted; has adequate acceptable clearances for installation, replacement, entry, servicing, and maintenance; and has electrical characteristics as shown. When furnished equipment, including motors, is different than indicated in the contract documents, provide required changes to electrical services, and related work as necessary to make furnished equipment completely operational. Coordinate changes with other trades.

3. Report any conflict to the Contracting Officer prior to proceeding with the work. Failure to follow this instruction is considered sufficient cause to alter the work, at no cost to the Government, as directed by the Contracting Officer.

B. Related Work Described Elsewhere: Where other divisions, particularly Division 15 - Mechanical, require electrical materials or installations under this division of the specifications, comply with all applicable requirements herein. Provide all electrical materials and installation work required to connect, test, and operate equipment described in other divisions of these specifications, as shown on the Electrical Drawings or specified hereinafter.

1.8 SUBMITTALS

A. Comply with requirements of Section 01330 - Submittal Procedures.

B. Provide shop drawings, descriptive bulletins, data sheets, diagrams, catalog cuts or other additional information as required for the items specified hereinafter in other sections.

1.9 MATERIALS

A. Quality: Provide all materials, products and equipment in strict accordance with all governing codes and ordinances.

B. Quantity: Equipment and items of any one classification which are used in quantity, such as accessories, wiring devices, disconnect switches, boxes, fittings, starters, controllers, fixtures, etc., shall be products of one manufacturer and shall be used only for services recommended by the manufacturer.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS AND MANUALS

A. Prepare operating and maintenance manuals for all equipment provided under Division 16 in accordance with Section 01701 – Operations and Maintenance Manuals.

B. Contents: Provide the following.
1. Manufacturers, suppliers, and subcontractors' names, addresses, and phone numbers.
2. Schedule and description of routine maintenance for each component.
3. Manufacturer's cuts and rating tables, including brochures for all equipment listed under required submittals.
4. Part numbers of all replaceable items.
5. Shop drawings, schematic wiring diagrams showing all external connections.
6. Operating Instructions.
7. Written guarantees.

C. Items described shall include, but not limited to, the equipment listed under "Shop Drawings" in this division of the specifications. Provide table of contents at front of manual indicating general content of each section. Provide index for each section of the manual with complete equipment catalog item or identification.

D. The information and diagrams included must be on the specific equipment installed for this project. General "product line" information is not acceptable. The equipment model and catalog numbers with appropriate prefixes and suffixes must be clearly indicated on the data

sheets. Any modifications to equipment in the field shall be updated on the drawings, diagrams, etc., to reflect the “As-Built” conditions.

1.11 RECORD DRAWINGS

A. Furnish as-built drawings in conformance with the requirements of Section 01702 – As Built Records and Drawings.

B. Show location of equipment, size and routing of raceway. Indicate and dimension locations and elevations of duct banks and manholes. Mark-ups may be schematic as related to interior raceway systems; however, all raceways shall be shown in proper relationship with junction boxes, panelboards, devices, and equipment. Raceways installed below grade shall be shown with both horizontal and vertical dimensions at an accuracy of plus or minus 6 inches. Keep drawings continuously updated during progress of project and ready for reference. At the completion of the project, turn over record AutoCAD Disks of updated drawings to the Contracting Officer.

1.12 SITE CONDITIONS AND METHODS

A. Delivery, Storage and Handling:
   1. Handle, store and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations and as approved by the Contracting Officer. Replace damaged or defective items.
   2. Equipment with damaged factory applied finishes shall be refinished as required to bring the equipment to a like-new condition in accordance with manufacturer's recommendations.

B. Measurements: Verify space availability by field measurement prior to submitting shop drawings for approval.

C. Roughing-In Dimensions: Obtain roughing-in dimensions for equipment from approved shop drawings or actual equipment measurements. Ensure proper roughing-in for all equipment and fixtures to which connections are made including General Contractor and Government furnished equipment and fixtures.

D. Cutting and patching: Keep cutting and patching to a minimum. If required, conform to specifications for the new general construction work. Finish to match existing work.

E. Manufacturer’s Installation Instructions: Follow manufacturer’s written instructions where furnished. If the details are in conflict with design drawings, notify Contracting Officer for resolution.

F. Accessibility: Install all equipment, which requires periodic servicing or repairs so it is readily accessible. Otherwise, obtain Contracting Officer’s approval of location. Maintain code clearances.

G. Rejected Materials: Remove damaged or rejected materials from the site.

H. Operation of Equipment and Systems: Contractor is responsible for all testing.

1.13 SAFETY AND PROTECTION

A. Protection: The Contractor shall take whatever measures are required to ensure that electrical safety and protection are maintained, including the proper covering, signage, and securing of "live" circuits.

1.14 INSTRUCTION FOR GOVERNMENT'S PERSONNEL

A. Scope: Following initial operation of all electrical equipment and prior to acceptance of the electrical work, conduct demonstrations of equipment operation and perform instruction periods for the Government personnel.

B. Contractor's representatives, in general, who conducts these instructions and demonstrations shall be qualified foremen or superintendents acquainted with this project and from the trade involved. For electrical systems and subsystems, the representative shall be the electrical subcontractor who performs testing and adjustment. For major equipment, the representative shall be manufacturer's representatives with operating experience and substantial design experience on this project. Their qualifications shall be submitted to the Contracting Officer before conducting the instruction period.

C. Representatives of Government who will be present at these meetings may include the Government's operating and maintenance personnel.

D. General Description of Instruction Periods: Include preliminary discussion and presentation of information from operation and maintenance manuals with appropriate references to drawings, followed by tours of equipment spaces explaining maintenance requirements access methods, servicing, maintenance procedures, settings, and available system and equipment adjustments.

E. Duration of Instruction Periods: Refer to Division 16 Sections for instruction periods specific to the equipment.

F. Scheduling of Instruction Periods: Provide notice of Contractor's readiness to conduct such instruction and demonstration periods to Contracting Officer after equipment and systems are fully operational and at least 2 weeks prior to each instruction period. Instruction and demonstration periods shall be conducted at such time as designated by and under supervision of the Contractor with the concurrence of the Contracting Officer.

1.15 INSPECTION

A. Submit written certification of inspection from the governing building authority stating that all work had been inspected, accepted, and approved as complying with existing governing ordinances and codes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment of manufacturers regularly engaged in production of such materials or equipment, and the manufacturer's latest standard design that complies with specification requirements. Each major component of equipment shall have the manufacturer's

name, address, model and serial number on a nameplate securely affixed in a conspicuous place; nameplate of the distributing agent will not be acceptable. Nameplates shall not be painted.

B. All Electrical Equipment shall have Underwriter's Laboratories, Inc., or other approved testing facility label wherever published standards exist. Equipment in compliance with UL Standards but not bearing their label is not acceptable. If the manufacturer cannot arrange for labeling of an assembled unit at the factory, the necessary inspection and acceptance by the testing facility shall be performed in the field at no additional cost to the Government, and be acceptable to the authority having jurisdiction.

C. All electrical panels, major equipment items and disconnects should be identified with phenolic labels.

PART 3 - EXECUTION

3.1 GENERAL CONSTRUCTION

A. Cutting and patching: Provide all cutting required for the installation of the electrical work. Patching shall be done by the general construction trades providing the material needed for restoration of floor, ceiling or wall materials. After installation of raceways, provide approved fire sealing materials to close spaces around raceways.

B. Painting: Touch up electrical equipment factory finished surfaces as required using factory purchased paint. Coordinate field painting requirements with the Contracting Officer prior to final trim and cover installation. Do not paint screw heads, hinges, nameplates, hardware, etc. All surface-mounted raceways in finished areas shall be painted. Coordinate timing of installation to minimize conflicts with painting requirements. Coordinate with painting specified under Section 09900-Paints and Coatings.

C. Cleaning: Promptly remove waste material and rubbish caused by electrical work. Prior to energizing equipment, remove all shipping materials, construction dirt and debris, vacuum and wipe-down all internal areas. At completion of the project, clean all electrical equipment inside and out installed under this Contract.

D. Equipment Pads: Comply with requirements of Section 03300—Cast-in-Place Structural Concrete. Pads shall be tied seismically and integral to slab on which they are placed.

1. Coordinate size and location of all equipment pads (Switch, Transformer, etc). Pads shall be sized as required/recommended by equipment supplier.

3.2 EXTENSION OF EXISTING ELECTRICAL WORK

A. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

B. Repair adjacent construction and finishes damaged during extension work.

C. Maintain access to existing installations scheduled to remain active.

D. Remove, relocate, and extend existing installations to accommodate new construction.

E. Remove abandoned wiring back to source of supply.

F. Remove abandoned conduit, boxes and equipment from all accessible surfaces and spaces. Cut conduit flush with concrete walls and floors, and patch surfaces.

G. Disconnect and remove abandoned devices.

H. Maintain access to existing electrical installations, which remain active. Modify installation or provide access panel as appropriate.

3.3 MISCELLANEOUS

A. Phase Relationship: Maintain consistent phase relationship and rotation throughout the project. Check and identify proper rotation of equipment prior to energizing said equipment.

End of Section

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials; conduit and equipment supports; anchors and fasteners; nameplates and labels; wire markers; raceway markers; underground warning tape; sealing and fireproofing of sleeves and openings between conduits.

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) - Standard of Installation.

B. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:
   1. Metal underground water pipe.
   2. Rod electrode.

B. Anchor and fasten electrical products to building elements and finishes as follows:
   1. Concrete Structural Elements: Provide expansion anchors.
   2. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
   3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
   4. Wood Elements: Provide wood screws.

C. Identify electrical components as follows:
   1. Nameplate for each electrical distribution and control equipment enclosure.
   2. Wire marker for each conductor at load center gutters, pull boxes, outlet and junction boxes, and each load connection.
   3. Raceway marker for each raceway longer than 6 feet.
   4. Underground warning tape along length of each underground raceway or cable.

1.4 DESIGN REQUIREMENTS

A. Select materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and raceway, including weight of wire and cable in raceway.

1.5 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 25 ohms.

1.6 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit grounding electrodes and connections; for fastening components; and nameplates, labels, and markers.

C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

1.7 RECORD DRAWINGS

A. Furnish as built drawings in conformance with the requirements of Section 01702 - As Built Drawings.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

A. Material: Copper-clad steel.

B. Diameter: 3/4 inch.

C. Length: 10 feet.

2.2 MECHANICAL CONNECTORS

A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.3 EXOTHERMIC CONNECTIONS

A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

2.4 WIRE

A. Material: Stranded copper.

B. Grounding Electrode Conductor.

2.5 ANCHORS AND FASTENERS

A. Materials and Finishes: Corrosion resistant.

2.6 FORMED STEEL CHANNEL

A. Description: Galvanized steel.

2.7 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.

B. Letter Size:
1. 1/8 inch letters for identifying individual equipment and loads.
2. 1/4 inch letters for identifying grouped equipment and loads.

C. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.8 WIRE MARKERS

A. Description: Cloth tape, split sleeve type wire markers.

B. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number.

2.9 CONDUIT MARKERS

A. Description: Split-tube type.

B. Color:
1. 12,470Y/7,200 Volt System: Red lettering on white background.
2. 120/240 Volt System: Black lettering on white background.

C. Legend:
1. Medium Voltage System: HIGH VOLTAGE.
2. 240 Volt System: 240 VOLTS.

2.10 UNDERGROUND WARNING TAPE

A. Description: 4 inch wide plastic tape, detectable type, with conductive and inductive metallic strip, colored red with suitable warning legend describing buried electrical lines.

2.11 SEALING AND FIREPROOFING

A. Fire and Smoke Rated Surfaces:
1. Manufacturers:
a. 3M CP 25N/S or CP25S/L caulk.
b. 3M FS 195 wrap or strip with restricting collar.
c. 3M CS 195 composite sheet.
d. Pipe Shield, Inc. series F fire barrier kits.

e. Proset Systems fire rated floor and wall penetrations.
f. Insta-Foam Products Insta-Fire Seal Firestop Foam.
g. Dow Corning Fire Stop System.

B. General:
1. Furnish UL listed products.
2. Select products with rating not less than rating of wall or floor being penetrated.

C. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.
3. For interior wall or floor openings, furnish one of the following to effect seal:
a. Tremco Dymonic.
b. Sika Corp. Sikaflex la.
c. Sonneborn Sonolastic NPI.
d. Mameco Vilken 116 urethane caulk.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 EXTENSION WORK

A. For occupied buildings, install temporary wiring and connections to maintain existing systems in service during construction.

B. Perform work on energized equipment or circuits with experienced and trained personnel.

C. Remove, relocate, and extend existing installations to accommodate new construction.

D. Repair adjacent construction and finishes damaged during extension work.

3.3 INSTALLATION

A. Grounding and Bonding Installation:
1. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.
2. Install bonding meeting Regulatory Requirements.
3. Bond together each metallic raceway, pipe, duct and other metal objects.
4. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
5. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
6. Obtain permission from Contracting Officer before drilling or cutting structural members.

B. Supports:
   1. Fabricate supports from structural steel or formed steel members. Rigidly weld members or install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
   2. Install surface mounted cabinets and load centers with minimum of four anchors.
   3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
   4. Install sheet metal channel to bridge studs above and below cabinets and load centers recessed in hollow partitions.

C. Identification Components:
   1. Degrease and clean surfaces to receive nameplates and labels.
   2. Install nameplate and label parallel to equipment lines.
   3. Secure nameplate to equipment front using screws.
   4. Secure nameplate to inside surface of door on recessed load centers in finished locations.
   5. Conduit Marker Spacing: 20 feet on center.
   6. Identify underground conduits using one underground warning tape for each trench at 3 inches below finished grade.

D. Raceway Painting: Identify conduit using field painting in accordance with Section 09900.

E. Paint bands 20 feet on center.
   1. Color:
      a. 240 Volt System: Yellow.
      b. Telephone System: Green.

3.4 SEALING AND FIREPROOFING

A. Fire Rated Surface:
   1. Seal opening at floor, wall, ceiling’ and roof as follows:
      a. Install 12 gage steel sleeve through opening and extending beyond minimum of 1 inch on each side of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Pack void with backing material.
      d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.

B. Non-Rated Surfaces:
   1. Seal opening through non-fire rated wall, floor, ceiling, and as follows:
      a. Install 12 gage steel sleeve through opening and extending beyond minimum of 1 inch on each side of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Install type of firestopping material recommended by manufacturer.
   2. Install escutcheons, floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
   3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of

conduit and tighten in place, in accordance with manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

A. Section 01451 Contractor Quality Control: Testing and inspection services.

B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

End of Section

SECTION 16121

MEDIUM-VOLTAGE CABLE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes medium voltage cable, cable terminations and sectionalizing cabinets.

1.2 REFERENCES

A. IEEE C2 (Institute of Electrical and Electronics Engineers) - National Electrical Safety Code.

B. IEEE 48 (Institute of Electrical and Electronics Engineers) - Test Procedures and Requirements for High- Voltage Alternating-Current Cable Terminations.

C. NEMA WC 8 (National Electrical Manufacturers Association) - Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

D. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for cable, terminations, and accessories.

C. Test Reports: Indicate results of cable test in tabular form and in plots of current versus voltage for incremental voltage steps, and current versus time at 30 second intervals at maximum voltage.

D. Ground resistance tests for the ground rings at transformers.

1.4 CLOSEOUT SUBMITTALS

A. Section 01702 - As Built Records and Drawings.

B. Project Record Documents: Record actual sizes and locations of cables.

C. Operation and Maintenance Data: Submit instructions for testing and cleaning cable and accessories.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer: Company specializing in installing Products specified in this Section with minimum

three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cable ends from entrance of moisture.

PART 2 - PRODUCTS

2.1 MEDIUM VOLTAGE CABLE

A. Manufacturers: BICC General Cables, Unishield, or approved equal.

B. Product Description: NEMA WC 8, ethylene propylene rubber insulated MV-105 cable.

C. Voltage: 15 kV, 133% insulation.

D. Conductor: #2 Copper, stranded, with extruded conducting stress control shield. Neutral conductor shall be full size, CU, 600 V. 15 KV cable is to have six corrugated copper drain wires embedded in an overall CPE jacket.

E. Insulation: Ethylene propylene rubber, 220 mils thick over the conductor stress control shield.

F. Medium voltage underground in concrete ductbank with Carlon DB60 PVC conduit.

2.2 MODULAR CABLE TERMINATION

A. Product Description: IEEE 48, Class 1, molded-rubber cable termination in kit form with stress cone, ground clamp, non-tracking rubber skirts, 200 amp loadbreak and 600 amp deadbreak connector, rubber cap, and aerial lug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify duct is ready to receive cable.

B. Verify routing and termination locations of cable prior to rough-in.

3.2 PREPARATION

A. Use swab to clean ducts before pulling cables.

3.3 INSTALLATION

A. Avoid abrasion and other damage to cables during installation.

B. Use suitable manufacturer approved lubricants and pulling equipment.

C. Sustain cable pulling tensions and bending radii below manufacturer’s recommended limits.

D. Ground cable shield at each termination and splice.

E. Hi-pot test all new cables per NEMA WC8 prior to energizing.

F. Install sectionalizing cabinets plumb and level on concrete pad.

G. Ground and bond sectionalizing cabinets in accordance with Section 16050. Test grounding by three point fall-of-potential method.

3.4 FIELD QUALITY CONTROL

A. Inspect exposed cable sections for physical damage.

B. Inspect cable for proper connections.

C. Inspect shield grounding, cable supports, and terminations for proper installation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect installed cables from entrance of moisture.

End of Section

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SECTION 16123

(600 VOLTS AND LESS) WIRE AND CABLE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes building wire and cable and nonmetallic-sheathed cable (NM-B and NMC-B).

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) - Standard of Installation.

B. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
1. Solid conductor for feeders and branch circuits 12 AWG and smaller.
2. Stranded conductors for control circuits.
3. Conductor not smaller than 12 AWG for power and lighting circuits.
4. Conductor not smaller than 16 AWG for control circuits.
5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

B. Wiring Methods: Provide the following wiring methods:
1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway and nonmetallic- sheathed cable (NMC).
2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway and nonmetallic-sheathed cable (NMC).
3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway and nonmetallic-sheathed cable (NMC).
4. Wet or Damp Interior Locations: Use only building wire, Type THHN or XHHW insulation, in raceway.
5. Exterior Locations: Use only building wire, Type THHN/THWN or XHHW insulation in raceway.
6. Underground Locations: Use only building wire, Type THHN/THWN or XHHW insulation in raceway and service-entrance cable (USE).
7. For service entrance, use service entrance cable (USE) only.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit for building wire and each cable assembly type.

C. Test Reports: Indicate procedures and values obtained.

1.5 CLOSEOUT SUBMITTALS

A. Section 01702 - As Built Records and Drawings.

B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

1.7 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.8 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers:
1. American Insulated Wire Co.
2. Diamond Wire & Cable Co.
3. Cablec Corp.
4. Essex Group Inc.
5. General Cable Co.
6. Rome.
7. Southwire Co.

B. Product Description: Single conductor insulated wire.

C. Conductor: Copper.

2.2 NONMETALLIC-SHEATHED CABLE (NM-B AND NMC-B)

A. Manufacturers:
1. American Insulated Wire Co.
2. Diamond Wire & Cable Co.
3. Cablec Corp.
4. Essex Group Inc.
5. General Cable Co.
6. Rome.
7. Southwire Co.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Install wire and cable in accordance with NECA "Standard of Installation."

C. Neatly train and lace wiring inside boxes, equipment, and panelboards.

D. Identify wire and cable under provisions of Section 16050. Identify each conductor with its circuit number or other designation indicated.

E. Special Techniques--Building Wire in Raceway:
1. Pull conductors into raceway at same time.
2. Install building wire 4 AWG and larger with pulling equipment.

F. Special Techniques - Cable:
1. Protect exposed cable from damage.
2. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.
4. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
5. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
6. Install solid conductor for feeders and branch circuits 12 AWG and smaller.
7. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

3.4 WIRE COLOR

A. General
1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
a. 120/240 Volt, 1-Phase, 3-Wire System:
Phase A: Black
Phase B: Blue

Neutral: White
Ground: Comply with requirements in this Section
Travelers: Purple (for 3- and 4-way switching).

2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
   a. 120/240 Volt, 1-Phase, 3-Wire System:
      Phase A: Black
      Phase B: Blue
      Neutral: White
      Ground: Comply with requirements in this Section
      Travelers: Purple (for 3- and 4-way switching).

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

End of Section

SECTION 16130

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

C. NECA (National Electrical Contractor’s Association) - "Standard of Installation"

D. NEMA FB 1 (National Electrical Manufacturers Association) - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. NEMA OS 1 (National Electrical Manufacturers Association) - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

F. NEMA OS 2 (National Electrical Manufacturers Association) - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

G. NEMA RN 1 (National Electrical Manufacturers Association) - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

H. NEMA TC 2 (National Electrical Manufacturers Association) - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

I. NEMA TC 3 (National Electrical Manufacturers Association) - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

J. NEMA 250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Underground More than 5 feet outside Foundation Wall: Provide thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.

C. Underground Within 5 feet from Foundation Wall: Provide rigid steel conduit. Provide cast

metal boxes.

D. Under Slab on Grade: Provide rigid steel conduit, or thickwall nonmetallic conduit. Provide cast metal or nonmetallic metal boxes.

E. Outdoor Locations, Above Grade: Provide rigid steel conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.

F. Through Slab on Grade: Provide rigid steel conduit. Provide cast sheet metal and nonmetallic boxes.

G. Wet and Damp Locations: Provide rigid steel conduit. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

H. Concealed Dry Locations: Provide rigid steel conduit and electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pullboxes. Provide nonmetallic boxes for NMC cable.

I. Exposed Dry Locations: Provide rigid steel conduit and electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pullboxes. Provide nonmetallic boxes for NMC cable.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 1/2 inch unless otherwise specified.

1.5 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for the following:
1. Flexible metal conduit.
2. Liquidtight flexible metal conduit.
3. Nonmetallic conduit.
4. Raceway fittings.
5. Conduit bodies.
6. Pull and junction boxes.
7. Handholes.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Section 01702 – As Built Records and Drawings.

B. Project Record Documents:
1. Record actual routing of conduits larger than 2 inch trade size.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC conduit from sunlight.

1.8 COORDINATION

A. Coordinate installation of outlet boxes for equipment connected under Section 16150.

B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Fittings and Conduit Bodies: NEMA FB 1; all steel fittings.

2.2 FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction.

B. Fittings: NEMA FB 1.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1.

2.4 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type. Set screw and indenter type are not acceptable.

2.5 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

2.6 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported;

furnish 1/2 inch male fixture studs where required.

2. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, aluminum and cast feralloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 16140.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.7 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 16131.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box: Material: Galvanized cast iron and cast aluminum. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. Fiberglass Concrete composite Handholes: Die-molded, glass-fiber concrete composite hand holes: Cover: Glass-fiber concrete composite, weatherproof cover with nonskid finish.

1. Minimum Inside dimensions: 28 inches long x 15 inches wide x 14 inches deep, unless noted otherwise or as required by code.
2. Cover Legend: “ELECTRIC”, “TELEPHONE”, “CABLE TV”, and “STREET LIGHTS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 INSTALLATION

A. Install raceway and boxes in accordance with NECA "Standard of Installation."

B. Ground and bond raceway and boxes in accordance with Section 16050.

C. Fasten raceway and box supports to structure and finishes in accordance with Section 16050.

D. Identify raceway and boxes in accordance with Section 16050.

E. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 16050.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct wireway supports from steel channel specified in Section 16050.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Route conduit under slab from point-to-point.

K. Conduit in Slab not permitted.

L. Maintain clearance between raceway and piping for maintenance purposes.

M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

N. Cut conduit square using saw or pipecutter; de-burr cut ends.

O. Bring conduit to shoulder of fittings; fasten securely.

P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

Q. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

R. Install no more than equivalent of three 90 degree bends between interior boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

T. Install fittings to accommodate expansion and deflection where raceway crosses control and expansion joints.

U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

W. Close ends and unused openings in wireway.

3.4 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

I. Install stamped steel bridges to fasten flush mounting outlet box between studs.

J. Install nonmetallic boxes on wood studs.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Install adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to ceiling support wires or other piping systems.

N. Support boxes independently of conduit.

O. Install gang box where more than one device is mounted together. Do not use sectional box.

P. Install gang box with plaster ring for single device outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with Section 16050.

B. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.

C. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.7 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

End of Section

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SECTION 16140

WIRING DEVICES GENERAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wall switches; receptacles; and device plates.

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) - Standard of Installation.

B. NEMA WD 1 (National Electrical Manufacturers Association) - General Requirements for Wiring Devices.

C. NEMA WD 6 (National Electrical Manufacturers Association) - Wiring Device -- Dimensional Requirements.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.5 EXTRA MATERIALS

A. Furnish two of each style, size, and finish wall plate for each dwelling unit.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

A. Manufacturers:
1. Arrow Hart
2. Bryant
3. GE
4. Hubbell
5. Leviton
6. Pass & Seymour
7. Substitutions: Not Permitted.

B. Product Description: NEMA WD 1, Specification grade, AC only general-use snap switch.

C. Body and Handle: Ivory plastic with toggle handle.

D. Ratings:
   1. Voltage: 120-277 volts, AC.
   2. Current: 20 amperes.

2.2 RECEPTACLES

A. Manufacturers:
   1. Arrow Hart
   2. Bryant
   3. GE
   4. Hubbell
   5. Leviton
   6. Pass & Seymour
   7. Substitutions: Not permitted.

B. Product Description: NEMA WD 1, Specification grade general use receptacle.

C. Device Body: Ivory plastic.

D. Configuration: NEMA WD 6, type as indicated on Drawings.

E. Convenience Receptacle: Type 5-20.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

G. Where weatherproof device required, provide cover for device which allows it to be protected while in use.

2.3 WALL PLATES

A. Manufacturers:
   1. Arrow Hart
   2. Bryant
   3. GE
   4. Hubbell
   5. Leviton
   6. Pass & Seymour
   7. Substitutions: Not permitted.

B. Decorative Cover Plate: Ivory, nylon.

C. Weatherproof Cover Plate: Gasketed cast metal plate, white color finish with threaded and gasketed device cover.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install 3- and 4- way switches so that the circuit is off when all switch handles are in the down position.

E. Install receptacles with grounding pole on bottom.

F. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

H. Connect wiring devices by wrapping solid conductor around screw terminal. Install stranded conductor for branch circuits 10 AWG and smaller. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.

I. Use jumbo size plates for outlets installed in masonry walls.

J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.4 INTERFACE WITH OTHERPRODUCTS

A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights as specified and as indicated on drawings.

B. Install wall switch 44 inches above finished floor, to bottom.

C. Install convenience receptacle 15 inches above finished floor, to bottom.

D. Install convenience receptacle 6 inches above backsplash, to bottom.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.

End of Section

SECTION 16150

WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electrical connections to equipment.

1.2 REFERENCES

A. NEMA WD 1 (National Electrical Protection Association) - General Purpose Wiring Devices.

B. NEMA WD 6 (National Electrical Protection Association) - Wiring Devices - Dimensional Requirements.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01702 - As Built Records and Drawings.

B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers include AFC Cable Systems, AMP Inc/Tyco, Hubbell/Anderson, 3M or approved.

B. Factory splices shall be factory fabricated and meet size, amp rating, material type and class ratings as necessary for the application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 INSTALLATION

A. Make electrical connections.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

E. Install terminal block jumpers to complete equipment wiring requirements.

F. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

G. Connections and splices should be factory-fabricated and meet, size, amperage rating, material type and class ratings as necessary for application.

3.3 ADJUSTING

A. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

End of Section

SECTION 16210

ELECTRICAL UTILITY SERVICES GENERAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes connection of electric service to each housing unit from pad mounted transformers.

1.2 SYSTEM DESCRIPTION

A. The medium voltage primary distribution system is owned by Malmstrom AFB.

B. Secondary Distribution System Characteristics: 120/240 volts, single phase, three-wire, 60 Hertz.

C. Service Entrance: Underground.

D. Underground Service Provisions: Underground service entrance to building service entrance equipment.
   1. All primary and secondary work including sectionalizers, pad mounted transformers, and underground service-entrance conductors, shall be by contractor.

E. 15 KV Sectionalizers.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit catalog data showing electrical characteristics and connection requirements of specified products.

C. Shop Drawings: Indicate electrical characteristics and connection requirements of equipment, plus routing of new underground electrical primary and secondary, telephone and cable conduit paths.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Malmstrom AFB written requirements and these specifications.

B. Maintain one copy of each document on site.

1.5 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

PART 2 - PRODUCTS

2.1 UTILITY METERS

A. Not required.

2.2 UTILITY METER BASE

A. Product Description: Combination meter base and main circuit breaker rated 200 amperes per Malmstrom AFB requirements.
   1. UL listed as service entrance equipment.
   2. Equipped with neutral bus, ground bus and ground jumper.
   3. Provide with meter jumper bars and socket cover.
   4. Provide dual units as shown on drawings.

2.3 EQUIPMENT PADS

A. Product Description: Cast-in-place concrete and precast concrete pad sized as indicated on Drawings.

2.4 15KV SECTIONALIZERS

A. Sectionalizers shall be Cooper Power Systems, 15 KV, 3 phase, or 1 phase, or approved equal. Typical dimensions shall be 30”H x 84”W x 22” D. The unit shall be made of 12 gage mild steel with a top hinged, removable cover with wind stop-lock, lifting lugs, two parking stands per phase, tamperproof construction, with a common grounding bussbar, pentahead security bolt and padlocking provisions and a corrosion-resistant coating system. Each sectionalizer shall be mounted on a 30” high ground sleeve manufactured by Copper Power Systems, (or approved equal) and protrude out of the ground at 6”above finished grade. Bottom area shall be dirt-bottom and have a 3 inch thick layer of 1/2” to 1” screened, loose gravel. Exterior finish shall be Federal Color #23578, to match existing base sectionalizers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify service equipment is ready to be connected and energized.

3.2 INSTALLATION

A. Install cast-in-place concrete pad for transformer, in accordance with Section 03300.

End of Section

SECTION 16271

PAD-MOUNTED TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes liquid-filled pad-mounted distribution transformers.

1.2 REFERENCES

A. ANSI C37.47 - Specifications for Distribution Fuse Disconnecting Switches, Fuse Supports, and Current-Limiting Fuses.

B. ANSI C57.12.26 - Pad-Mounted Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors, High Voltage 34 500 Grd Y/19 920 Volts and Below; 2500 kVA and Smaller.

C. ANSI C57.12.28 - Switchgear and Transformers--Pad-Mounted Equipment--Enclosure Integrity.

D. IEEE C57.12.00 (Institute of Electrical and Electronics Engineers) - General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

E. IEEE C57.12.90 (Institute of Electrical and Electronics Engineers) - Test Code for Liquid-Immersed Distribution Power, and Regulating Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers.

F. IEEE C57.13 (Institute of Electrical and Electronics Engineers) - Requirements for Instrument Transformers.

G. IEEE C57.106 (Institute of Electrical and Electronics Engineers) - Guide for Acceptance and Maintenance of Insulating Oil in Equipment.

H. IEEE 386 (Institute of Electrical and Electronics Engineers) - Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.

I. NEMA 260 (National Electrical Manufacturers Association) - Safety Labels for Padmounted Switchgear and Transformers Sited in Public Areas.

J. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate electrical characteristics and connection requirements, outline dimensions, connection and support points, weight, specified ratings and materials.

C. Product Data: Submit electrical characteristics and connection requirements, standard model design tests, and options.

D. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

E. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

1.4 CLOSEOUT SUBMITTALS

A. Section 01702 –As Built Record and Drawings.

B. Product Data: Submit catalog data showing electrical characteristics and connection requirements of specified products.

C. Project Record Documents: Include copy of manufacturer's certified drawings.

D. Operation and Maintenance Data: Submit maintenance procedures for sampling and maintaining fluid.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years experience.

B. Testing Agency: Company member of International Electrical Testing Association and specializing in testing products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01501 – Construction Facilities and Temporary Controls: Product storage and handling, storing, and protecting products.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 MAINTENANCE MATERIALS

A. Furnish two each of special tools required to operate and maintain transformer.

1.9 EXTRA MATERIALS

A. Furnish two sets of each size and type fuse.

PART 2 - PRODUCTS

2.1 LIQUID-FILLED TRANSFORMERS

A. Product Description: ANSI C57.12.26, single phase, pad mounted, residential application, dead front construction, self-cooled transformer unit.

B. Cooling and Temperature Rise; IEEE C57.12.00; Class OA. 65 degrees C, self-cooled.

C. Insulating Liquid: Oil conforming to IEEE C57.106.

2.2 SERVICE CONDITIONS

A. Meet requirements for usual service conditions described in IEEE C57.12.00

2.3 RATINGS

A. Capacity: As shown on drawings.

B. Primary Voltage: 7.2 kV Line-Neutral connected.

C. Taps: Standard primary taps.

D. Secondary Voltage: 240/120 volts, single phase.

E. Impedance: 1.8 percent minimum.

F. Basic Impulse Level: 95 kV.

2.4 ACCESSORIES

A. Accessories: IEEE C57.12.00, standard accessories and the following:
1. Oil drain.
2. Filler and level plugs with automatic pressure relief device.

B. Tap Changer: Externally-operated type.

C. Primary Terminations: Bushing wells conforming to IEEE 386; furnish two for loop feed. Include bushings for insulated loadbreak connectors.

D. Primary Overcurrent Protection: Canister-type current-limiting fuses to conforming to ANSI C37.47, sized at 150% of full load current.

E. Secondary Terminations: Spade lugs.

F. Other Accessories: Primary lightning arrestors.

2.5 FABRICATION

A. Conform to requirements of ANSI C57.12.28.

2.6 FACTORY FINISHING

A. Clean surfaces before applying paint.

B. Apply corrosion-resisting primer to surfaces.

C. Apply finish coat of baked enamel stencil to 4 mils thick.

D. Finish Color: Painted Antique Linen, Federal Color # 23578.

2.7 SOURCE QUALITY CONTROL (AND TESTS)

A. Provide factory tests conforming to IEEE C57.12.90. Include routine tests as defined in IEEE C57.12.00 and the following other tests:
   1. Impedance voltage and load loss.
   2. Dielectric tests.
   3. Audible sound level.
   4. Short circuit capability.
   5. Telephone influence factor (TIF).

B. Test insulating liquid samples in accordance with IEEE C57.106.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify pads and supports are suitable for installation.

3.2 INSTALLATION

A. Install plumb and level on concrete pad.

B. Install safety labels in accordance with NEMA 260.

C. Install engraved plastic nameplates in accordance with Section 16050.

D. Ground and bond transformer in accordance with Section 16050. Test grounding by three point fall-of-potential method.

3.3 FIELD QUALITY CONTROL

A. Section 01451 – Contractor Quality Control: Testing and inspection services.

B. Inspect and test in accordance with NETA ATS, except Section 4.

3.4 ADJUSTING

A. Adjust primary taps so secondary voltage is within 2 percent of rated voltage.

End of Section

SECTION 16442

LOAD CENTERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section is for branch circuit load centers.

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) -Standard of Installation

B. NEMA AB 1 (National Electrical Manufacturers Association) - Molded Case Circuit Breakers.

C. NEMA PB 1 (National Electrical Manufacturers Association) – Load Centers.

D. NEMA PB 1.1 (National Electrical Manufacturers Association) - Instructions for Safe Installation, Operation and Maintenance of Load Centers Rated 600 Volts or Less.

E. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Product Data: Submit catalog data showing specified features of standard products.

1.4 CLOSEOUT SUBMITTALS

A. Section 01702 - As Built Records and Drawings.

B. Project Record Documents: Record actual locations of load centers and record actual circuiting arrangements.

C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years experience. Approved manufacturers are GE, Seimens, and Square D, or approved equivalent.

1.6 MAINTENANCE MATERIALS

A. Furnish two of each load center key. Load centers keyed alike to Government's current keying system.

PART 2 - PRODUCTS

2.1 LOAD CENTERS

A. Product Description: Dead front safety type load center, with bus ratings as indicated on Drawings.

B. Minimum Integrated Short Circuit Rating: 10,000 amperes RMS symmetrical.

C. Molded Case Circuit Breakers: Snapin, quick make, quick break circuit breakers with toggle handles that indicated when tripped. NEMA AB 1, plug-on type thermal magnetic trip circuit breakers, with common trip handle for poles, listed as Type SWD for lighting circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Arcfault rated circuit breakers shall be provided in all bedroom circuits as indicated on Drawings. Do not use tandem circuit breakers.

D. Enclosure: General Purpose.

E. Box: Flush or Surface type as shown on drawings with door, and lock on door. Finish in manufacturer's standard gray enamel.

F. Bus: Copper.

G. Neutral at full size.

H. Engraved phenolic label on the exterior door.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install load centers in accordance with NEMA PB 1.1 and NECA "Standard of Installation."

B. Install and load centers plumb.

C. Install recessed load centers flush with wall finishes.

D. Height: 6 feet to top of load center.

E. Install filler plates for unused spaces in load centers.

F. Provide typed circuit directory for each branch circuit load center. Revise directory to reflect circuiting changes to balance phase loads.

G. Install engraved plastic nameplates in accordance with Section 16050.

H. Ground and bond load center enclosure according to Section 16050. Connect equipment ground bars of panels in accordance with NEC Article 517.

3.2 FIELD QUALITY CONTROL

A. Section 01451 – Contractor Quality Control: Testing and Inspection Services.

3.3 ADJUSTING

A. Measure steady state load currents at each load center feeder; rearrange circuits in load centers to balance phase loads to within 15 percent of each other.

End of Section

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SECTION 16510

INTERIOR LUMINAIRES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior luminaires, lamps, ballasts, and accessories.

1.2 REFERENCES

A. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.

C. Product Data: Submit dimensions, ratings, and performance data.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.6 MAINTENANCE MATERIALS

A. Contractor to provide spare maintenance materials (lens, lamps and ballasts) equal to 10% of total equipment provided.

PART 2 - PRODUCTS

2.1 INTERIOR LUMINAIRES

A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

2.2 FLUORESCENT BALLASTS

A. Product Description: Electronic ballast rapid start less than 10 percent THD, suitable for lamps specified, with voltage to match luminaire voltage.

2.3 INCANDESCENT LAMPS

A. Manufacturers:
   1. General Electric Co.
   2. Osram-Sylvania.
   3. Philips Electronics North America] Model.
   4. Substitutions: Not Permitted.

2.4 FLUORESCENT LAMPS

A. Manufacturers:
   1. General Electric Co.
   2. Osram-Sylvania.
   3. Philips Electronics North America] Model.
   4. Substitutions: Not Permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.

B. Locate recessed ceiling luminaires as indicated on Drawings.

C. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

D. Install recessed luminaires to permit removal from below.

E. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

F. Install clips to secure recessed grid-supported luminaires in place.

G. Install wall-mounted luminaires at height as indicated on Drawings.

H. Install accessories furnished with each luminaire.

I. Connect luminaires to branch circuit outlets provided under Section 16130 as indicated on Drawings.

J. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

K. Install specified lamps in each luminaire.

L. Ground and bond interior luminaires in accordance with Section 16050.

3.2 FIELD QUALITY CONTROL

A. Section 01451 – Contractor Quality Control: Testing and inspection services.

B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

A. Aim and adjust luminaires.

3.4 CLEANING

A. Remove dirt and debris from enclosures.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Clean finishes and touch up damage.

3.5 PROTECTION OF FINISHED WORK

A. Relamp luminaires having failed lamps at Substantial Completion.

End of Section

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SECTION 16520

EXTERIOR LUMINAIRES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exterior luminaries, poles, and accessories.

1.2 REFERENCES

A. ANSI C82.4 - Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type).

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.

C. Product Data: Submit dimensions, ratings, and performance data.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01501 – Construction Facilities and Temporary Controls: Product storage and handling requirements.

1.6 COORDINATION

A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.7 MAINTENANCE MATERIALS

A. Furnish two of each lamp installed.

B. Furnish two gallons of touch-up paint for each different painted finish and color.

C. Furnish two ballasts of each lamp type installed.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Street Lighting and Path Lighting Luminaires:
1. Housing shall be fabricated from one-piece formed aluminum with clean precision formed edges.
2. Reflector shall consist of a one-piece hydroformed reflector with specular alzac surface.
3. A mogul lamp socket shall be mounted in a one-piece casing, fully gasketed at the reflector surface.
4. Lens shall consist of a 3/16-inch thick impact-resistant clear tempered glass lens enclosed by a one-piece molded high temperature gasket. Lens and gasket shall interlock in an aluminum frame, which shall hinge at the pole end.
5. Luminaire shall be arm-mounted.
6. Provide photocell control for each luminaire.
7. Luminaire shall be equal in appearance and quality to the American Electric Lighting used in existing Matador Site.
8. The pole and arm assembly shall be capable of supporting itself and the specified luminaire under sustained wind forces of 100 mph with an additional 30 percent gust factor.
9. Provide a pole cap with finish to match the shaft, forming a neat water repellent closure.
10. Poles shall be square aluminum, non-tapered, size as indicated on drawings. Color shall match existing.
11. Provide a steel grounding stud opposite handhole openings.
12. Two-piece base cover assembly to be furnished with pole and installed by Contractor.
13. Apply non-shrink grout between pole base and concrete foundation with a weep opening to allow moisture to escape. Refer to manufacturers recommendations.
14. All poles shall include vibration dampers.
15. For the pole light, each leg of the circuit shall be fused and be accessible at the handhole.
16. Pole assembly and fixtures shall be furnished with a dark bronze anodized finish.

B. Other Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.

2.2 HIGH INTENSITY DISCHARGE (HID) BALLASTS

A. Product Description: ANSI C82.4, high pressure sodium lamp ballast, suitable for lamp and environmental conditions specified, with voltage to match luminaire voltage.

2.3 HID LAMPS

A. Manufacturers:
1. Osram-Sylvania.
2. Philips Electronic North America.
3. General Electric Co.
4. Substitutions: Not Permitted.

2.4 METAL POLES

A. Material and Finish: Extruded seamless 6063 or 6061 alloy aluminum with anodized bronze finish.

B. Section Shape and Dimensions: 6 inch square straight.

C. Height: As indicated on drawings.

D. Base: Non-breakaway type.

E. Accessories:
1. Handhole.
2. Anchor bolts.

F. Loading Capacity Ratings:
1. Luminaire Weight: 150 pounds.
2. Steady Wind: 100 miles per hour, minimum with 30 percent gust factor.

2.5 CONCRETE BASES

A. Foundations for poles to be cast-in-place, size and shape as noted on the drawings.

B. Place concrete in spirally wrapped treated paper for round foundations, and construction forms for square foundations.

C. Sack-finish and round all edges to approximately 1/4 inch radius concrete surfaces above grade.

D. Concrete to have 3000 psi minimum 28 day compressive strength.

E. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings and meet ACI 318M. Anchor bolts shall be in a welded cage or properly positioned by the tie wire to stirrups.

F. Prior to placing concrete, install copperclad steel ground rods, not less than 5/8 inch diameter by 10 feet long, in each foundation. Drive the rods vertically under the foundations so not less than 6 feet of rod is in contact with the earth.

2.6 FLUORESCENT BALLASTS

A. Product Description: Ballasts for exterior fluorescent fixtures shall be cold weather rated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify foundations are ready to receive fixtures.

3.2 INSTALLATION

A. Install concrete bases for lighting poles at locations as indicated on Drawings, in accordance with Section 03300.

B. Install poles plumb. Install double nuts to adjust plumb. Grout around each base.

C. Install lamps in each luminaire.

D. Bond and ground luminaries, metal accessories and metal poles in accordance with Section 16050. Install supplementary grounding electrode at each pole.

3.3 FIELD QUALITY CONTROL

A. Section 01451 – Contractor Quality Control: Testing and Inspection Services.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

C. Measure illumination levels.

D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.4 ADJUSTING

A. Aim and adjust luminaries to provide illumination levels and distribution.

3.5 CLEANING

A. Clean photometric control surfaces as recommended by manufacturer.

B. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

A. Relamp luminaries having failed lamps at Substantial Completion.

End of Section

SECTION 16710

COMMUNICATION CIRCUITS

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall coordinate and arrange with the local Telecommunications and CATV Utility Companies for provisioning of telecommunication and CATV service distribution and building entrance service. The local utility companies will provide network interface devices (NID) as points of demarcation at each living unit. The Contractor shall provide interior terminating devices, outlets, premises wiring and accessories.

1.2 REFERENCES

A. TIA/EIA 570 – B (Telecommunications Industries Association/Electronic Industries Association) - Residential Telecommunications Cabling Standard.

B. Department of Defense (DOD) - Air Force Family Housing Guide.

C. NFPA 72 – National Electrical Code (NEC)

1.3 SYSTEM DESCRIPTION

A. The Telecommunications and CATV Utility Companies shall provide telephone and CATV service distribution, building entrance cables, and network interface devices, with service drop to Telephone/CATV HUB enclosure in each utility room.

B. The local Telecommunications Utility Company is Qwest.
   1. Contact: Butch Preston, OSP Engineer, 406-771-2533
   2. Contact: Scott Cleveland, Cable Maintenance Foreman, 406-771-2585

C. The local CATV Utility Company is Bresnan Communications.
   1. Contact: Henry Woloszyn, OSP Engineer, 406-727-8881
   2. Contact: Paul Gay, Construction Mgr., 406-727-8881

D. Service Entrance Pathway:
   1. Provide empty raceway from point of connection at Telephone and CATV Utility provided pedestals to the building entrance service NIDs.

E. Entrance Wiring: By Telephone and CATV Utility Companies.

F. Horizontal Pathway: Comply with TIA/EIA 569-A and 570-B, using concealed pathways and/or raceway as required.

G. Telecommunications Horizontal Wiring: Provide home runs from each outlet to the telephone/CATV Hub enclosure in the utility room, using unshielded horizontal cables. 4-pair, Category 5e, unshielded twisted pair (UTP), UL Listed as required in the NEC as suitable for use in residential housing. Home run from the Hub enclosure to the utility's respective NID.

H. CATV Horizontal Wiring: Provide home runs from each outlet to the telephone/CATV Hub enclosure in the utility room, using coaxial horizontal cables. Coaxial cable UL Listed as required in the NEC as suitable for use in residential housing.

I. Outlet Devices and Faceplates: Provide outlet devices at locations indicated on contract document drawings.

1.4 SUBMITTALS

A. Comply with requirements of Section 01330 – Submittal Procedures.

B. Product Data: Submit catalog data for each termination device, cable, faceplate and outlet device.

C. Test Reports: Document and provide procedures and results for specified field-testing and inspection.

1.5 CLOSEOUT SUBMITTALS

A. Section 01702 – As Built Records and Drawings Project Record Documents: Record and submit actual locations, quantities, and sizes of outlet devices.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years experience.

B. Installer: Company specializing in installing products specified in this section with minimum five years experience.

C. Testing Agency: Company specializing in testing products specified in this section with minimum five years experience.

PART 2 - PRODUCTS

2.1 TELEPHONE PULL BOX ENCLOSURE (NID- NETWORK INTERFACE DEVICE) AND CATV PULL BOX ENCLOSURE (NID- NETWORK INTERFACE DEVICE)

A. NEMA Type 3/3R enclosure, 12 inches by 12 inches by 6 inches with removable cover. Provide knockouts in the field.

B. Acceptable Manufacturer:
   1. Circle AW Part No. 12126 RTSC NK.
   2. Or approved equivalent.

2.2 TELEPHONE AND CATV HUB ENCLOSURE

A. Metal constructed box that will accept Voice, Data and CATV modules, minimum of 14 inches by 14 inches by 3 inches with a removable cover.
   1. Acceptable manufacturer:
      a. Leviton Part No. 47605-14W (SMC 140)
      b. Or approved equivalent

B. Voice and CATV module:
   1. 4 phone lines
   2. 9 telephones
   3. 6 data locations
   4. 6 CATV locations
      a. Leviton: Part No. 47603-BTV
      b. Or approved equivalent.

2.3 OUTLET DEVICES AND FACEPLATES

A. General:
   1. Provide angled down outlet connection device for telephone.
   2. Provide straight outlet connection device for CATV.

B. Telephone:
   1. Provide one 8-position, 8-pin, angled down, Category 5e, outlet connector jack color ivory to match electrical cover plates.
   2. Wire all outlet connector jacks to TIA/EIA Standard T568A pin-out.
   3. Acceptable manufacturers:
      a. AVAYA Communications.
      b. NORDX/CDT.
      c. Siemon.
      d. Or approved equivalent.

C. CATV:
   1. Provide one “F” type, coaxial coupler (barrel) connector device for each TV location indicated on drawings.
   2. Match CATV faceplate color to that of telephone and electrical cover plates, electrical ivory.
   3. Acceptable manufacturers:
      a. AVAYA Communications.
      b. NORDX/CDT.
      c. Siemon.
      d. Or approved equivalent.

2.4 COAXIAL CABLE CONNECTORS

A. Provide an “F” type, male, connector for each CATV drop at the outlet end.

B. Connect the coaxial cable to the outlet device using the “F” type connector provided.

2.5 HORIZONTAL CABLE

A. Telephone:
   1. Provide UL Listed Category 5e, unshielded twisted pair (UTP), 100-ohm, 24 AWG copper, 4-pair cable home run for each telephone outlet indicated on the drawings.
   2. Comply with TIA/EIA Standards 568-A, 569-A, 570-B, and the NEC.

   3. Acceptable manufacturers:
      a. AVAYA Communications.

b. NORDX/CDT.
c. CommScope
d. Berk-Tek
e. Or approved equivalent.

B. CATV:
4. Provide UL Listed foam polyethylene dielectric RG-6 Series, 77 percent shielded, tri-shield PVC jacketed, NEC rated CATV coax cable home run for each TV outlet indicated on the drawings.
5. Comply with TIA/EIA Standards 568-A, 569-A, 570-B, and the NEC.
6. Acceptable manufacturers:
a) CommScope, F677TSV V
b) Or approved equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

C. Provide pathways in accordance with TIA/EIA Standards 569-A, 570-B, and the NEC.

D. Provide wire and cable in accordance with TIA/EIA Standards 568-B.1 and B.2, 570-B, and the NEC.

E. Provide outlet boxes, mud rings, and enclosures plumb and level, and attach securely to building structure.

F. Install recessed boxes and mud rings flush with wall finishes.

G. Install polyethylene pulling string in each empty telephone and CATV utility conduit over 10-feet in length or containing any bends.

H. Provide “F” type connectors at the outlet end of all coaxial cables and connect to the faceplate coax coupler (barrel) connector.

I. Terminate 4-pair UTP cables to the telecommunications outlet connector jacks using TIA/EIA Standard T568A pin-out.

J. Home run all telecommunications cables from their outlet location to the telephone/CATV Hub enclosure in the utility room respectively. Run the commercial telecommunications lines from the telephone/CATV Hub enclosure to the demarcation point of connection provided by Qwest. Coordinate with the utility for location and the amount of excess cable to leave at the demarcation point of connection.

K. Home run all CATV cables from their outlet location to the telephone/CATV Hub enclosure in the utility room. Run the commercial telecommunications lines from the telephone/CATV Hub enclosure to the demarcation point of connection provided by Bresnan Communications. Coordinate with the utility for location and the amount of excess cable to leave at the demarcation point of connection.

L. Direct Qwest to connect all telecommunications service cable at the telephone/CATV Hub enclosure in the following manner:
   1. Connect the blue-white pair to the first pair in the buried service wire provided by Qwest.
   2. Connect the orange-white pair to the second pair in the buried service wire provided by Qwest.
   3. Connect all horizontal cables at the NID so the tenant can plug a phone into any outlet and that outlet will be activated.

M. Direct Bresnan Communications to connect the CATV service cable at the telephone/CATV Hub enclosure so that all horizontal cables will be active at their respective CATV outlet.

3.2 FIELD QUALITY CONTROL

A. Bresnan Communications is responsible for the proper signal level at the outlet connector device where the tenant's receiver is connected.

B. Test 4-pair copper cables in accordance with TIA/EIA 568-A Standards for Category 5e for the permanent link test. Provide documented results to the Base Communications Squadron for approval.

C. Repair to the Base Communications Squadron's satisfaction any wire runs that fail the permanent link test or otherwise deemed non-compliant.

End of Section

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SECTION 16722

RESIDENTIAL SMOKE AND CARBON MONOXIDE DETECTORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes residential smoke detectors that are to be installed in sleeping rooms, corridors and living areas.

B. Section includes residential carbon monoxide and explosive gas detectors to be installed near the furnace and on all floor levels.

1.2 REFERENCES

A. National Fire Protection Association (NFPA) - NFPA 70, National Electrical Code (NEC), 2002 Edition.

B. National Fire Protection Association (NFPA) - NFPA 72, National Fire Alarm Code, 2002 Edition.

C. National Fire Protection Association (NFPA) - NFPA 720, Recommended Practice for the Installation of Household Carbon Monoxide (CO) Warning Equipment, 2003 Edition.

D. Underwriters Laboratories (UL) – UL 3124, Single and Multiple Station Carbon Monoxide Alarms.

1.3 SYSTEM DESCRIPTION

A. Single station smoke detectors shall be hardwired to 120 VAC circuits and looped together such that any detector in alarm shall cause all smoke detectors to signal an alarm. The detectors shall be photoelectric style and located as indicated in the contract documents.

B. Single station carbon monoxide detectors shall be hardwired to 120 VAC circuits and looped together such that any detector in alarm shall cause all other carbon monoxide detectors to signal an alarm. They shall be located as indicated in the contract documents.

1.4 SUBMITTALS

A. Comply with requirements of Section 01330 – Submittal Procedures.

B. Product Data: Submit catalog data for each type detector.

1.5 CLOSEOUT SUBMITTALS

A. Comply with requirements of Section 01702 – As Built Records and Drawings.

B. Project Record Documents: Record and submit actual detector locations and circuits wired to.

PART 2 - PRODUCTS

2.1 DETECTORS

A. Smoke detectors shall be hardwired to a 120VAC dedicated circuit. Detectors shall be capable of interconnecting with a minimum 18 similar devices by interconnecting wiring. When interconnected with additional devices, all units shall sound an alarm upon activation of any single detector. Detector shall provide visible indication that the device is active and which device is in alarm and be equipped with a test button. Detector will not have battery backup.
   1. Acceptable manufacturer is American Personal Security.
   2. Or approved equivalent.

B. Carbon monoxide detector shall contain a digital readout and 85-dB horn output. Detectors shall be capable of interconnecting with a minimum 18 similar devices by interconnecting wiring. When interconnected with additional devices, all units shall sound an alarm upon activation of any single detector. Detector shall provide visible indication that the device is active and which device is in alarm and be equipped with a test button. Detector will not have battery backup
   1. Acceptable manufacturer is American Sensor.
   2. Or approved equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Detectors shall have a dedicated 120V circuit.

B. Smoke detectors shall have interconnecting wiring to interconnect all devices. All devices sound on any single alarm. Install all devices and wire according to manufacturer's recommendations.

C. Carbon monoxide explosive gas detector shall have interconnecting wiring to interconnect all devices. All devices sound on any single alarm. Install all devices and wire according to manufacturer's recommendations. Located in an easily accessible and visible location.

3.2 TESTS

A. System hookup and test is to be accomplished by the contractor in the presence of the Base Fire Marshall. The contractor shall furnish a letter to the contracting officer certifying that the system is installed properly and is complete and operating as specified and the Base Fire Marshall has approved testing.

End of Section

SECTION 16950

TESTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work includes testing of electrical installations to assure compliance with code and Contract Document requirements for proper system operation.

B. Contract Requirements: General Conditions, Supplementary Conditions, Division 1, and Sections 16010 and 16050 apply to Work in this section.

C. The following work shall be performed by a testing agency:
   1. Grounding Tests
   2. Ground Fault Protection Systems Tests and Calibration. Test New and Existing Systems.
   3. Medium Voltage Circuit Tests
   4. Pad-Mounted Transformer

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable city, county, and state codes and ordinances. In case of conflict with drawings or specifications, the codes and ordinances govern.

B. Basis:
   1. Uniform Building Code
   2. NFPA 70
   3. Local Energy Code (enforced by AHJ)

1.3 SUBMITTALS

A. General: Comply with requirements in Division 1, Section 16010, and the following.

B. Test Procedures:
   1. For Tests Listed

C. Test Reports:
   1. For Tests Listed

D. Certificates:
   1. Testing Agency Membership in National Electrical Testing Association
   2. Qualifications of Individuals Performing Tests by Testing Agency

1.4 TESTING AGENCY QUALIFICATIONS

A. General: Retain services of a National Electrical Testing Association member firm or approved. Testing agency shall not be associated with manufacturer of equipment or systems under test.

1.5 TEST REPORTS

A. General: Submit certified test reports for tests listed in this section. Insert copy into Operations and Maintenance Manuals.

1.6 SCHEDULE

A. General: Notify A/E 10 working days prior to performance of any test.

PART 2 - PRODUCTS

2.1 GENERAL

A. Comply with Article “Quality Assurance” provisions, specifications, and manufacturer’s data. Where these may be in conflict, the more stringent requirements govern.

2.2 TEST EQUIPMENT

A. Description: Test equipment as necessary for testing of electrical equipment and systems. Non-proprietary test equipment will remain the property of the Contractor or testing agency.

B. Proprietary Test Equipment:
   1. For products in which proprietary test equipment is needed for testing, product manufacturer shall provide test equipment and demonstrate its use. Proprietary test equipment shall become property of Owner upon completion of testing.
   2. Identify proprietary test equipment required in test procedures submittals and in a separate list of equipment to be included in Operations and Maintenance Manuals.

PART 3 - EXECUTION

3.1 INSPECTION

A. Description: Verify installation conditions as satisfactory to receive work of this section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Field Measurements: Field verify locations of new and existing work prior to commencing work of this section.

B. Protection: Protect surrounding areas and surfaces to preclude damage from work of this section.

3.3 INSTALLATION, APPLICATION, ERECTION, AND PERFORMANCE

A. Description: Perform the work in accordance with Article “Quality Assurance” provisions, specifications, and manufacturer's installation instructions and directions. Where these may be in conflict, the more stringent requirements govern.

3.4 LOW VOLTAGE CIRCUIT TESTS

A. Description: Test feeders. Test wiring and connections for continuity and ground before fixtures or other loads are connected. Make tests with minimum 500 Volt DC "Megger" type tester. If tests indicate faulty insulation (less than 2 megohms), correct such defects and retested. Submit tabulation of “Megger” tests.

3.5 LOAD BALANCE TESTS

A. Description: Check for proper load balance between phase conductors. Make adjustments as necessary to bring unbalance to within 15 percent of average load.

3.6 TRANSFORMER TAPS

A. Description: After facility is fully operational and systems are on line, change taps for rated volt output.

3.7 GROUNDING TESTS

A. Description: Measure OHMIC value of electric service entrance grounding electrode using "Multiple Ground Rod" method and suitable instruments. Maximum resistance to ground shall be less than 25 ohms.
   1. Measure resistance between each pair of ground electrodes and record these values. (Resistance A, B, C,_ _ _). Record ground condition, date, weather, and similar conditions.
   2. Average the value (A+B+C+---n)/n
   3. Contact A/E immediately if average value is greater than 10 ohms.
   4. Make measurements utilizing a Biddle "Vibroground" or approved meter “Megger” which induces a high current into tested circuit and measures resultant voltage.
   5. Tabulate results and certify to A/E that grounding test has been made and that requirements have been met.

B. Ground Rings around all Transformers and Sectionalizers listed on the drawings, whether work is done on them or not, shall be tested using the 3 point fall of potential method. Maximum resistance to ground shall be less than 25 ohms.

3.8 GROUND FAULT PROTECTION SYSTEMS TESTS AND CALIBRATION

A. Description: Test proper operation of GFCI receptacles.

3.9 MEDIUM VOLTAGE CIRCUIT TESTS

A. Visual and Mechanical Inspections of all medium voltage cable that is new or being modified or re-terminated:
   1. Inspect exposed cable sections for physical damage.
   2. Verify cable is supplied and connected in accordance with the Contract Documents.
   3. Inspect for shield grounding, cable support, and termination.
   4. Check that visible cable bends are in accordance with ICEA or manufacturer's minimum allowable bending radius.

B. Electrical Tests:
   1. Perform shield continuity test by ohm meter methods. Record ohmic values.

End of Section

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APPENDIX I

Soil Boring Locations and Profiles Prepared (for Bazan & Associates) by:

Thomas Dean & Hoskins, Inc., Great Falls, Montana

TD&H Job No. 03-142

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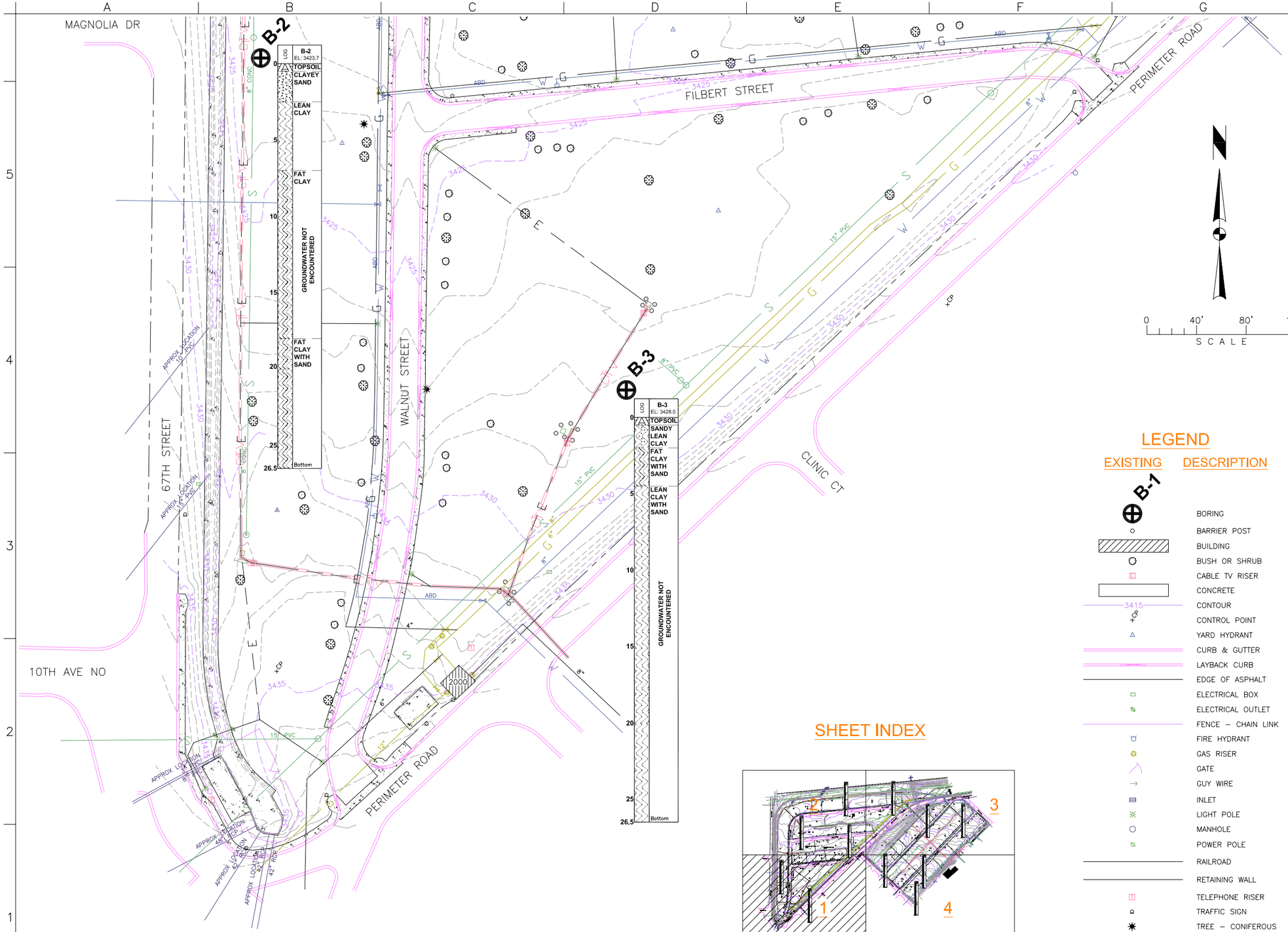


LEGEND

EXISTING	DESCRIPTION
B-1	BORING
	BARRIER POST
	BUILDING
	BUSH OR SHRUB
	CABLE TV RISER
	CONCRETE
3415	CONTOUR
+CP	CONTROL POINT
	YARD HYDRANT
	CURB & GUTTER
	LAYBACK CURB
	EDGE OF ASPHALT
	ELECTRICAL BOX
	ELECTRICAL OUTLET
	FENCE – CHAIN LINK
	FIRE HYDRANT
	GAS RISER
	GATE
	GUY WIRE
	INLET
	LIGHT POLE
	MANHOLE
	POWER POLE
	RAILROAD
	RETAINING WALL
	TELEPHONE RISER
	TRAFFIC SIGN
	TREE – CONIFEROUS
	TREE – DECIDUOUS
	VALVE

SHEET INDEX

FIGURE 1

US Army Corps of Engineers
Seattle District

THOMAS, DEAN & HOSKINS, INC.
ENGINEERING CONSULTANTS
TD&H

Symbol	Description	Date	Approved

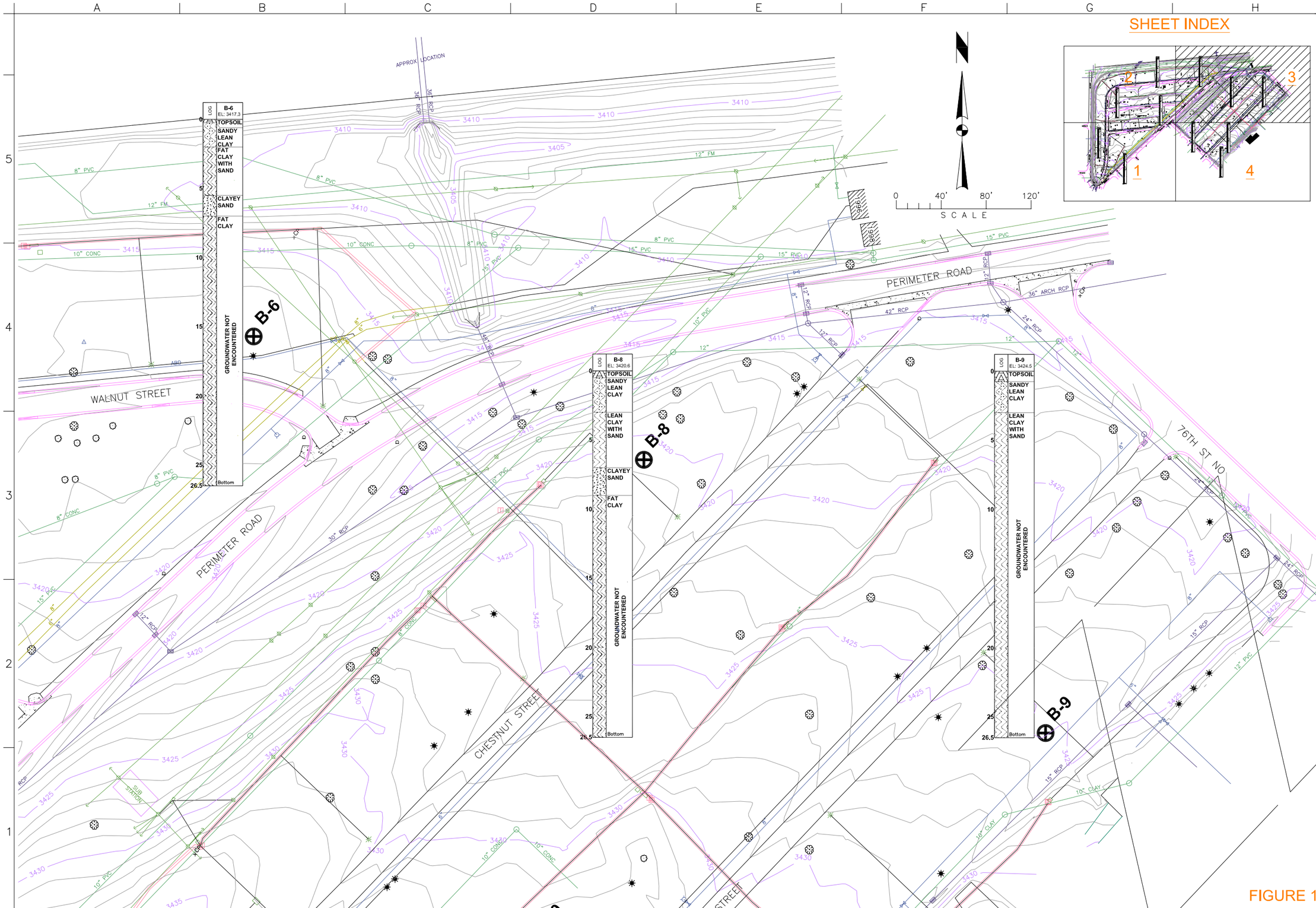
Designed by: EAJ
Dwn by: DRK
Ckd by: DLZ
Reviewed by:
Submitted by:
Date:
Rev.
Date: 12 January 2004
ACAD file name: 03-1428boring.DWG
Plot Scale Ratio: 1:1
Drawing code: X
RFP No. –
Contract No. –
Section

REPLACE FAMILY HOUSING, PHASE V
NZAS 99-4005A, MALMSTROM AFB, MONTANA

SOIL BORING LOCATIONS & PROFILES

Sheet reference number: 1

ALL SCALES SHOWN ARE BASED ON A STANDARD DRAWING SIZE OF 22" X 34" OR METRIC DRAWING SIZE OF 559mm X 864mm. IF ANY OTHER SIZE DRAWINGS ARE FURNISHED OR PLOTTED THE CONTRACTOR SHALL ADJUST THE SCALES ACCORDINGLY. THE CONTRACTOR SHALL ALSO ADVISE HIS SUB-CONTRACTORS OF THE ABOVE.



US Army Corps of Engineers
Seattle District

THOMAS, DEAN & HOSKINS, INC.
ENGINEERING CONSULTANTS
TD&H

Symbol	Description	Date	Approved

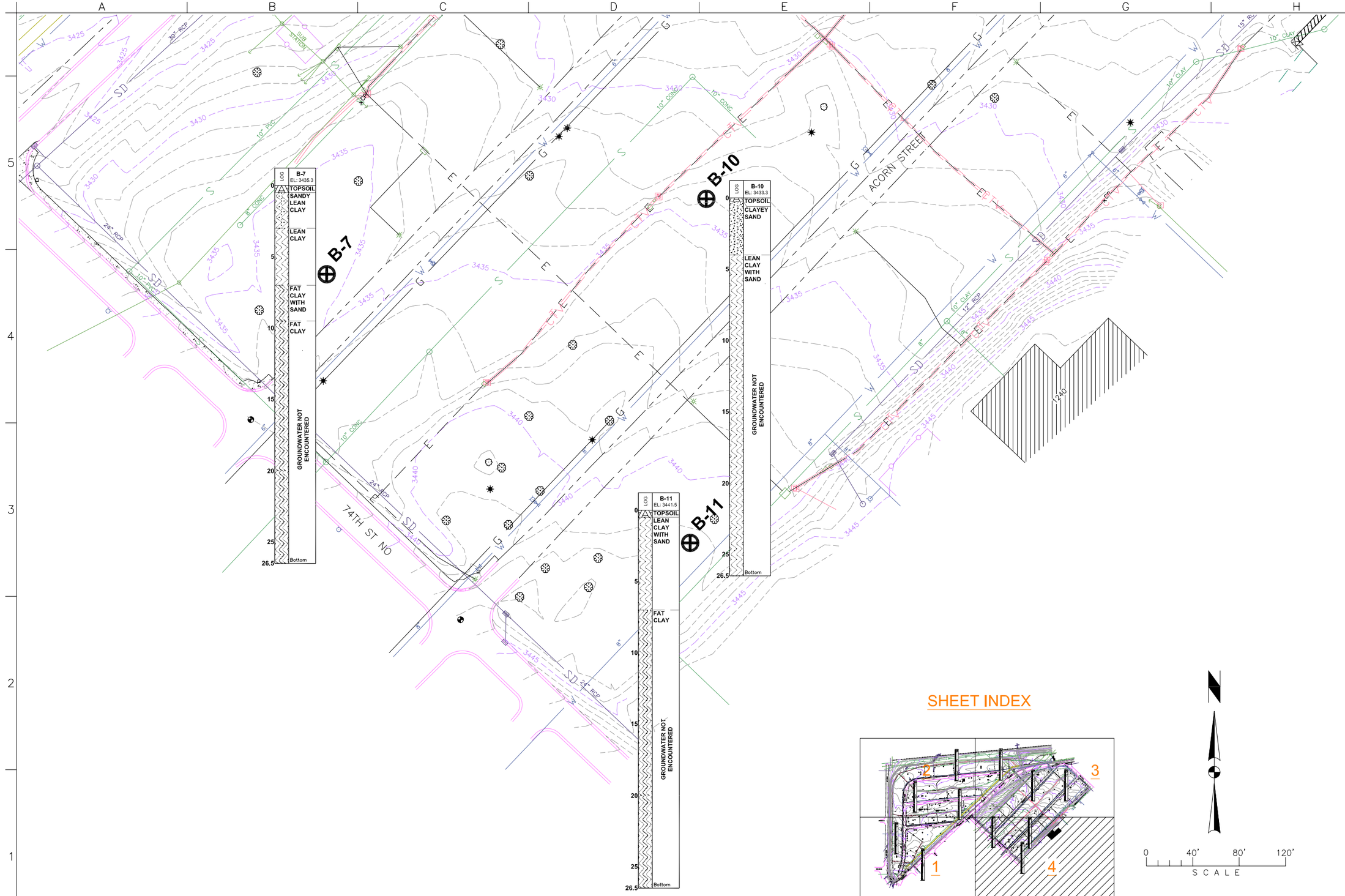
Designed by: EAJ	Date: 12 January 2004	Rev.
Dwn by: DRK	Ckd by: DLZ	ACAD file name: 03-142boring.DWG	RFP No. –
Reviewed by:		Plot Scale Ratio: 1:1	Contract No. –
Submitted by: Chief:	Section	Drawing code: X	

REPLACE FAMILY HOUSING, PHASE V
NZAS 99-4005A, MALMSTROM AFB, MONTANA
SOIL BORING LOCATIONS & PROFILES

Sheet reference number: 3

FIGURE 1

ALL SCALES SHOWN ARE BASED ON A STANDARD DRAWING SIZE OF 22" X 34" OR METRIC DRAWING SIZE OF 559mm X 864mm. IF ANY OTHER SIZE DRAWINGS ARE FURNISHED OR PLOTTED THE CONTRACTOR SHALL ADJUST THE SCALES ACCORDINGLY. THE CONTRACTOR SHALL ALSO ADVISE HIS SUB-CONTRACTORS OF THE ABOVE.



SHEET INDEX

0 40' 80' 120'
SCALE

FIGURE 1

US Army Corps of Engineers
Seattle District

THOMAS, DEAN & HOSKINS, INC.
ENGINEERING CONSULTANTS
TD&H

Symbol	Description	Date	Approved

Designed by: EAJ
Dwn by: DRK
Ckd by: DLZ
Reviewed by:
Submitted by:
Date: 12 January 2004
ACAD file name: 03-1428boring.DWG
Plot Scale Ratio: 1:1
Drawing code: X
Rev.
RFP No. –
Contract No. –
Sheet
Section

REPLACE FAMILY HOUSING, PHASE V
NZAS 99-4005A, MALMSTROM AFB, MONTANA
SOIL BORING LOCATIONS & PROFILES

Sheet reference number: 4

ALL SCALES SHOWN ARE BASED ON A STANDARD DRAWING SIZE OF 22" X 34" OR METRIC DRAWING SIZE OF 559mm X 864mm. IF ANY OTHER SIZE DRAWINGS ARE FURNISHED OR PLOTTED THE CONTRACTOR SHALL ADJUST THE SCALES ACCORDINGLY. THE CONTRACTOR SHALL ALSO ADVISE HIS SUB-CONTRACTORS OF THE ABOVE.

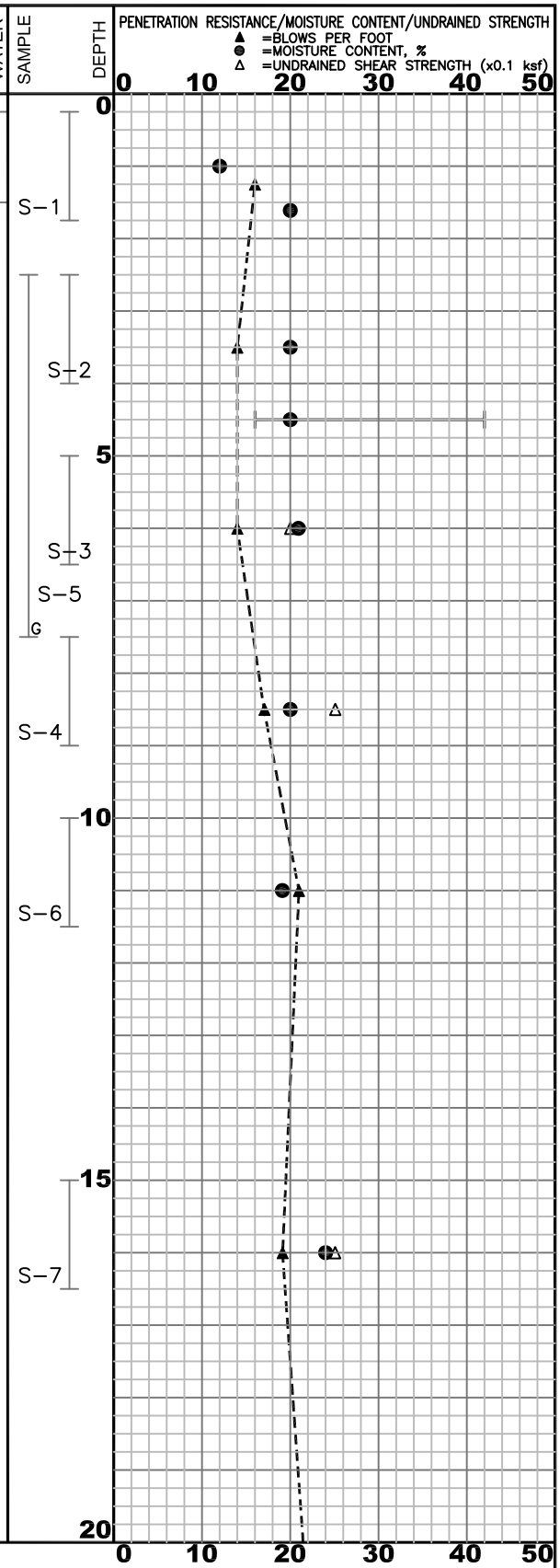
PATH\FILENAME

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3416.2 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.25	
	Sandy, lean **CLAY**, very stiff, moist, brown.	1.5	
	Lean **CLAY** with sand, stiff to very stiff, mottled, moist, brown with white inclusions. Modified Proctor (Figure 19) Maximum Dry Unit Weight = 122.7 pcf Optimum Moisture = 12.7% **California Bearing Ratio = 2%**		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/04/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Continued on Following Page

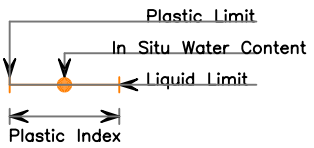


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- G Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- R 2-1/2-inch I.D. ring sampler
- T 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-1

Phase 5 Housing
Malmstrom Airforce Base
Great Falls, Montana

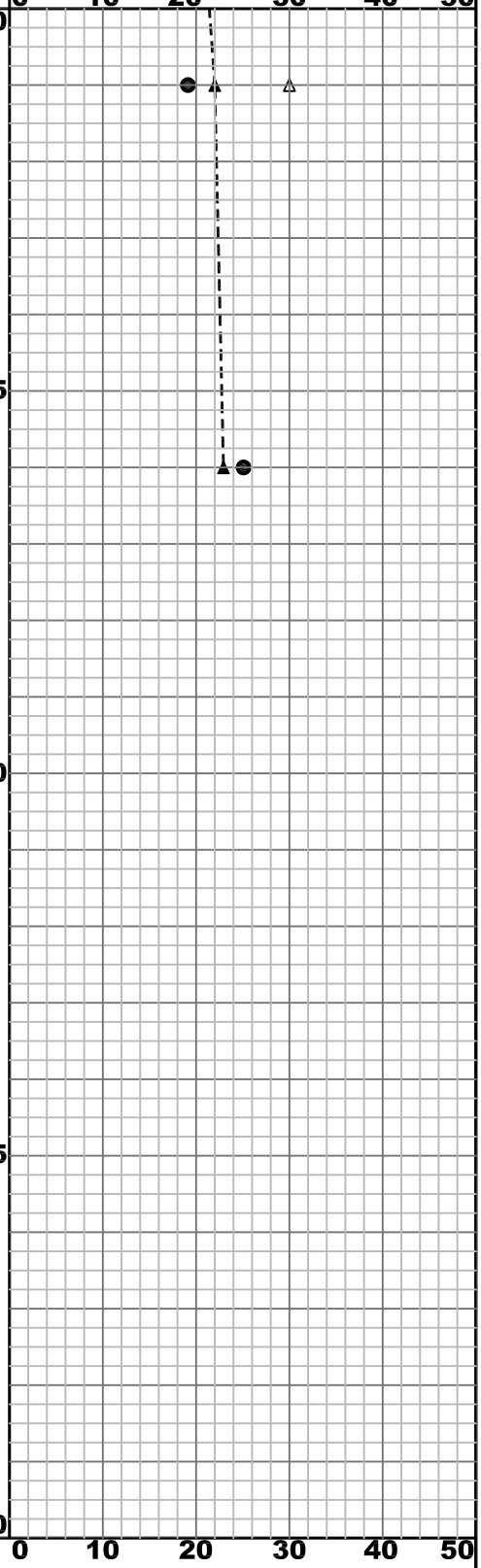
December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 2
Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3416.2 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page Trace subrounded gravel at 20.0 feet.			S-8	20
				S-9	25
		26.5			
	Bottom of Soil Boring : 26.5 feet		Groundwater Not Encountered During Drilling		30
					35
					40

PENETRATION RESISTANCE/MOISTURE CONTENT/UNDRAINED STRENGTH
▲ =BLOWS PER FOOT
● =MOISTURE CONTENT, %
△ =UNDRAINED SHEAR STRENGTH (x0.1 ksf)



Logged by: Dana Olcott, E.I.T. (11/04/03)

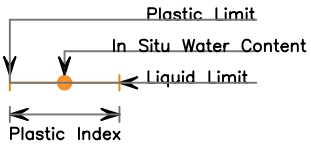
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-1 (cont.)

Phase 5 Housing
Malmstrom Airforce Base
Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 2
Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3423.7 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.5	
	Clayey **SAND**, medium dense, trace roots, slightly moist, brown.	2.5	
	Lean **CLAY**, very stiff, pockets of fine sand and white salt crystals, slightly moist to moist, grayish brown to brown.	7.0	
	Fat **CLAY**, very stiff to stiff, trace pockets of fine sand, moist, brown.	18.0	**Groundwater Not Encountered During Drilling**
	Fat **CLAY** with sand, very stiff, glacial till, trace subrounded gravel, moist, brown.		

Logged by: Dana Olcott, E.I.T. (11/04/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

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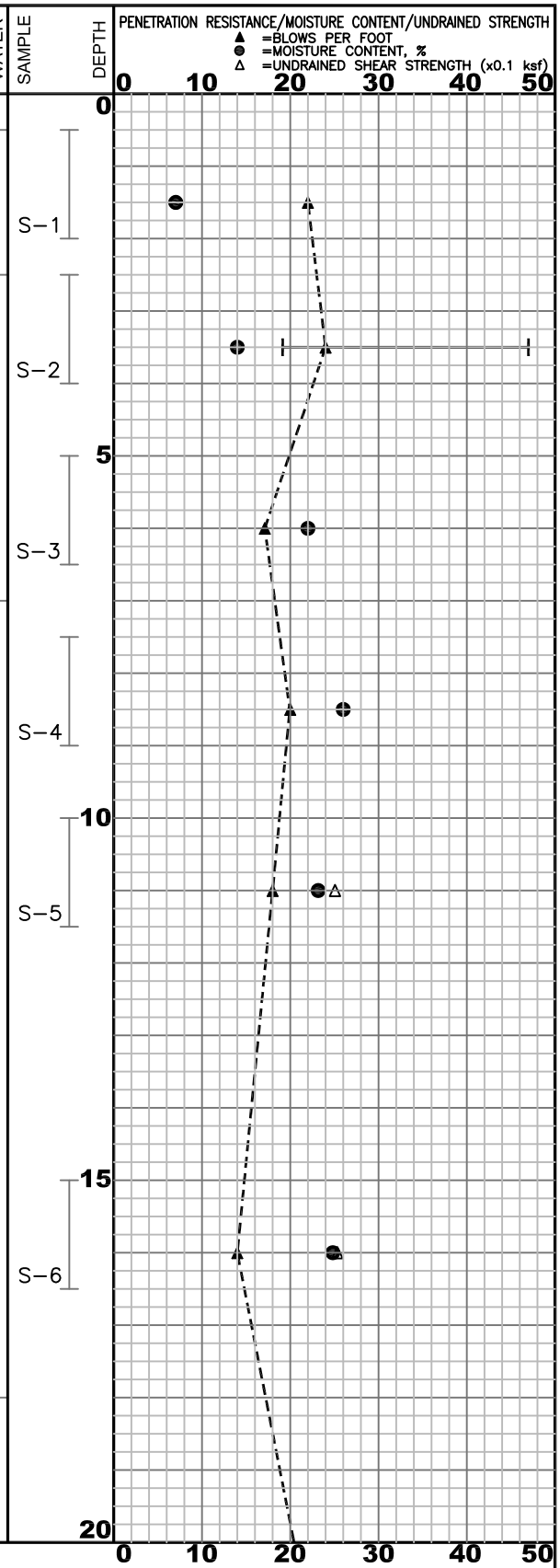
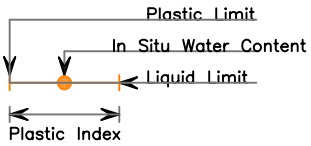


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-2

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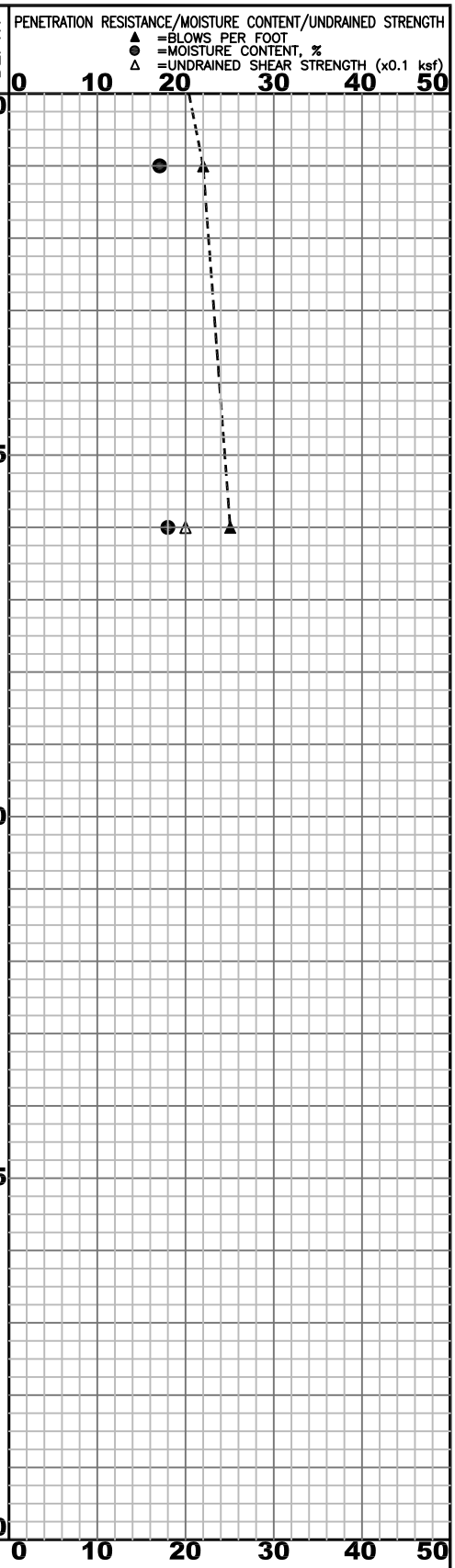
Figure No. 3

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3423.7 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-7	20
					25
		26.5		S-8	
	Bottom of Soil Boring : 26.5 feet		**Groundwater Not Encountered During Drilling**		30
					35
					40



Logged by: Dana Olcott, E.I.T. (11/04/03)

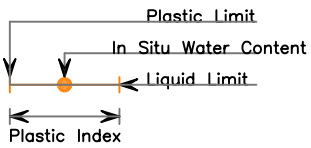
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-2 (cont.)

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Figure No. 3

Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3428.5 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.5	
	Sandy, lean **CLAY**, stiff, trace roots to 1.0 feet, slightly moist, light brown with white inclusions.	2.0	
	Fat **CLAY** with sand, stiff, glacial till, moist, brown.	4.5	
	Lean **CLAY** with sand, stiff to very stiff, glacial till, mottled, trace coarse sand and subrounded gravel, moist, brown. Consolidation/Swell Test (Figure 16) Dry Unit Weight = 106 pcf		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

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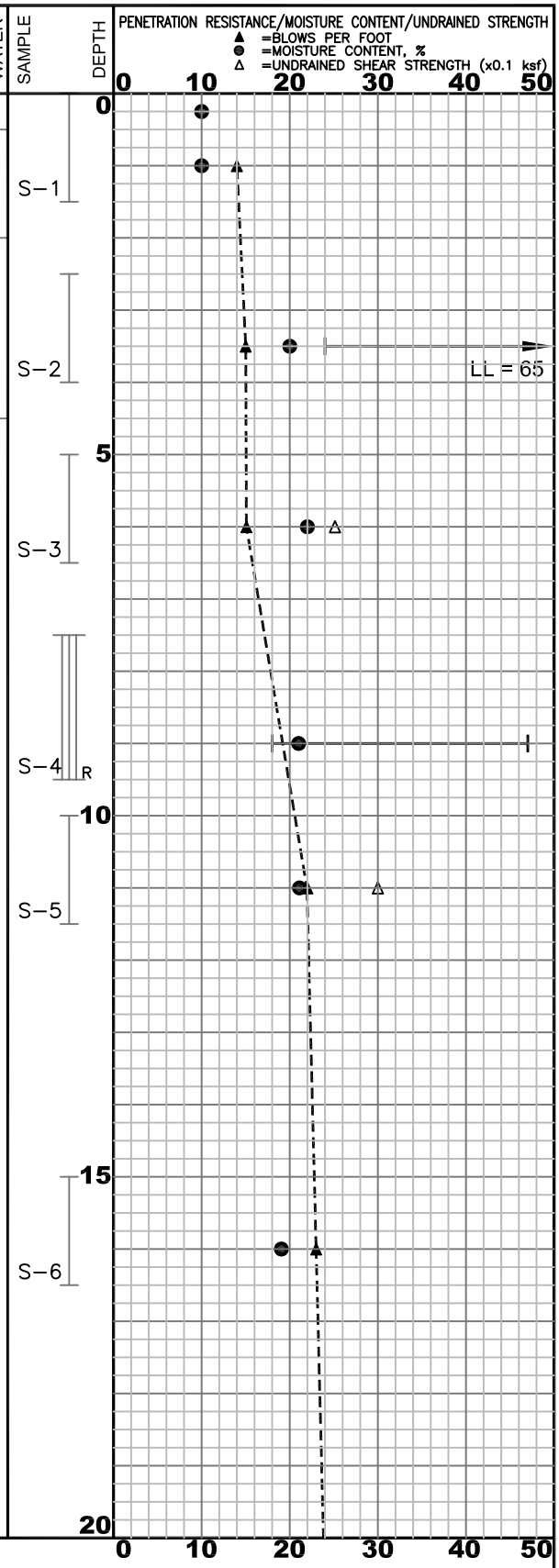
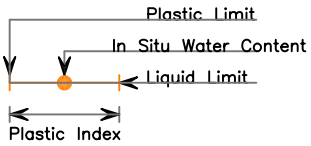


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- G Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- R 2-1/2-inch I.D. ring sampler
- T 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-3

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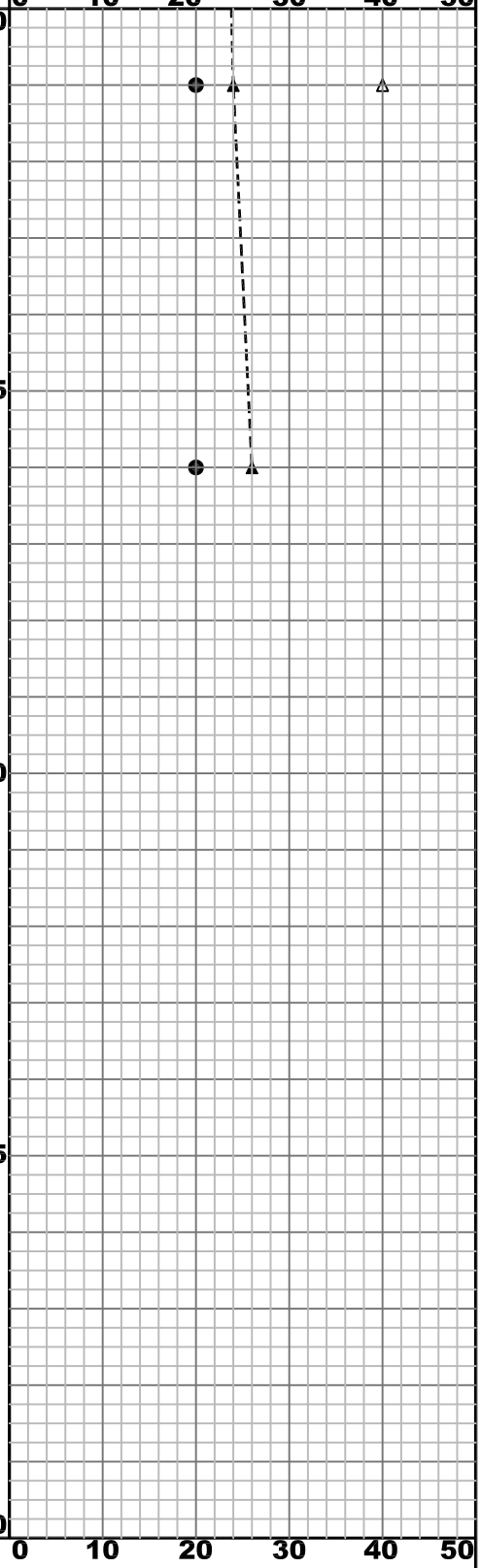
Figure No. 4

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3428.5 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page				
	More gravel at 23.5 feet.			S-7	20
					25
		26.5		S-8	
	Bottom of Soil Boring : 26.5 feet		Groundwater Not Encountered During Drilling		30
					35
					40

PENETRATION RESISTANCE/MOISTURE CONTENT/UNDRAINED STRENGTH
▲ =BLOWS PER FOOT
● =MOISTURE CONTENT, %
△ =UNDRAINED SHEAR STRENGTH (x0.1 ksf)



Logged by: Dana Olcott, E.I.T. (11/07/03)

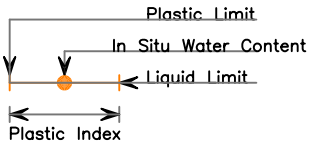
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-3 (cont.)

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GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

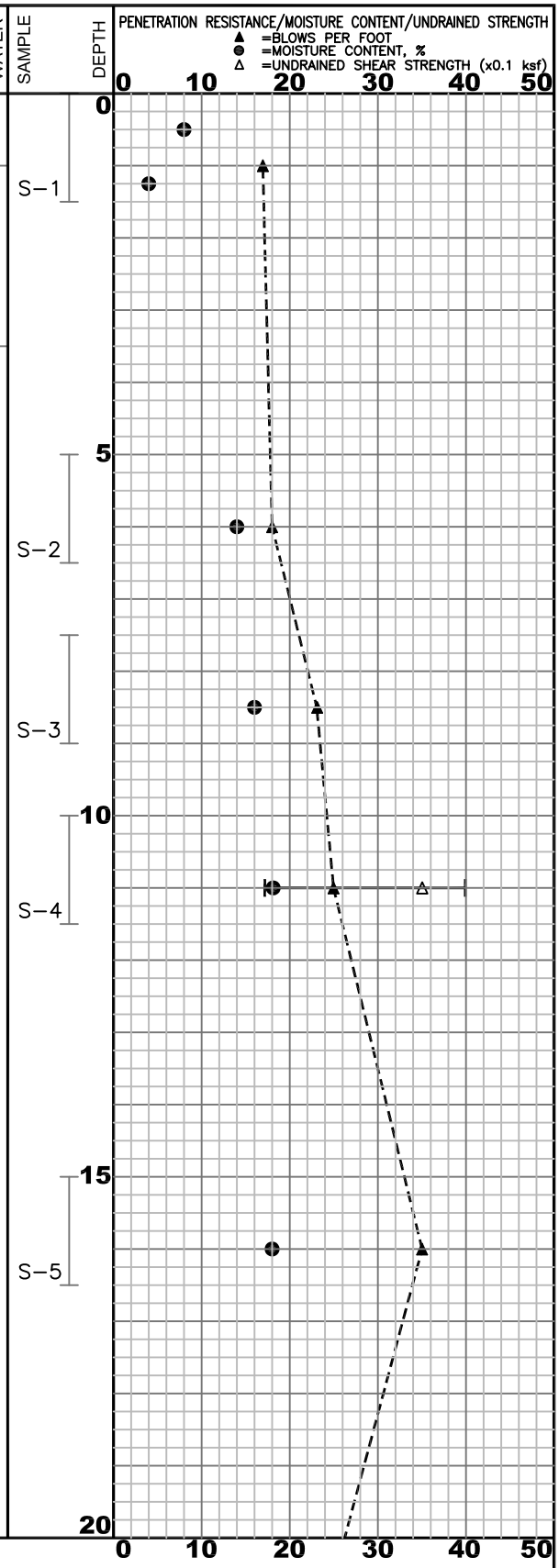
Figure No. 4
Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3425.2 SOIL DESCRIPTION	DEPTH	GROUND WATER
	Sandy, lean **CLAY**, very stiff, slightly moist, brown with white inclusions.	1.0	
	Silty **SAND**, medium dense, slightly moist, light brown.	3.5	
	Lean **CLAY** with sand, very stiff to hard, glacial till, trace subrounded coarse sand and gravel, moist, brown, mottled with orange, dark brown, and gray.		**Groundwater Not Encountered During Drilling**
	Trace silt pockets at 15.0 feet.		

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Continued on Following Page

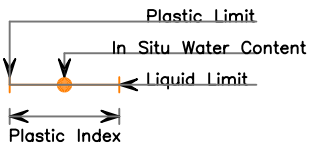


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-4

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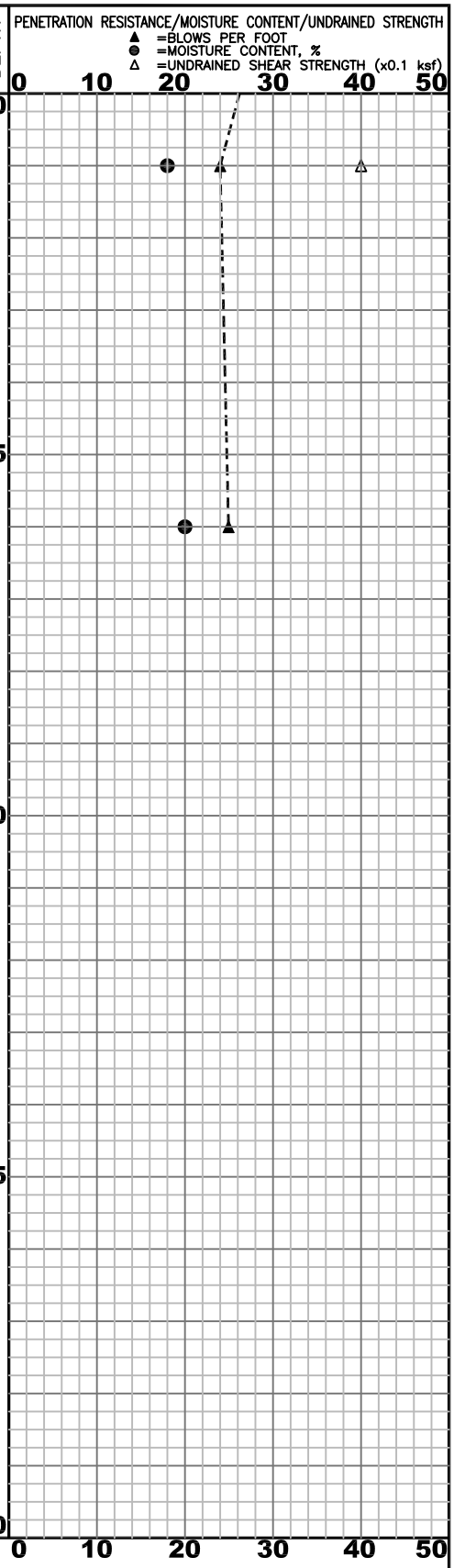
Figure No. 5

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3425.2 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page Gravelly at 22.0 feet.			S-6 S-7	20 25
	Bottom of Soil Boring : 26.5 feet	26.5	Groundwater Not Encountered During Drilling		30 35 40

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

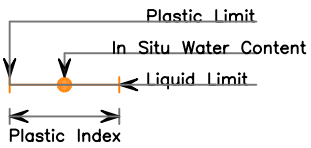


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-4 (cont.)

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Figure No. 5

Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3415.0 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.5	
	Sandy, lean **CLAY**, very stiff to stiff, slightly moist, brown. Zones of clayey fine sand at 5.0 feet.	7.5	
	Lean **CLAY** with sand, very stiff, zones of clayey sand, moist, brown with dark brown inclusions. Consolidation/Swell Test (Figure 17) Dry Unit Weight = 117 pcf	13.0	
	Lean **CLAY**, very stiff, glacial till, trace sand and subrounded gravel, moist, dark brown with orange and gray mottles.		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/04/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

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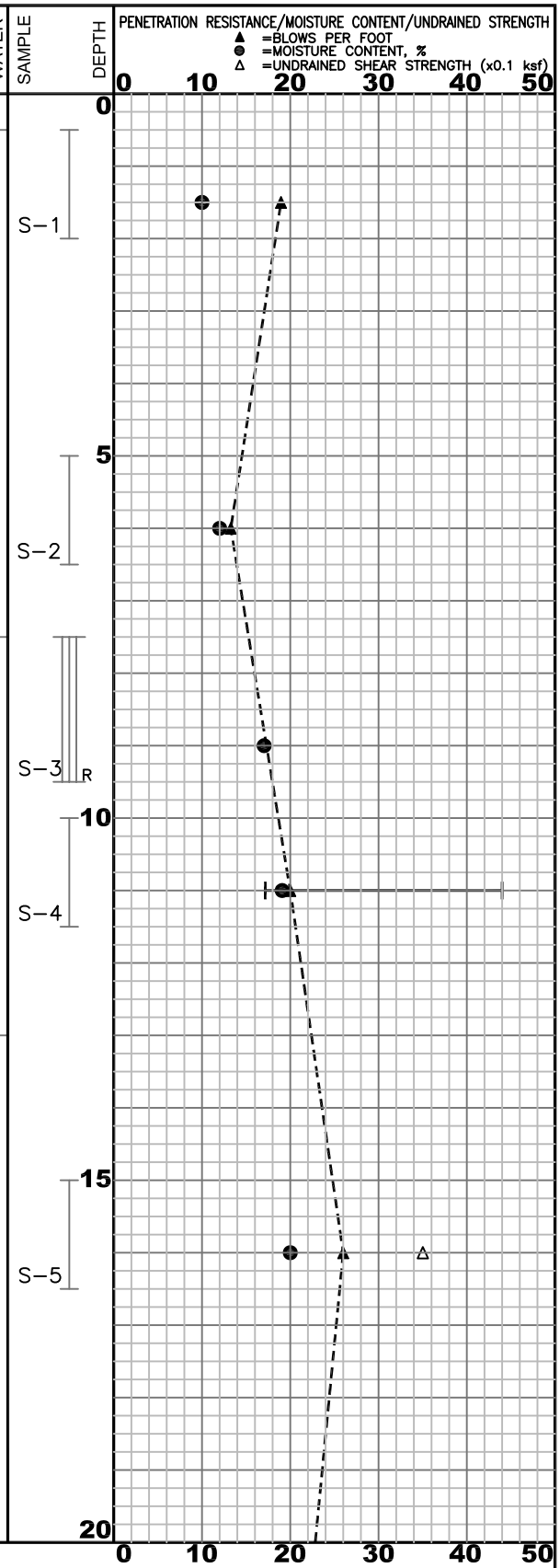
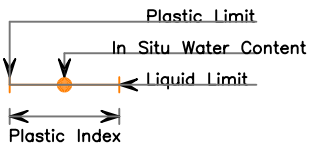


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-5

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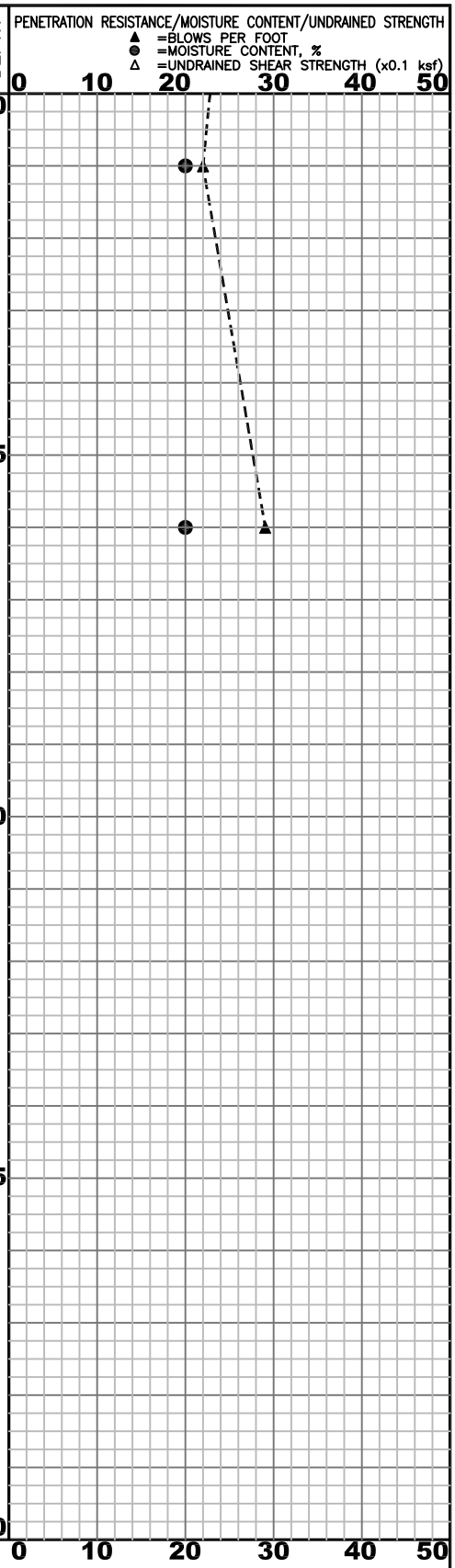
Figure No. 6

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3415.0 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-6 S-7	20 25
	Bottom of Soil Boring : 26.5 feet	26.5	**Groundwater Not Encountered During Drilling**		30 35 40

Logged by: Dana Olcott, E.I.T. (11/04/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

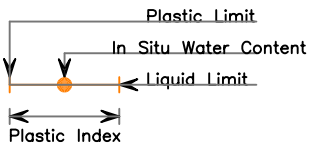


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-5 (cont.)

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Figure No. 6
Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3417.3 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.25	
	Sandy, lean **CLAY**, very stiff, trace roots, slightly moist, brown with white inclusions.	2.0	
	Fat **CLAY** with sand, stiff, moist, brown.	5.5	
	Clayey **SAND**, medium dense, moist, brown.	7.0	
	Fat **CLAY**, very stiff, trace sand and subrounded gravel, moist, brown with white and light brown inclusions.		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/04/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

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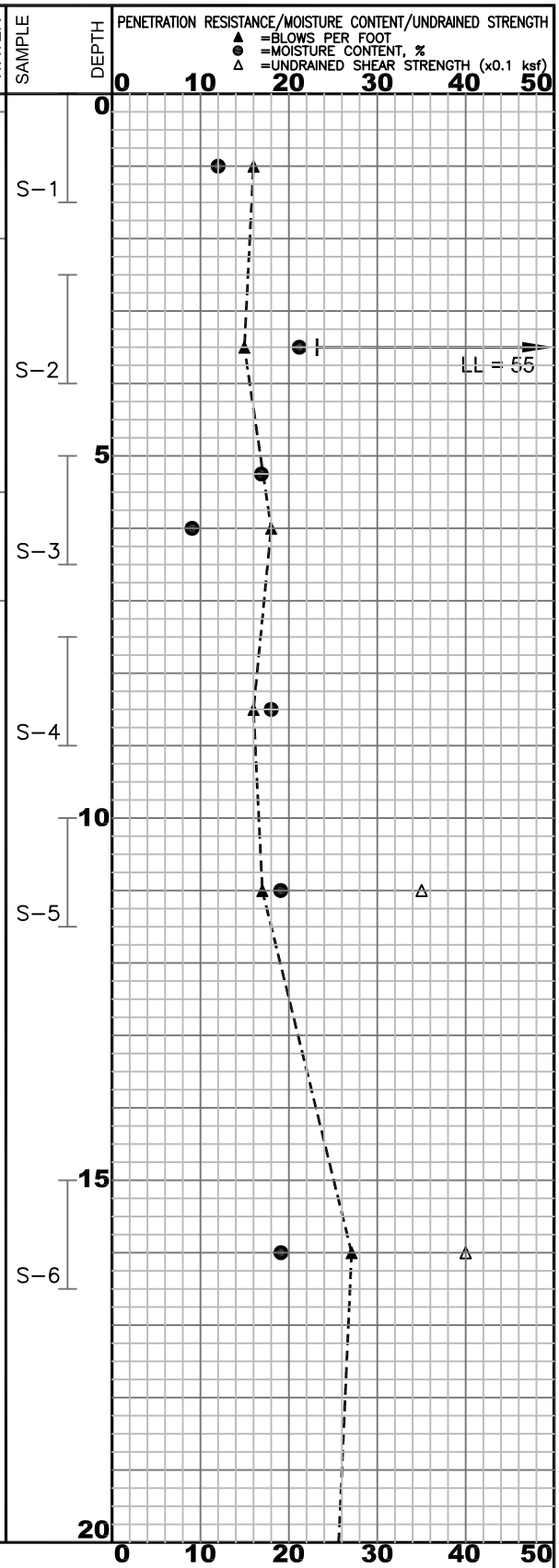
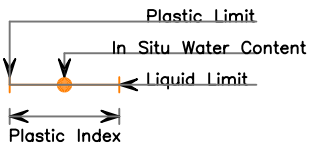


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-6

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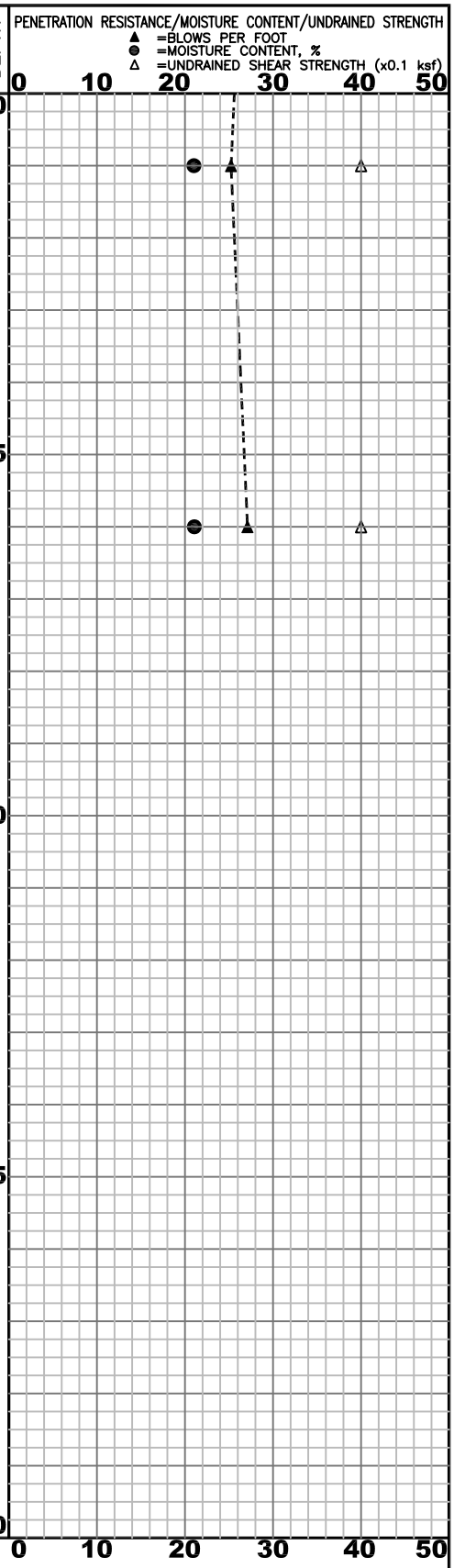
Figure No. 7

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3417.3 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-7	20
				S-8	25
		26.5			
	Bottom of Soil Boring : 26.5 feet		**Groundwater Not Encountered During Drilling**		30
					35
					40



Logged by: Dana Olcott, E.I.T. (11/04/03)

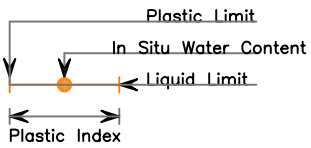
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-6 (cont.)

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Figure No. 7

Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3435.3 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS, clayey sand.	0.5	
	Sandy, lean **CLAY**, very stiff, trace roots, slightly moist, light brown.	3.0	
	Lean **CLAY**, very stiff, glacial till, trace subrounded coarse sand and gravel, slightly moist to moist, brown.	7.0	
	Fat **CLAY** with sand, very stiff, glacial till, trace subrounded gravel, moist, brown.	9.5	
	Fat **CLAY**, very stiff, glacial till, trace sand and subrounded gravel, moist, brown with orange and gray inclusions.		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

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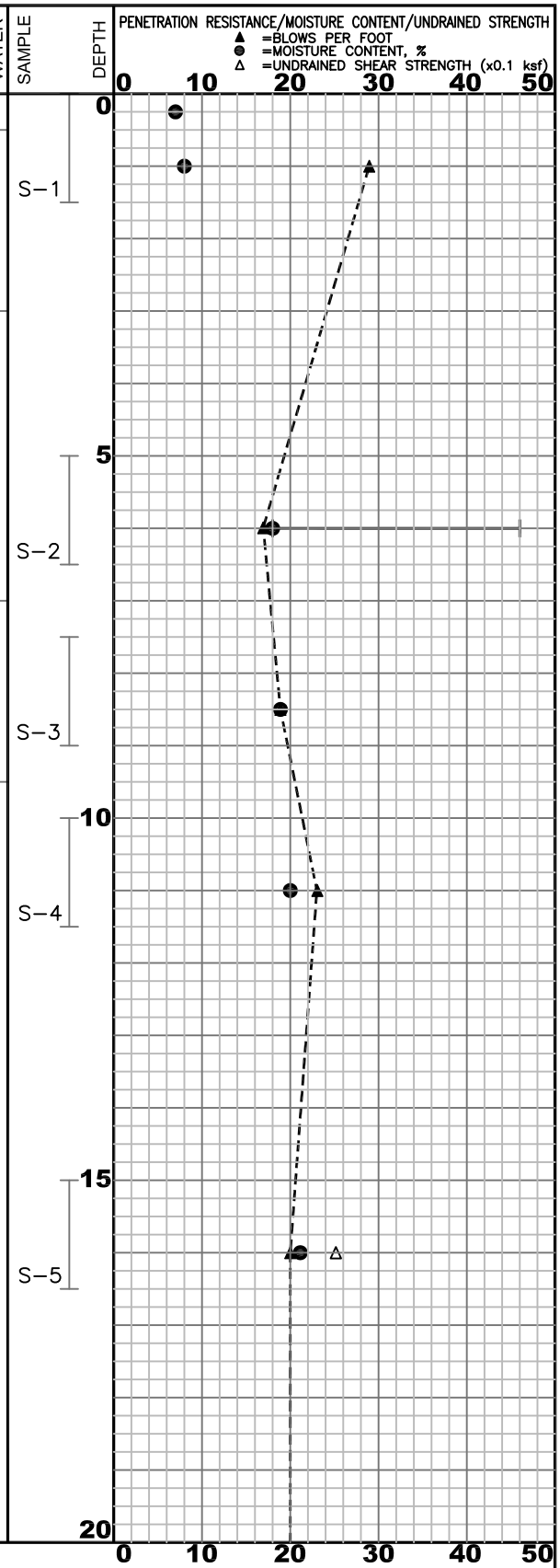
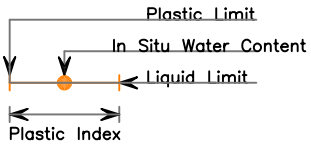


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-7

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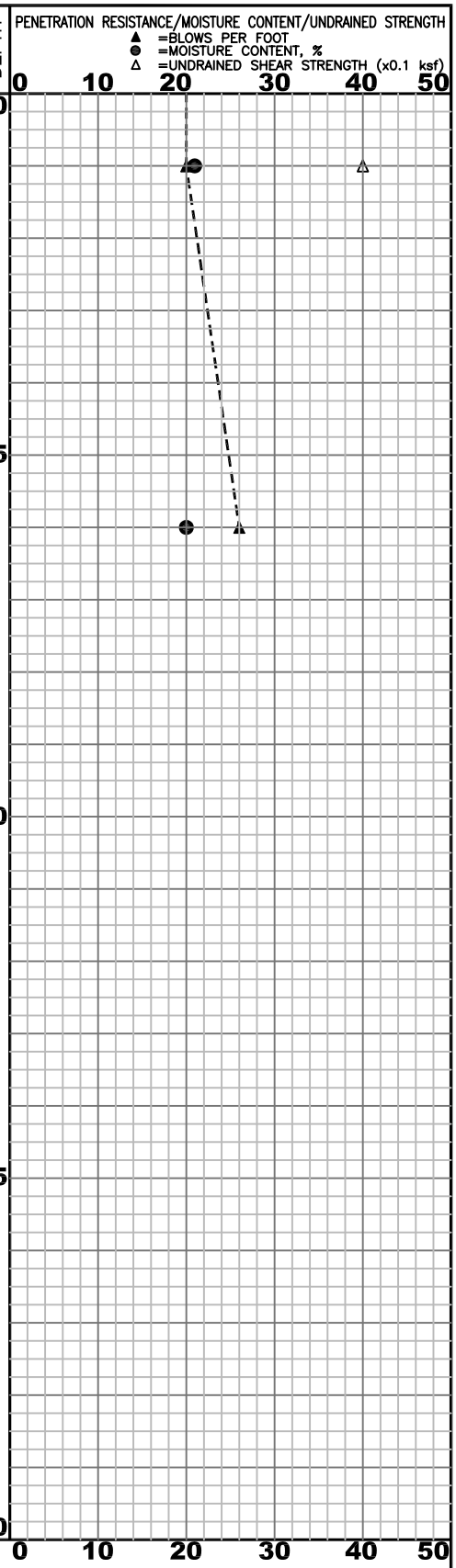
Figure No. 8

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3435.3 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-6	20
					25
		26.5		S-7	
	Bottom of Soil Boring : 26.5 feet		**Groundwater Not Encountered During Drilling**		30
					35
					40



Logged by: Dana Olcott, E.I.T. (11/07/03)

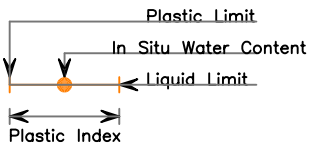
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-7 (cont.)

Phase 5 Housing

Malmstrom Airforce Base

Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 8

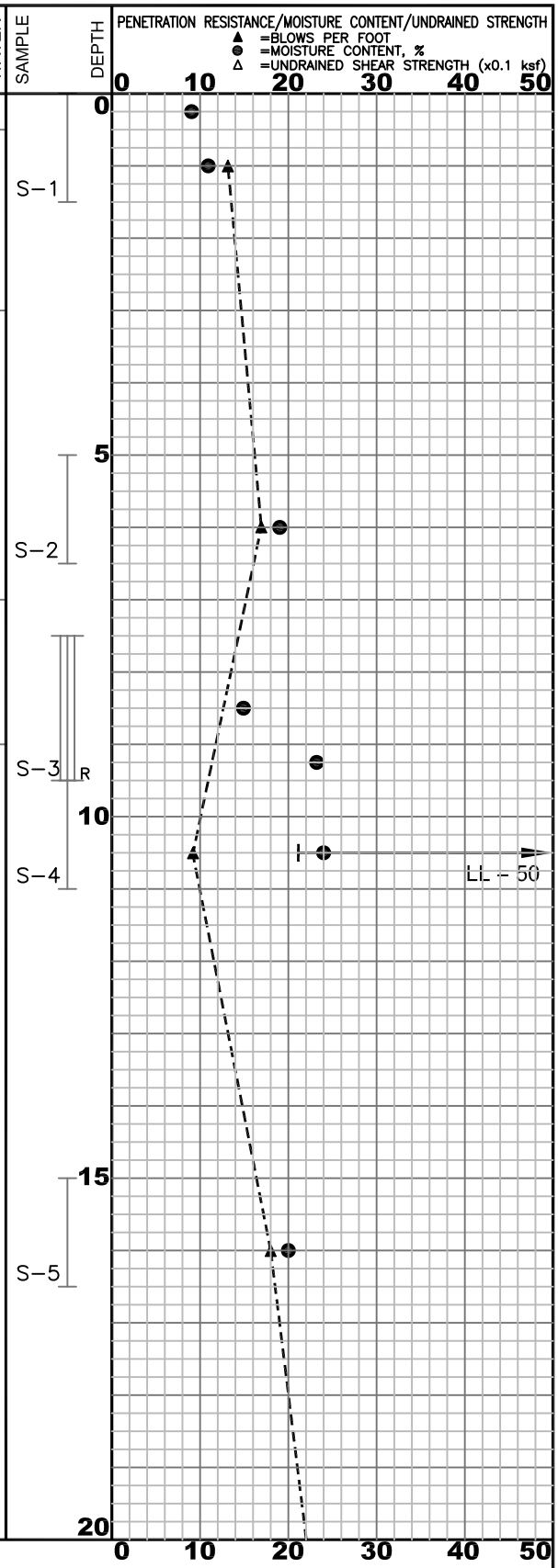
Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3420.6 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS, clayey sand.	0.5	
	Sandy, lean **CLAY**, stiff, trace roots, slightly moist, light brown.	3.0	
	Lean **CLAY** with sand, very stiff, trace gravel, moist, brown.	7.0	
	Clayey **SAND**, moist, brown.	9.0	
	Fat **CLAY**, stiff to very stiff, glacial till, trace subrounded coarse sand and subrounded gravel, pockets of fine sand, moist, brown with white and orange inclusions. More plastic at 13.0 feet.		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Continued on Following Page

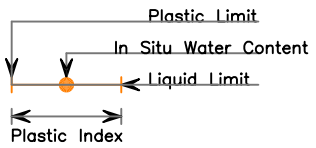


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- G Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- R 2-1/2-inch I.D. ring sampler
- T 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-8

Phase 5 Housing

Malmstrom Airforce Base

Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

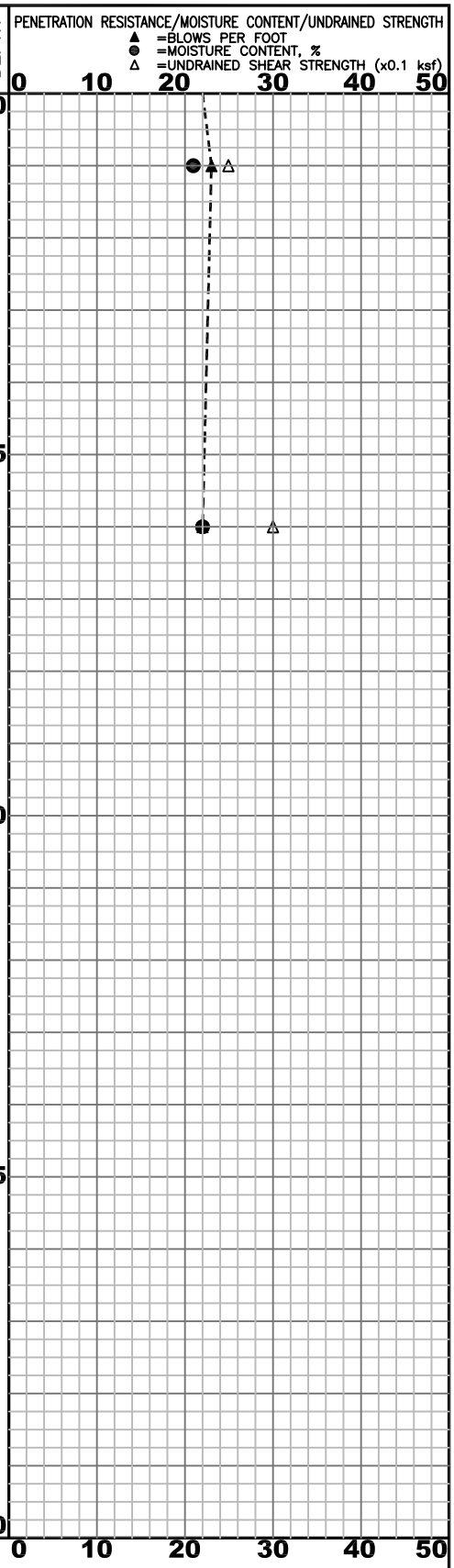
Figure No. 9

Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3420.6 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-6 S-7	20 25
	Bottom of Soil Boring : 26.5 feet	26.5	**Groundwater Not Encountered During Drilling**		30 35 40

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

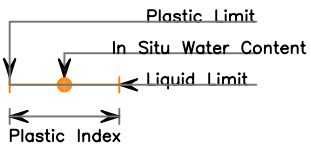


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-8 (cont.)

Phase 5 Housing

Malmstrom Airforce Base

Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

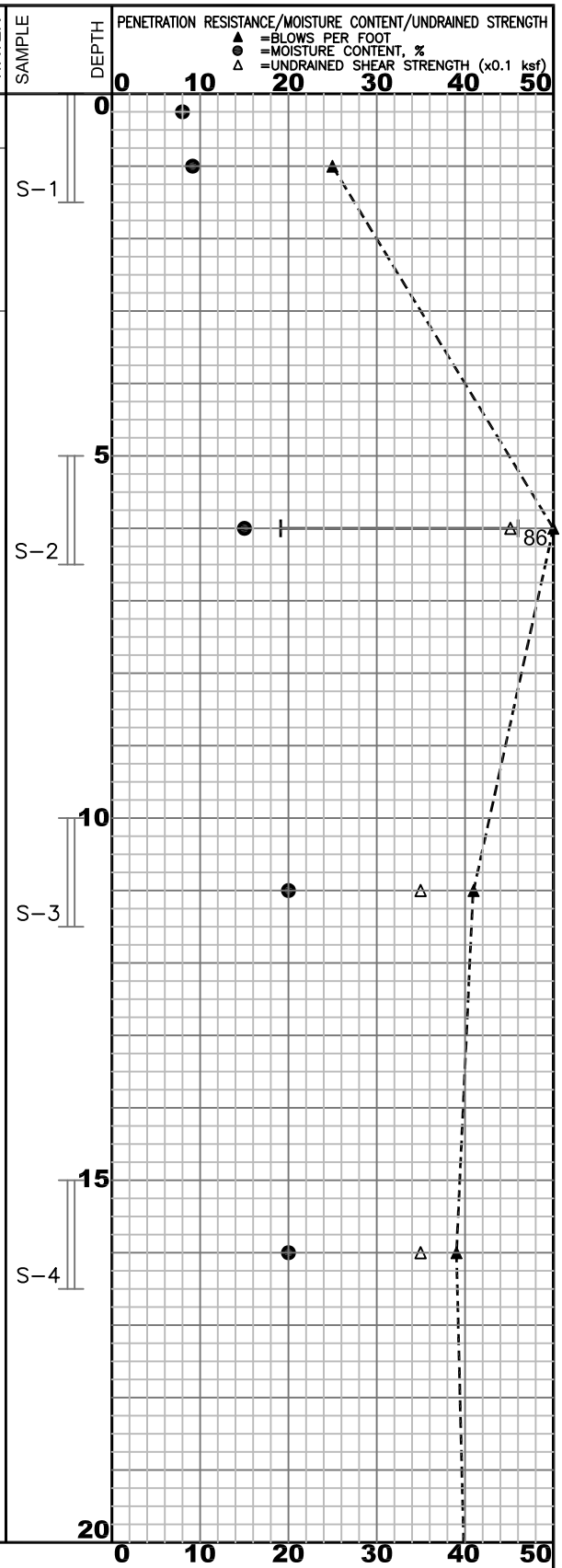
Figure No. 9
Sheet 2 of 2

GRAPHIC LOG	SURFACE: Muddy / grass turf APPROXIMATE SURFACE ELEVATION: 3424.5 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.75	
	Sandy, lean **CLAY**, very stiff, trace roots, slightly moist, brown with white inclusions.	3.0	
	Lean **CLAY** with sand, hard, glacial till, trace subrounded coarse sand and gravel, slightly moist to moist, brown with orange and gray inclusions.		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/10/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Continued on Following Page

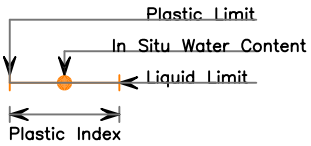


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-9

Phase 5 Housing

Malmstrom Airforce Base

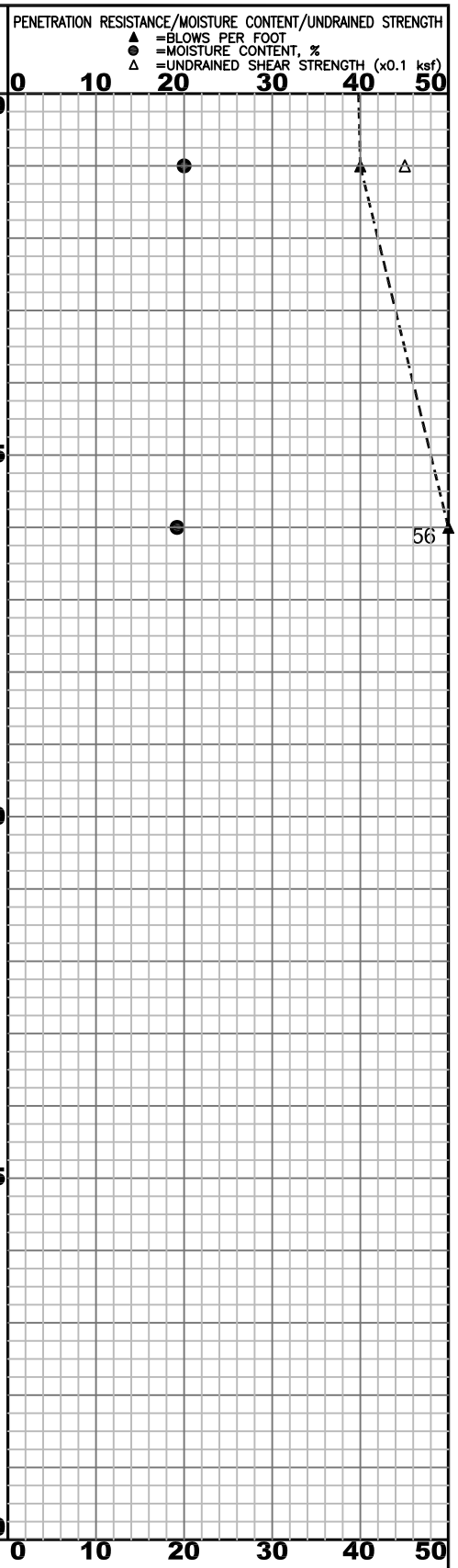
Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 10
Sheet 1 of 2

GRAPHIC LOG	SURFACE: Muddy / grass turf APPROXIMATE SURFACE ELEVATION: 3424.5 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-5	20
				S-6	25
		26.5			
	Bottom of Soil Boring : 26.5 feet		**Groundwater Not Encountered During Drilling**		30
					35
					40



Logged by: Dana Olcott, E.I.T. (11/10/03)

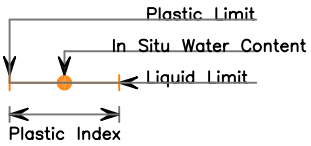
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-9 (cont.)

Phase 5 Housing

Malmstrom Airforce Base

Great Falls, Montana

December 2003 03-142

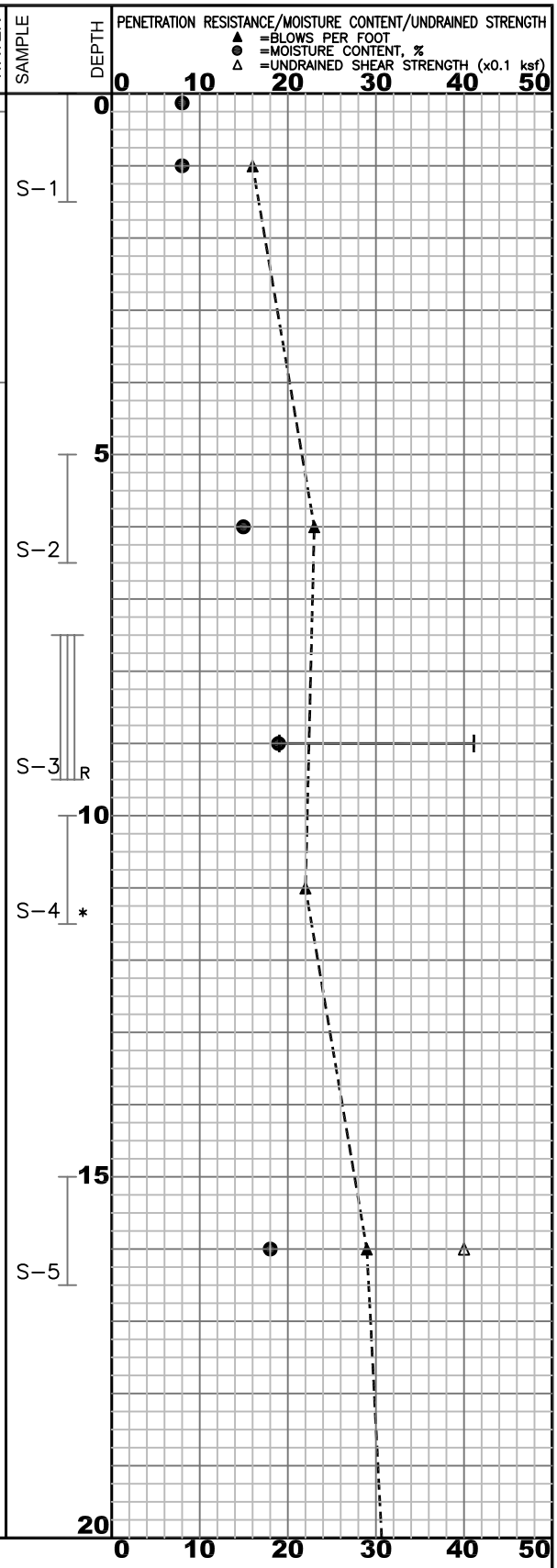
TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 10

Sheet 2 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3433.3 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.25	
	Clayey **SAND**, medium dense, trace gravel, slightly moist, light brown with white inclusions.	4.0	
	Lean **CLAY** with sand, very stiff to hard, glacial till, trace subrounded gravel, slightly moist to moist, brown.		
	Consolidation/Swell Test (Figure 18) Dry Unit Weight = 113pcf		
	Logged by: Dana Olcott, E.I.T. (11/07/03) Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.		**Groundwater Not Encountered During Drilling**

Continued on Following Page

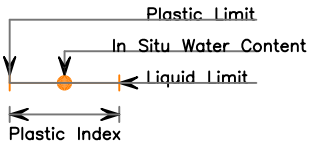


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-10

Phase 5 Housing
Malmstrom Airforce Base
Great Falls, Montana

December 2003 03-142

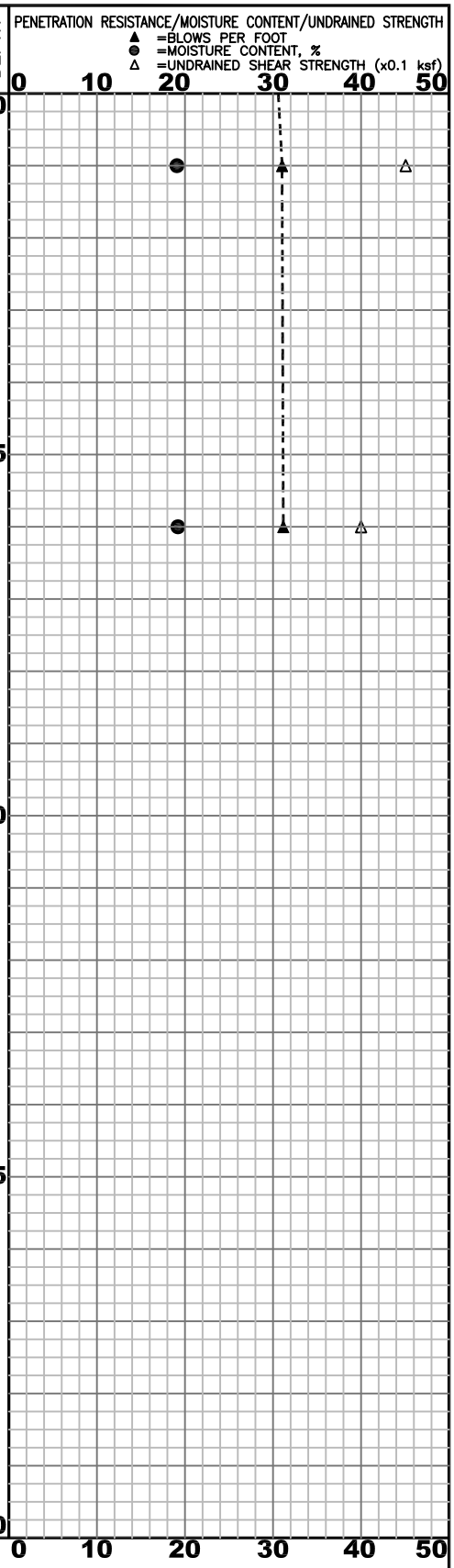
TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 11
Sheet 1 of 2

GRAPHIC LOG	SURFACE: Snow covered grass turf APPROXIMATE SURFACE ELEVATION: 3433.3 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-6 S-7	20 25
	Bottom of Soil Boring : 26.5 feet	26.5	**Groundwater Not Encountered During Drilling**		30 35 40

Logged by: Dana Olcott, E.I.T. (11/07/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

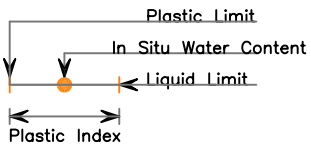


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-10 (cont.)

Phase 5 Housing

Malmstrom Airforce Base

Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 11

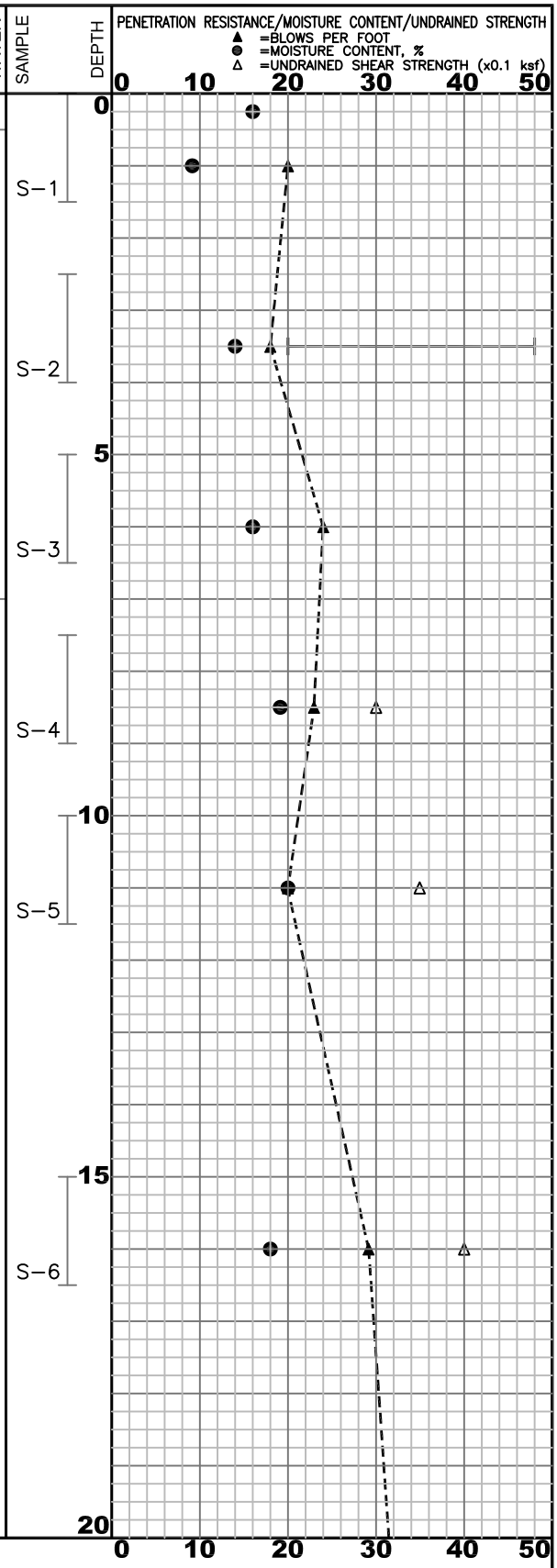
Sheet 2 of 2

GRAPHIC LOG	SURFACE: Wet grass turf APPROXIMATE SURFACE ELEVATION: 3441.5 SOIL DESCRIPTION	DEPTH	GROUND WATER
	TOPSOIL AND ORGANICS	0.5	
	Lean **CLAY** with sand, very stiff, trace fine gravel, moist, brown.	7.0	
	Fat **CLAY**, very stiff to hard, glacial till, trace sand and subrounded gravel, moist, brown with orange and gray inclusions.		**Groundwater Not Encountered During Drilling**

Logged by: Dana Olcott, E.I.T. (11/10/03)

Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Continued on Following Page

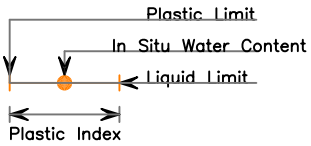


Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-11

Phase 5 Housing

Malmstrom Airforce Base

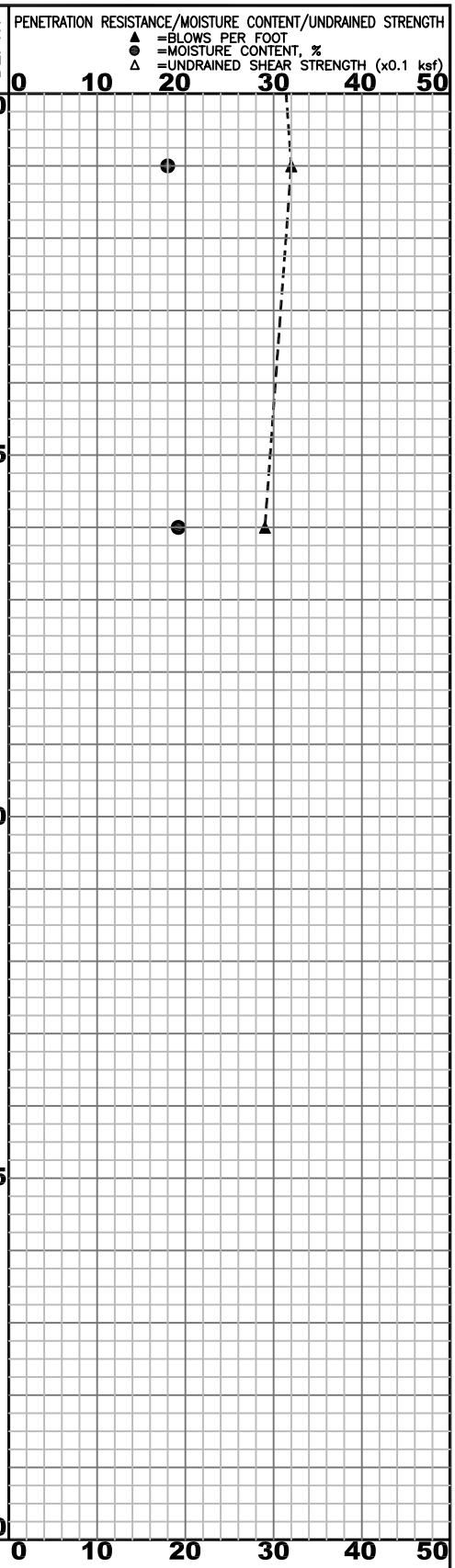
Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 12
Sheet 1 of 2

GRAPHIC LOG	SURFACE: Wet grass turf APPROXIMATE SURFACE ELEVATION: 3441.5 SOIL DESCRIPTION	DEPTH	GROUND WATER	SAMPLE	DEPTH
	Continued from Previous Page			S-7	20
				S-8	25
		26.5			
	Bottom of Soil Boring : 26.5 feet		**Groundwater Not Encountered During Drilling**		30
					35
					40



Logged by: Dana Olcott, E.I.T. (11/10/03)

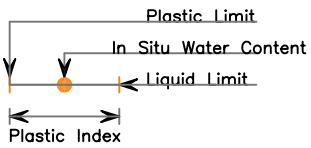
Drilled by: Boland Drilling using a Mobile B-59 drill rig with 6-inch HSA.

Note: The stratification lines represent approximate boundaries between soil types. Actual boundaries may be gradual or transitional.

LEGEND

- ▲ SPT blows per foot
- ● Field Moisture content
- ▼ Groundwater Level
- Grab/composite sample
- 1-3/8-inch I.D. split spoon
- 2-1/2-inch I.D. split spoon
- 2-1/2-inch I.D. ring sampler
- 3-inch I.D. thin-walled sampler
- * No sample recovery

Atterberg Limits



GNP = Granular and Nonplastic

Log of Soil Boring B-11 (cont.)

Phase 5 Housing

Malmstrom Airforce Base

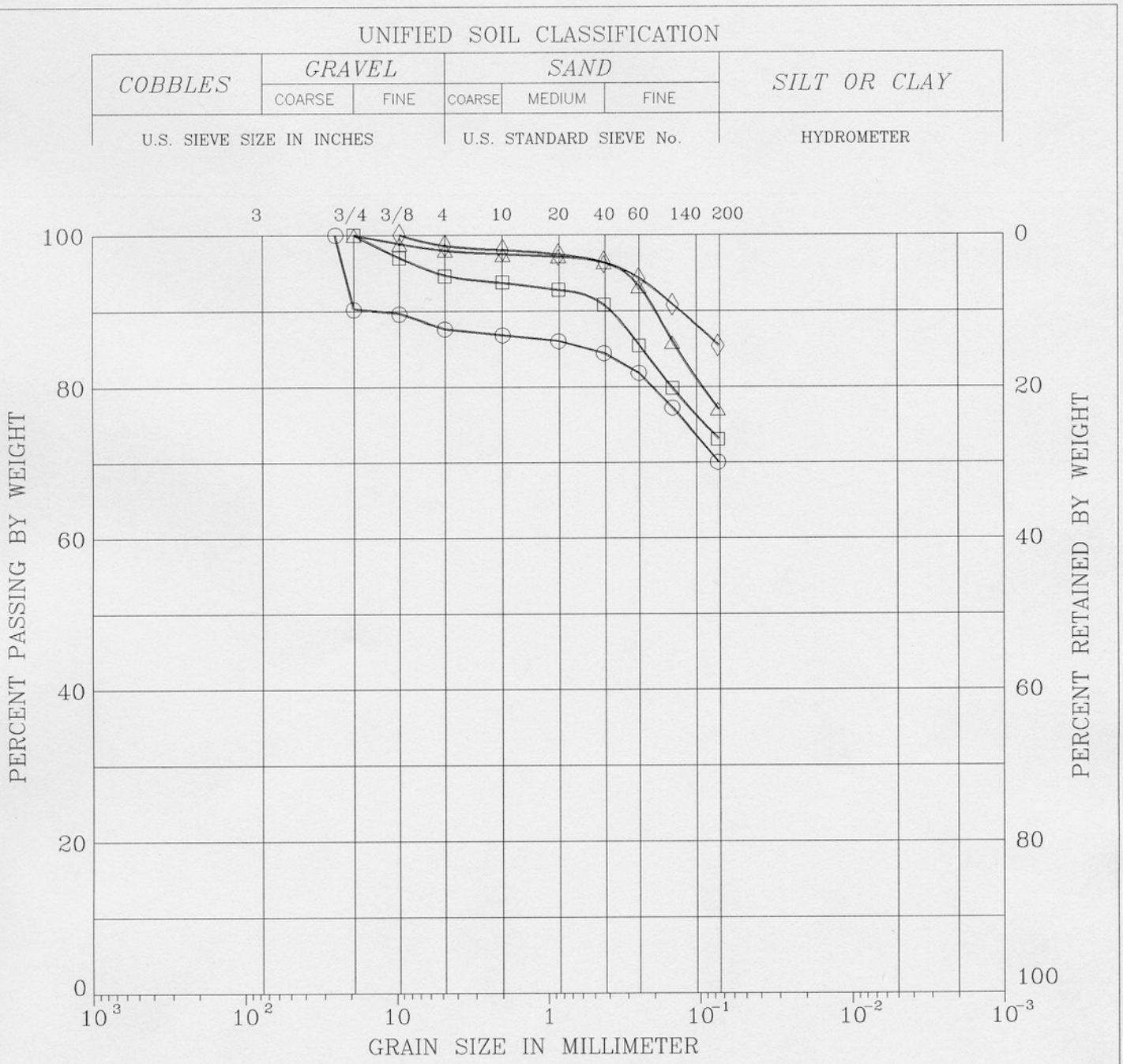
Great Falls, Montana

December 2003 03-142

TD&H THOMAS, DEAN & HOSKINS, INC. ENGINEERING CONSULTANTS GREAT FALLS–BOZEMAN–KALISPELL–HELENA SPOKANE LEWISTON MONTANA WASHINGTON IDAHO

Figure No. 12

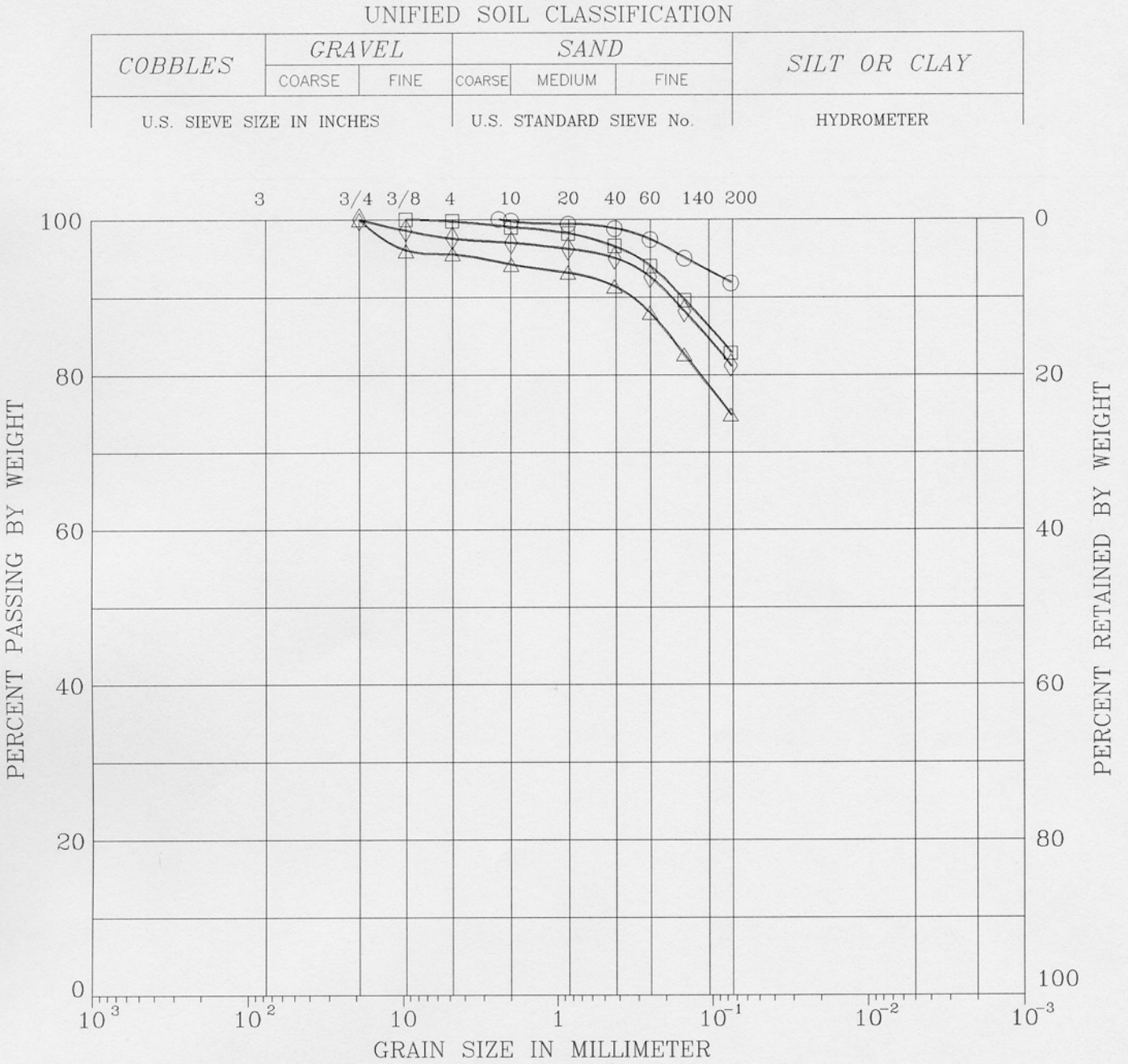
Sheet 2 of 2



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-4,S-4	10-11.5	40	23	Lean CLAY with sand (CL)
□	B-5,S-4	10-11.5	44	27	Lean CLAY with sand (CL)
△	B-6,S-2	2.5-4.0	55	32	Fat CLAY with sand (CH)
◊	B-7,S-2	5.0-6.5	46	28	Lean CLAY (CL)

Remark :

Project No. 03-142	Malmstrom Air Force Base Phase 5 Housing
THOMAS, DEAN & HOSKINS Engineering Consultants	GRAIN SIZE DISTRIBUTION Figure No. 14



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-8,S-4	9.5-11	50	29	Fat CLAY (CH)
□	B-9,S-2	5.0-6.5	46	27	Lean CLAY with sand (CL)
△	B-10,S-3	7.5-9.5	41	22	Lean CLAY with sand (CL)
◊	B-11,S-2	2.5-4.0	48	28	Lean CLAY with sand (CL)

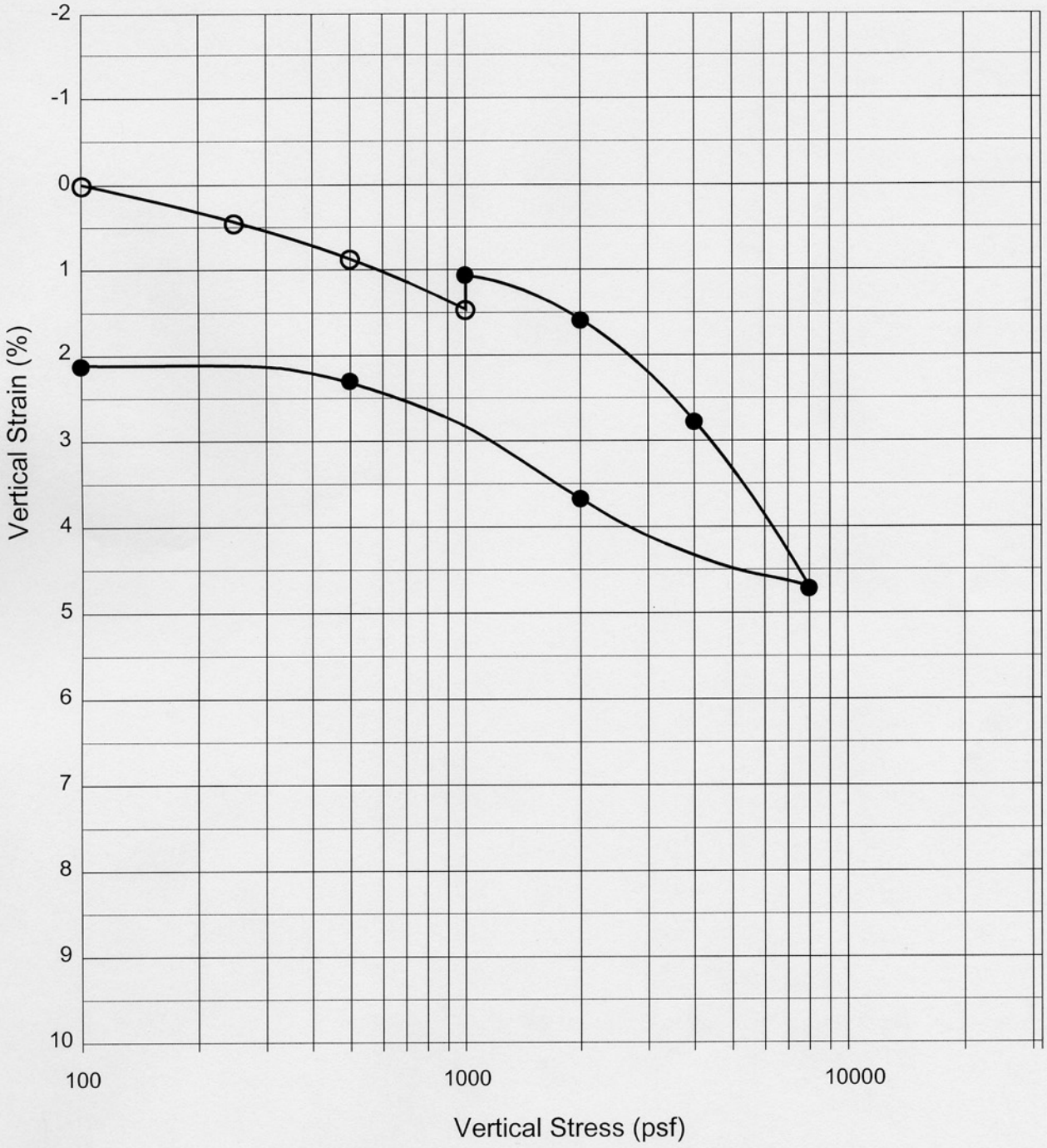
Remark :

Project No. 03-142	Malmstrom Air Force Base Phase 5 Housing
THOMAS, DEAN & HOSKINS Engineering Consultants	GRAIN SIZE DISTRIBUTION Figure No. 15

THOMAS, DEAN & HOSKINS
Engineering Consultants

TD&H Project #: 03-142
Date: 11/21/03

CONSOLIDATION TEST



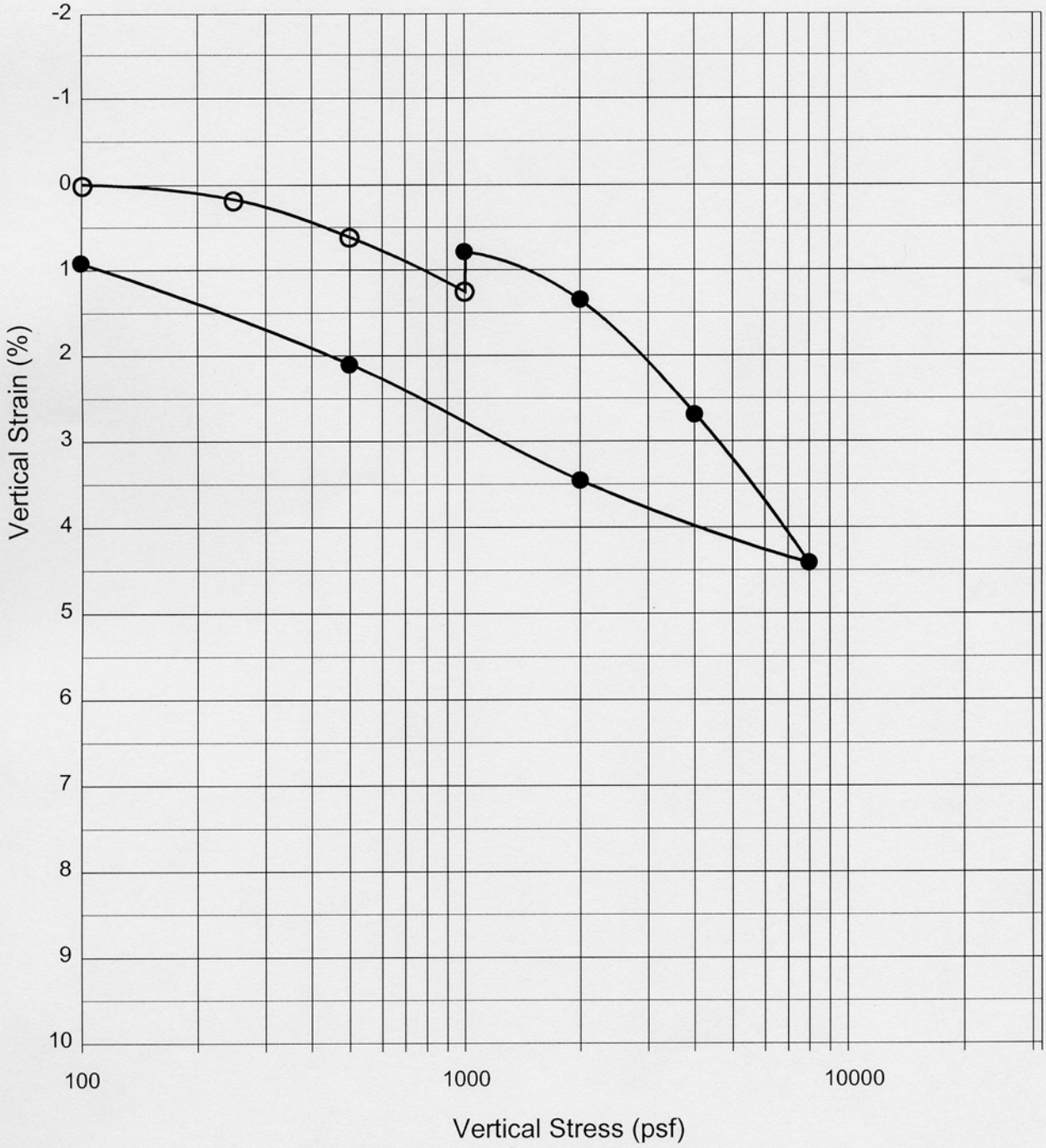
○ **Field Moisture** ● **Inundated**

Soil Classification:	Lean **CLAY** with sand (CL)		Phase V Housing
Sample Number:	B-3, S-4		Malmstrom Air Force Base
Sample Depth:	7.5 - 9.5	Atterberg Limits	Great Falls, Montana
Initial Moisture:	23%	**LL = 47**	**FIGURE 16**
Final Moisture:	23%	**PI = 29**	
Dry Unit Weight:	106 pcf		

THOMAS, DEAN & HOSKINS
Engineering Consultants

TD&H Project #: 03-142
Date: 11/22/03

CONSOLIDATION TEST



○ **Field Moisture** ● **Inundated**

Soil Classification:	Lean **CLAY** with sand (CL)
Sample Number:	B-5, S-3
Sample Depth:	7.5 - 9.5
Initial Moisture:	14%
Final Moisture:	16%
Dry Unit Weight:	117 pcf

Atterberg Limits
LL = Not Determined
PI = Not Determined

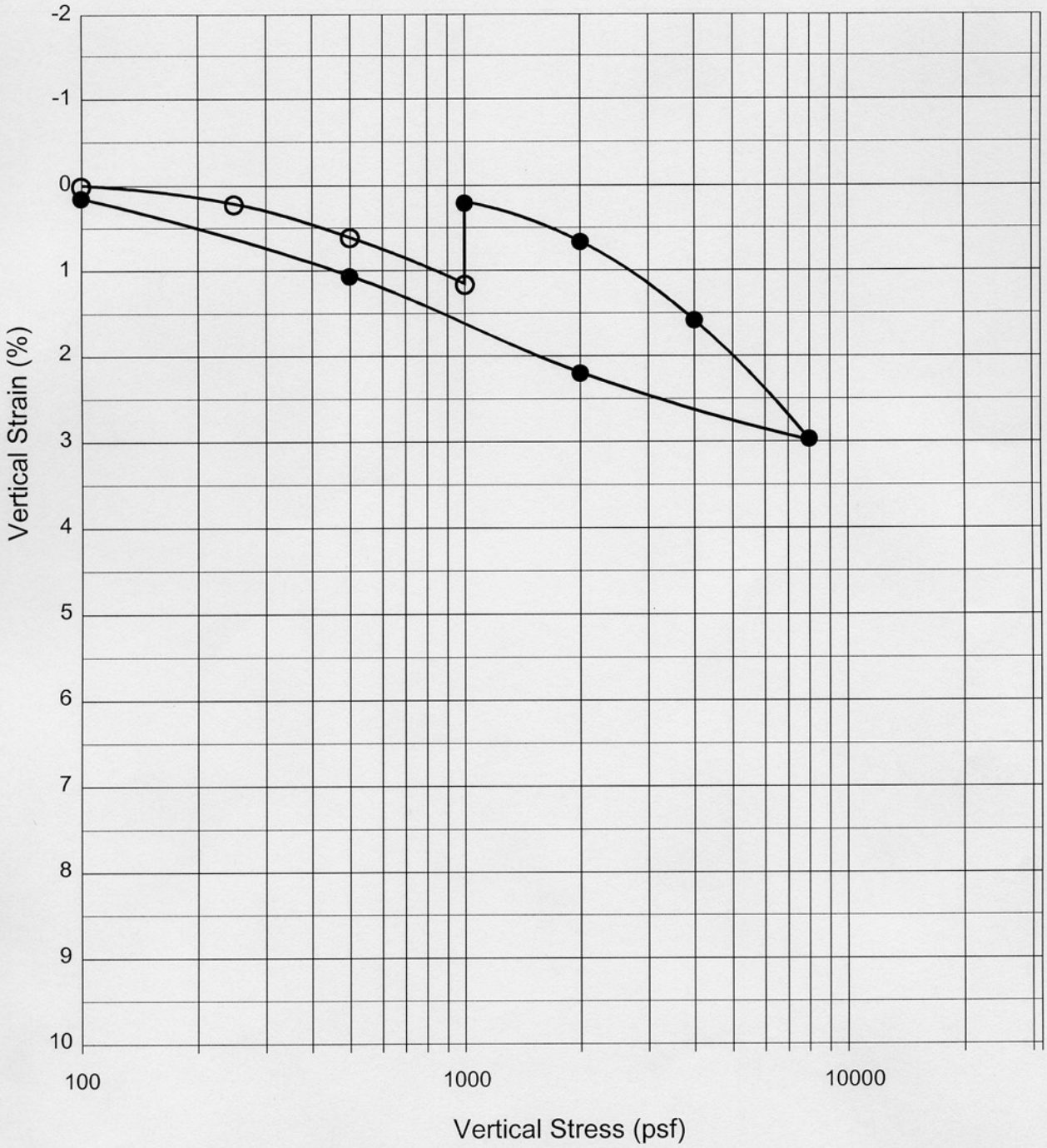
Phase V Housing
Malmstrom Air Force Base
Great Falls, Montana

FIGURE 17

THOMAS, DEAN & HOSKINS
Engineering Consultants

TD&H Project #: 03-142
Date: 11/22/03

CONSOLIDATION TEST



○ **Field Moisture** ● **Inundated**

Soil Classification:	Lean **CLAY** with sand (CL)	
Sample Number:	B-10, S-3	
Sample Depth:	7.5 - 9.5	Atterberg Limits
Initial Moisture:	20%	**LL = 41**
Final Moisture:	21%	**PI = 22**
Dry Unit Weight:	113 pcf	

Phase V Housing
Malmstrom Air Force Base
Great Falls, Montana

FIGURE 18

THOMAS, DEAN & HOSKINS
Engineering Consultants

TD&H Project #: 03-142
Date: 11/18/03

Client: Bazan and Associates
1 Lake Bellevue Drive
Bellevue, WA 98005

Project: Malmstrom Airforce Base, Phase 5 Housing
Contractor: N/A
Material: Native Subgrade - Composite Of Drill Cuttings
Location: B-1, S-5, 2.5' - 7.5' BGS

TEST PROCEDURE

☐ Standard Proctor (AASHTO T-99, ASTM D-698)
☒ Modified Proctor (AASHTO T-180, ASTM D-1557)
☐ Other: _____

Unified Classification (ASTM D-2487)
Lean CLAY with sand (CL)
Liquid Limit: **42**
Plastic Index: **26**
Specific Gravity: 2.75 (assumed)

Sieve Size	% Passing	Specs.
2-1/2-inch	--	--
2-inch	--	--
1-1/2-inch	--	--
1-inch	--	--
3/4-inch	100	--
1/2-inch	--	--
3/8-inch	100	--
No. 4	99	--
No. 10	98	--
No. 20	97	--
No. 40	96	--
No. 60	92	--
No. 100	85	--
No. 200	77	--

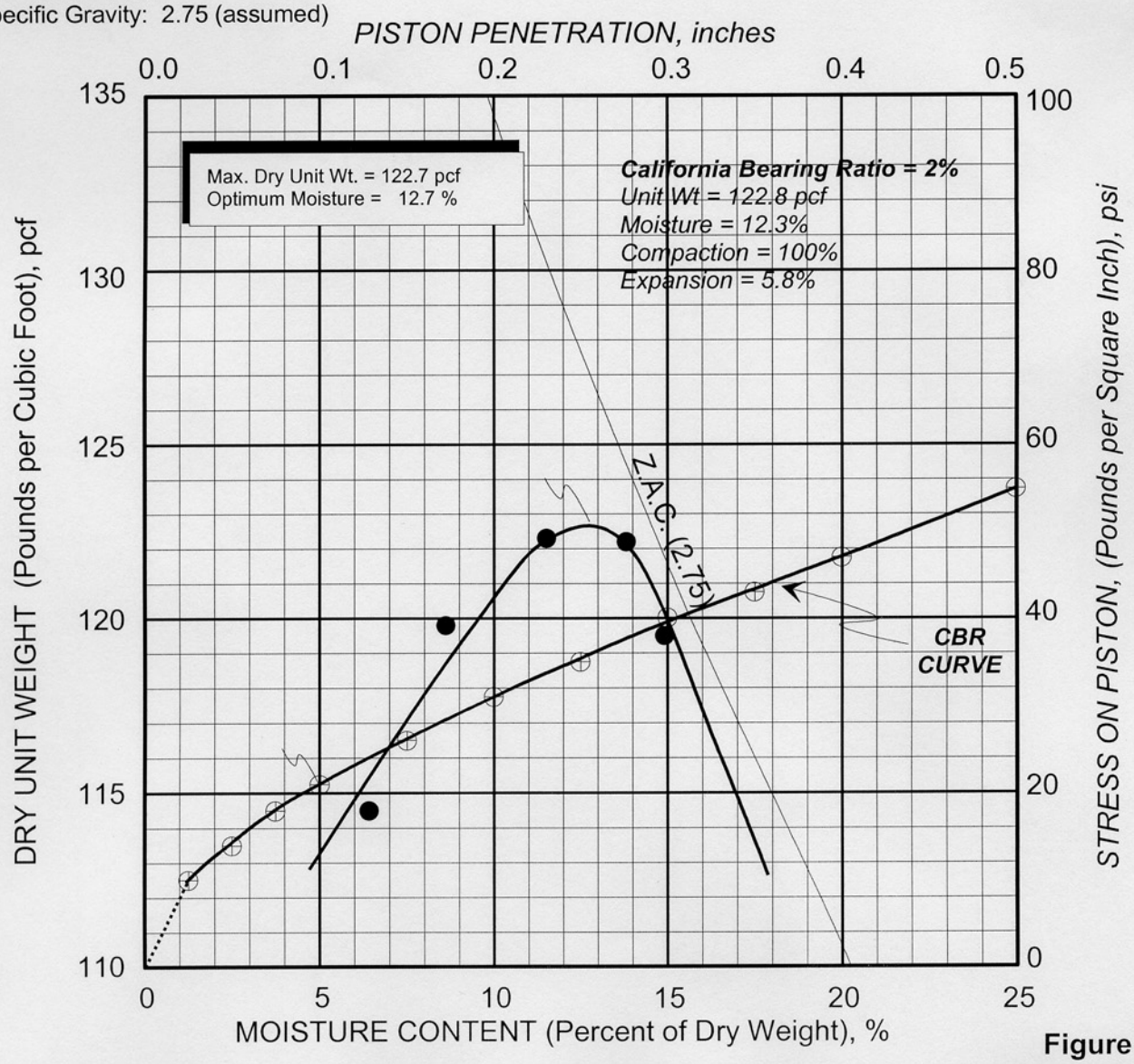


Figure 19

THOMAS, DEAN & HOSKINS
Engineering Consultants
Great Falls, Kalispell, Bozeman, Montana
Spokane, Washington, Lewiston, Idaho

SOIL CLASSIFICATION AND SAMPLING TERMINOLOGY FOR ENGINEERING PURPOSES

STANDARD PENETRATION TEST (ASTM D1586)

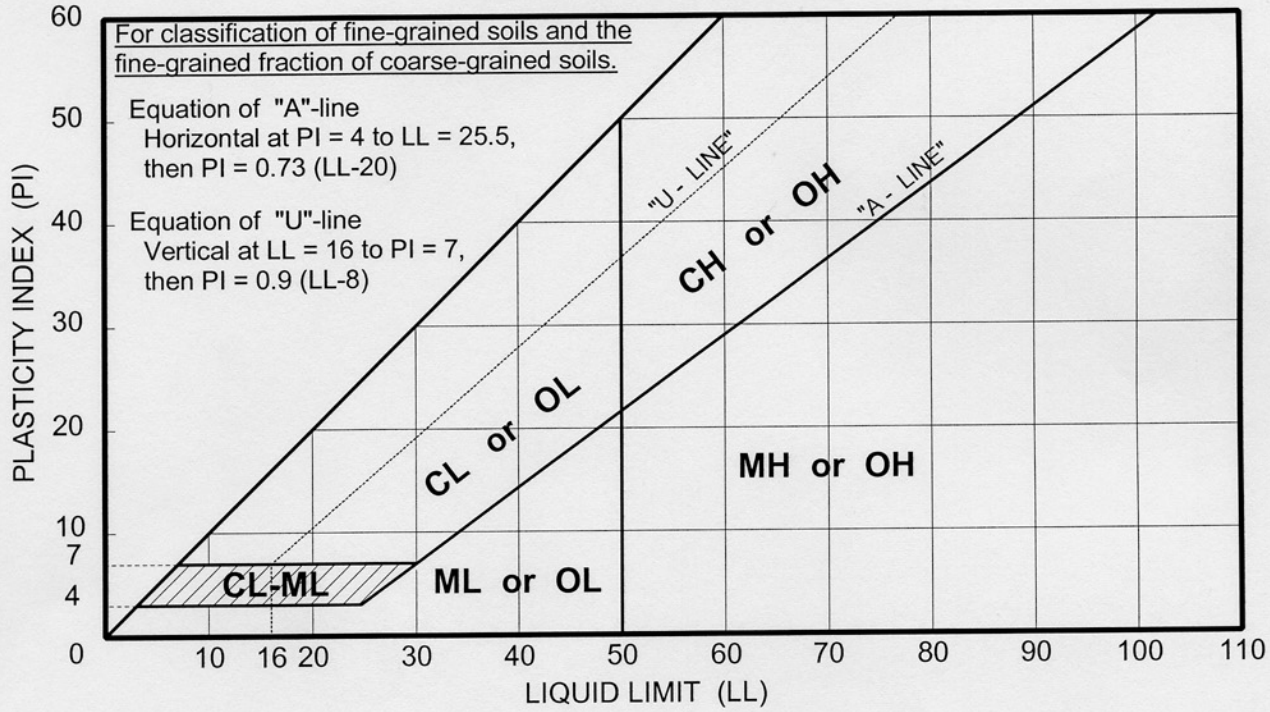
RELATIVE DENSITY*		RELATIVE CONSISTENCY*	
Granular, Noncohesive (Gravels, Sands, & Silts)	Standard Penetration Test (blows/foot)	Fine-Grained, Cohesive (Clays)	Standard Penetration Test (blows/foot)
Very Loose	0-4	Very Soft	0-2
Loose	5-10	Soft	3-4
Medium Dense	11-30	Firm	5-8
Dense	31-50	Stiff	9-15
Very Dense	+50	Very Stiff	15-30
		Hard	+30

*** Based on Sampler-Hammer Ratio of 8.929 E-06 ft/lbf and 4.185 E-05 ft^2/lbf for granular and cohesive soils, respectively (Terzaghi)**

PARTICLE SIZE RANGE

Sieve Openings (Inches)				Standard Sieve Sizes			
12"	3"	3/4"	No.4	No.10	No.40	No.200	<No.200
BOULDERS	COBBLES	GRAVELS		SANDS			SILTS & CLAYS
		Coarse	Fine	Coarse	Medium	Fine	(Distinguished By Atterberg Limits)

PLASTICITY CHART



GW - Well-graded GRAVEL
GP - Poorly-graded GRAVEL
GM - Silty GRAVEL
GC - Clayey GRAVEL

SW - Well-graded SAND
SP - Poorly-graded SAND
SM - Silty SAND
SC - Clayey SAND

CL - Lean CLAY
ML - SILT
OL - Organic SILT/CLAY
CH - Fat CLAY
MH - Elastic SILT
OH - Organic SILT/CLAY

03/01

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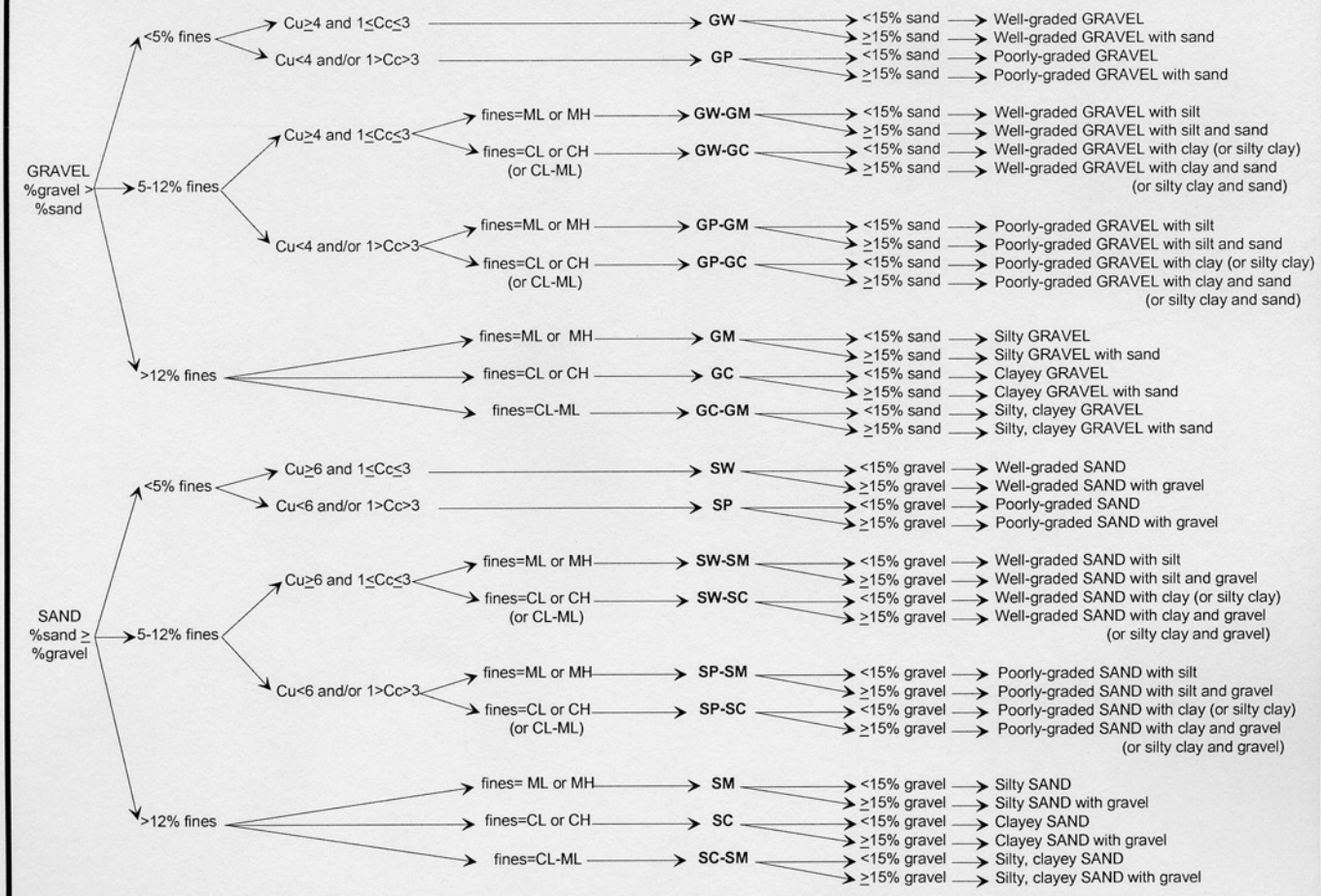
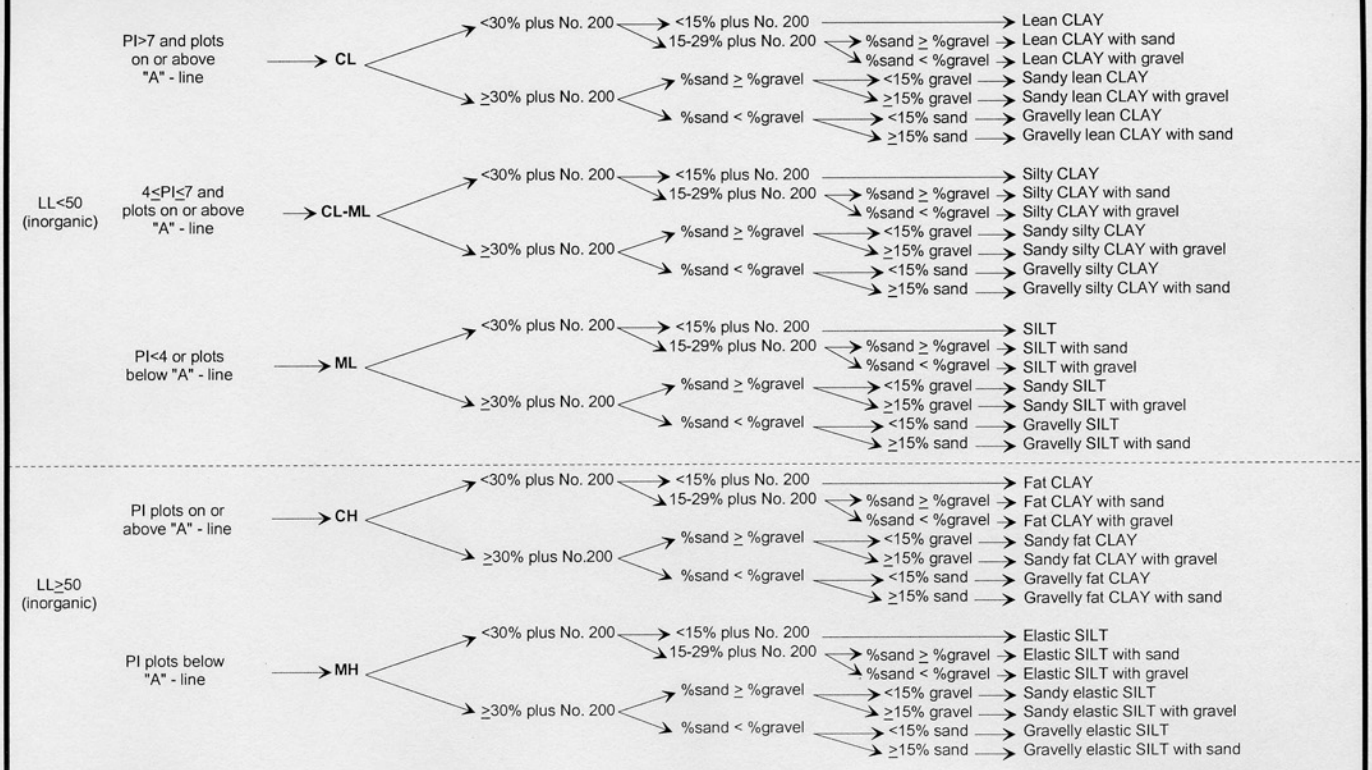
ASTM D2487 CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES



Flow Chart For Classifying Coarse-Grained Soils (More Than 50 % Retained On The No. 200 Sieve)



Flow Chart For Classifying Fine-Grained Soils (50 % Or More Passes The No. 200 Sieve)

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